
BIOLOGICAL ASSESSMENT

(continued)

APPENDIX B

Pacific Connector's Plan of Development

(CONTINUED)

Appendix F
Corrosion Control Plan



**Pacific
Connector**
GAS PIPELINE

Pacific Connector Gas Pipeline, LP

Corrosion Control Plan

Pacific Connector Gas Pipeline Project

January 2018

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1.0 INTRODUCTION

Pacific Connector Gas Pipeline, LP (PCGP) will implement methods to protect the Pacific Connector Gas Pipeline (Pipeline or Pipeline Project) system from external, internal, and atmospheric corrosion in accordance with DOT 49 CFR 192. Corrosion Control is critical to public safety and the safe/reliable operation of the pipeline. This plan will illustrate methods used to identify the corrosion control needs for the Pipeline Project, as well as methods to provide the required protection and mitigation. Per DOT 49 CFR 192.455 (2) the Pipeline must have a cathodic protection system designed, installed and in operation within 1 year from the completion of pipeline construction. Throughout the life of the Pipeline, all corrosion control and maintenance procedures will be performed by, or under the direction of a qualified pipeline corrosion specialist.

2.0 CORROSION CONTROL METHODS

2.1 External Corrosion Control

2.1.1 Protective Coating

All buried piping components of the Pipeline will be installed with an external protective coating. All below ground pipe will be mill coated with Fusion Bonded Epoxy (FBE) coating and all field joints or repairs will be coated with FBE or a two-part epoxy with similar characteristics critical to corrosion protection. These characteristics include:

- Sufficient adhesion to the metal surface to effectively resist underfilm migration of moisture;
- Adequate ductility to resist cracking during bending and construction operations;
- Sufficient strength to resist damage due to handling and stresses imposed by the soil environment;
- Properties compatible with supplemental cathodic protection systems;
- Exhibition of low moisture absorption;
- High electrical resistance; and
- Specifications compatible with the service environment in which the coating shall be used (i.e., directional drilling, aggressive backfill).

All above ground piping, vessels, valves, tanks, etc. will be painted to protect against atmospheric corrosion using approved earth tones.

2.1.2 Cathodic Protection

A Cathodic Protection (CP) system designed to protect the Pipeline, will be installed within 1 year after completion of pipeline construction. CP prevents corrosion from forming on the pipeline by making the pipeline cathodic to the surrounding environment. To achieve this, the pipeline is placed in contact with a more easily corroded anode and may include a DC powered rectifier. The rectifier is connected to an array of anodes buried in the ground, known as a groundbed, and increases the effectiveness of the anode system. The positive output from the rectifier is connected to the anode while the negative terminal is connected to the pipeline. The soil surrounding the pipeline acts as an electrolyte permitting the system to protect the pipeline.

Attachment A depicts a typical Deepwell Groundbed and Attachment B depicts a typical Conventional Distributed Anode Groundbed. Both serve the same purpose and operate in the same manner, but depending on the subsurface/geographical conditions, available workspace,

range of effectiveness and easement configuration, one or the other may prove more advantageous.

If a Deepwell is installed, it will require a truck-mounted well drilling rig. Deepwells typically range from 100' to 300' deep and 10" in diameter. The drill rig will require an area of approximately 60' x 80' to safely perform installation work. The finished "footprint" will be approximately 10 to 15 square feet (sq. ft.). Each of the deepwells will require approximately three to seven days for installation.

If a Conventional Distributed Anode Groundbed is installed, it will require a standard backhoe trench that is approximately 200' to 500' long and approximately 5' deep. The anode beds will likely consist of carbon, graphite or iron anodes buried in the ground and attached to a rectifier. The finished "footprint" will be approximately 15' wide by 200' to 500' in length. Each of the groundbeds will require approximately three to seven days for installation.

Installation of Cathodic Protection sites will comprise of a small qualified crew to handle the installation of the anodes, rectifier, and associated cables. This crew typically ranges in size from 5-7 onsite personnel.

Prior to installing CP systems along the pipeline, qualified personnel will conduct soil resistivity measurements and pipe-to-soil potential measurements to create a resistivity potential profile. Based on this profile and other factors including local geology, ground moisture, climatic conditions, and the condition of the coating, CP systems will be designed and installed to meet site specific conditions. Once installed, the rectifiers may be adjusted to maintain optimum levels of CP. CP systems may require additional easement agreements which will be acquired after the design is completed and sites selected.

The following table will be populated after the Cathodic Protection system has been designed to provide details on the CP Site numbers, locations, and design.

**Table 1
Cathodic Protection Locations**

CP Site Number	Milepost	Engineering Station	Landowner	Site Access (Road Name)	Design (i.e. Conventional, Deepwell, or Test Station)

To every extent possible, groundbeds will be situated near existing roads. Access on roads used during the installation and maintenance of CP sites will be acquired through agreements with the proper agencies and landowners after the CP site locations have been identified.

The rectifiers will require electrical power from public utility power, solar panels, or thermal electric generators (TEG). Areas where power is acquired via public utilities will typically have a rectifier installed on a steel post above ground. The rectifier will be enclosed in a metal case and locked to prevent tampering. Thermal electric generators are typically surrounded by security fencing to prevent any tampering and theft. TEG powered CP systems contain more above ground appurtenances than systems where power is acquired via public utilities.

During the CP system installations, appropriate erosion control Best Management Practices (BMPs) will be installed as necessary, and in accordance with the Erosion Control and Revegetation Plan (ECRP) (Appendix I to the POD). Any potential air, noise, and fugitive dust

emissions that may be generated from the installation of the CP system shall adhere to the BMPs identified in the Air, Noise, and Fugitive Dust Control Plan (Appendix B to the POD). PCGP will hire qualified onsite inspectors to ensure the proper installation of all erosion and sedimentation control measures.

2.1.3 Cathodic Protection Monitoring

The CP system will be tested and if necessary, adjusted at least once each calendar year, but not exceeding 15 months to ensure the CP system is providing acceptable levels of protection as outlined in DOT 49 CFR 192.465. Tests will be completed including Close Interval Survey (CIS) that measures pipe to soil potentials, electromagnetics, and guided wave ultrasonics. CP test stations will be located along the pipeline to allow PCGP to routinely monitor voltage and current levels. A sample test station drawing is shown in Attachment C.

2.1.4 Electrical Isolation

All buried or submerged pipeline will be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit. Electrical isolation is critical to avoid any interference with other structures that would lower the effectiveness of the CP systems. Locations will be identified based on factors such as:

- Areas where the pipeline may be supported above ground by metallic supports;
- Areas where a change of ownership of facilities occurs; and
- Areas where below ground piping comes above grade just prior to entering a building or enclosed area (i.e. meter station, compressor station), and just after exiting the enclosure but prior to returning below grade.

2.2 Atmospheric Corrosion

To protect the pipeline from atmospheric corrosion, all pipe exposed to the atmosphere will be cleaned and coated with materials suitable for the prevention of atmospheric corrosion, and will be inspected as outlined in the DOT 49 CFR 192.

2.3 Internal Corrosion Control

In addition to the pipeline being internally coated, proper steps will be taken to minimize internal corrosion, taking into account the properties of the gas entering the pipeline. Whenever any pipe is removed for any reason, the internal surface will be inspected for evidence of corrosion. If internal corrosion is found, adjacent pipe will be investigated to determine the extent of the internal corrosion and the proper repair or replacement will be made accordingly.

2.4 Inline Inspection

A set of 4 Inline Inspection (ILI) tool launcher and receiver facilities will be installed to allow PCGP the ability to internally inspect the pipeline in its entirety. These facilities will launch and receive ILI tools that clean and inspect the pipe for wall loss due to corrosion (both internal and external) as well as inspect for dents and deformations. As per the DOT 49 CFR 192, an integrity management program will be created by PCGP prior to placing the pipeline into service that will identify the frequency of the inline inspection tool runs. The frequency will be based on factors such as pipeline sections located in High Consequence Areas (HCA), analysis of data collected from field surveys, and general inspection of the pipeline.

The ILI tool launcher and receiver facilities are typically surrounded by security fencing if they are located outside a fenced in compressor station or meter station. They will also have at least one gate to allow access for maintenance and ILI operations.

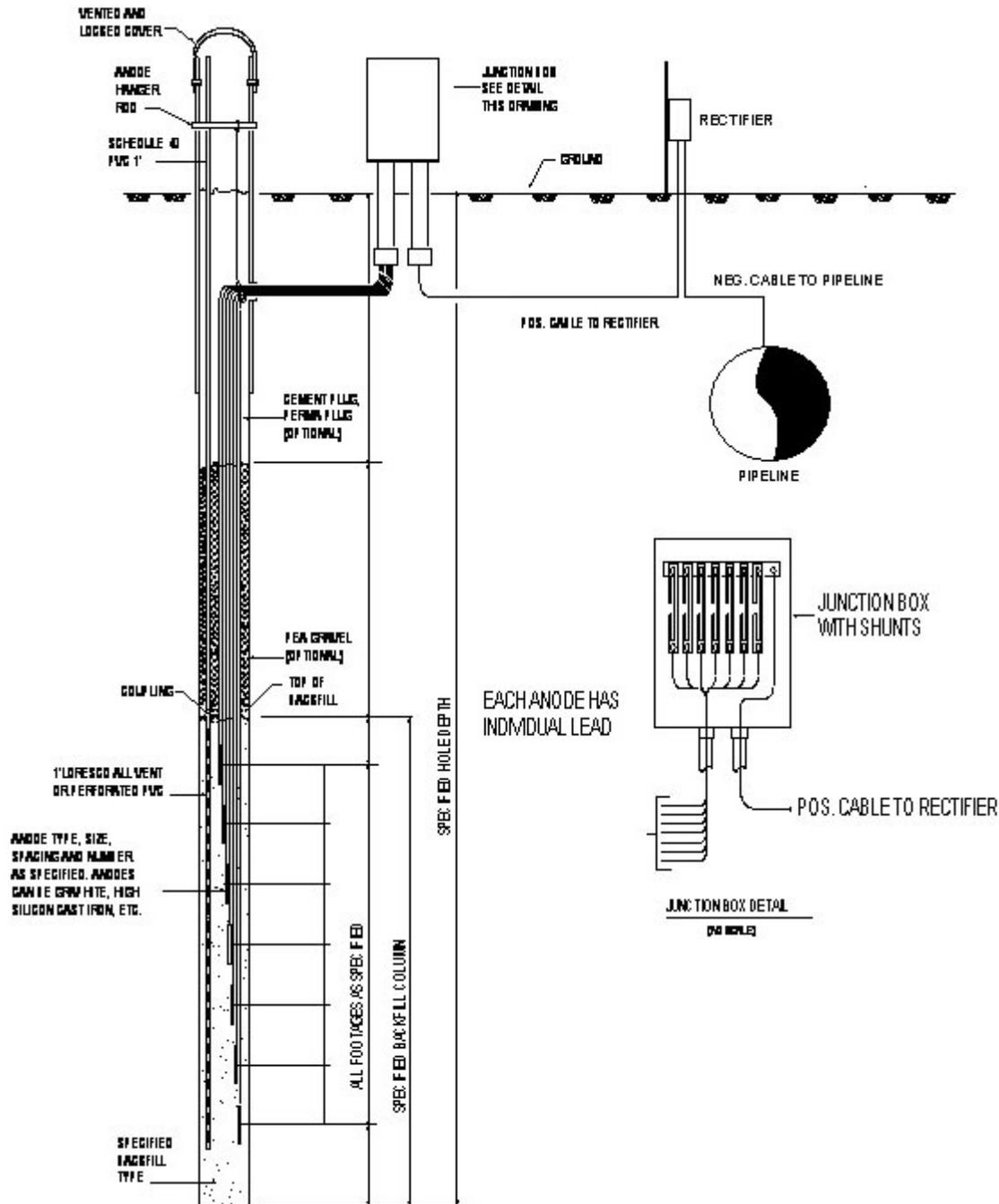
3.0 REPAIR METHODS

If corrosion is identified on any part of the pipeline, the proper repair methods will be utilized depending on severity, location and type. Proper safety precautions will be implemented at the time the corrosion is identified and during the repair or replacement. Permanent and temporary repairs may include methods such as composite wraps, steel wraps, and pipe replacements.

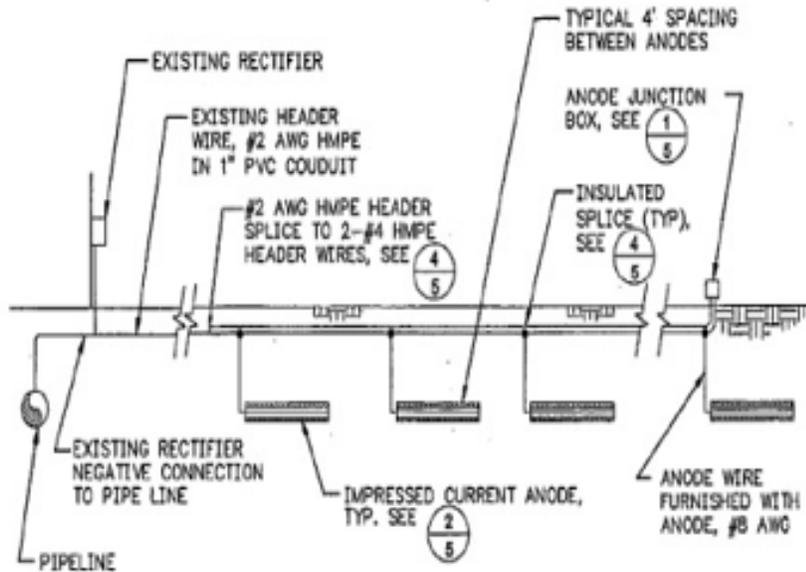
3.1 Repair Response Time

PCGP will follow the requirements of DOT 49 CFR 192.922(c) regarding response times if corrosion is discovered on the pipeline during cathodic protection or Inline Inspection inspections.

ATTACHMENT A Deepwell Anode Groundbed

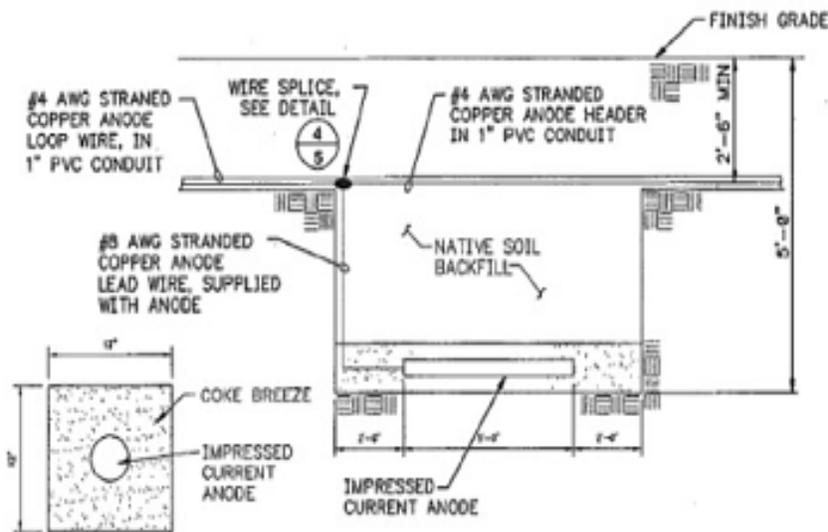


ATTACHMENT B Conventional Distributed Anode Groundbed



CATHODIC PROTECTION RECTIFIER AND GROUND BED (3/5)

NTS



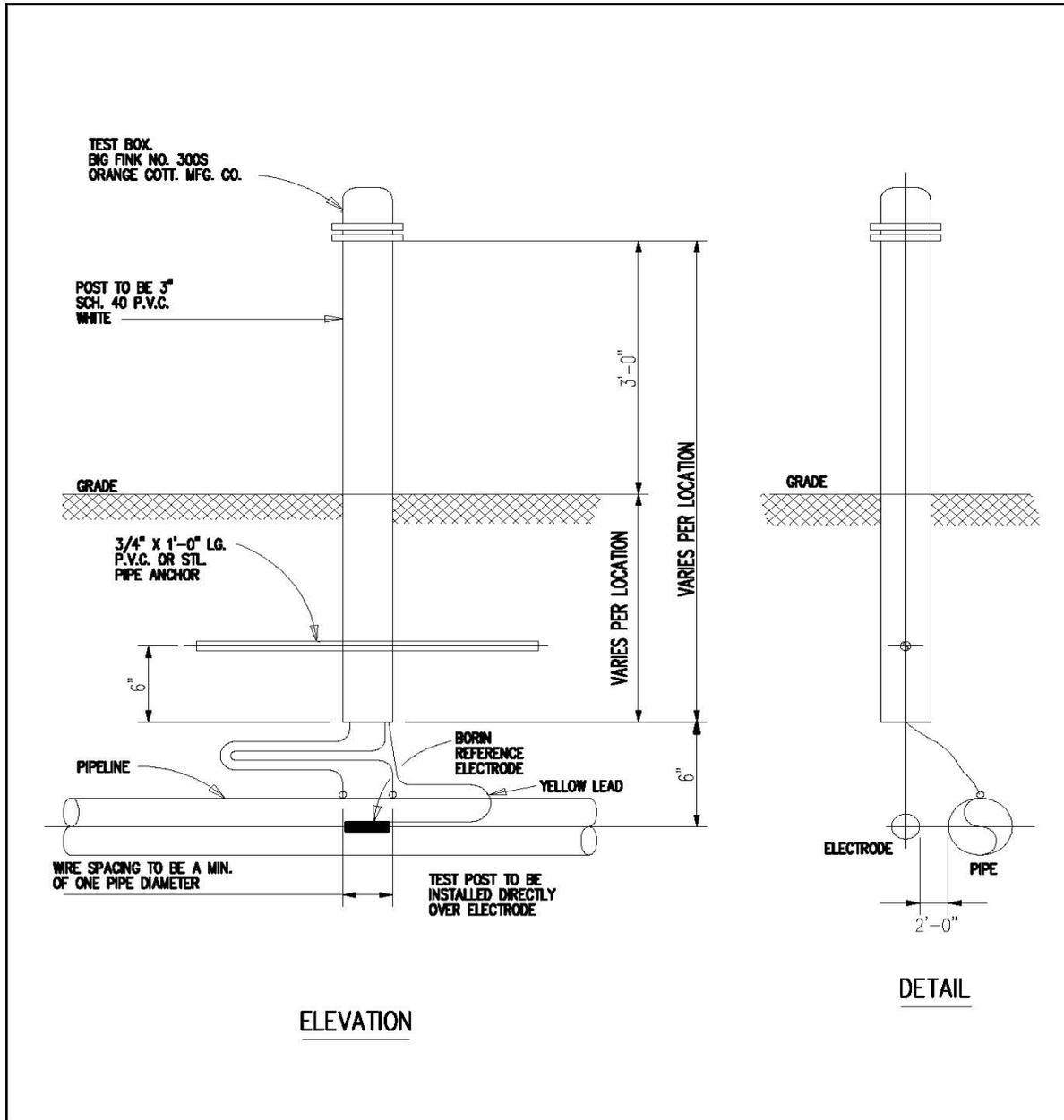
SECTION

IMPRESSED CURRENT ANODE INSTALLATION (2/5)

NTS

ATTACHMENT C

Sample Cathodic Protection Test Station



				SAMPLE CATHODIC PROTECTION TEST SITE INSTALLATION WITH PERMENT ELECTRODE						
2	ISSUED	GOW	2/96		SCALE	NONE	DATE	2/21/94	APPR	JBG
1	ISSUED	TLB	2/94	JBG	DRAWN BY	TLB	CHECKED BY		NO.	STD-A-2-8029
NO.	REVISION	BY	DATE	APP						

Appendix G

Environmental Briefings Plan



**Pacific
Connector**
GAS PIPELINE

Pacific Connector Gas Pipeline, LP

Environmental Briefings Plan

Pacific Connector Gas Pipeline Project

January 2018

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Attachment 1 Federal Land-Managing Agency Notification Contacts

1.0 INTRODUCTION

The purpose of this Plan is to outline the environmental reporting procedures, briefings, or notifications that PCGP will provide to the federal land-managing agencies prior to construction, during construction, post construction, and during operations of the Pacific Connector Gas Pipeline (Pipeline).

This Plan describes the information that will be communicated to the federal land-managing agencies' appointed supervisory and field staff, who will be involved in the Pipeline, to keep them informed of the status, construction schedule, and progress. Due to the linear construction method of the Pipeline, reporting will be provided at regular intervals during construction. Problems or issues that arise during construction (i.e., instances of non-compliance, problem areas), will be included in the reporting as well as the corrective actions taken. For example, an erosion control device (silt fence/strawbales) that is installed improperly on the construction limits with no impact would be reported as a problem area. Conversely, an erosion control device (silt fence/strawbales) that was installed improperly on the construction limits with subsequent impact to an adjacent sensitive resource (sedimentation/turbidity) would be reported as a non-compliance. Attachment 1 provides a list of the agency officials that will receive the various reports or notifications. The tables in Attachment 1 will be updated as needed and at a minimum on an annual basis.

This Plan does not include notification/reporting required by other federal or state regulations or conditions of approvals or other plans within this Plan of Development. Some of these plans are listed below:

- Blasting Plan
- Contaminated Substances Discovery Plan
- Fire Prevention and Suppression Plan
- Fish Salvage Plan
- Integrated Pest Management Plan
- Klamath Project Facilities Crossing Plan
- Prescribed Burning Plan
- Transportation Management Plan
- Right-of-Way Clearing Plan
- Spill Prevention Containment and Countermeasures Plan (SPCC)
- Safety and Security Plan
- Unanticipated Discovery Plan

2.0 PRE-CONSTRUCTION REPORTING

PCGP will follow the construction procedures and mitigation measures set out in the Pipeline's permits and the FERC certificate. If PCGP proposes a modification to these procedures and mitigation measures, PCGP would:

1. request any modification in accordance with the applicable regulations to be submitted to both FERC and the applicable federal land managing agency to the extent federal lands are at issue;
2. justify each modification relative to site-specific conditions;
3. explain how that modification provides an equal or greater level of environmental protection than the original measure; and

4. receive approval in writing from the Director of the OEP before using that modification.

PCGP will file with the FERC and federal land-managing agencies detailed maps or alignment sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the FERC or the BLM. PCGP would request, in writing, approval before construction in or near each of these areas. For each area, the request would include a description of the existing land use/cover type, and documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. Before construction in or near the area would begin, PCGP would receive approval in writing from the Director of OEP. PCGP would file with the federal land-managing agencies all modifications that affect federal lands or facilities.

This requirement does not apply to extra workspace allowed by FERC's Upland Erosion Control, Revegetation and Maintenance Plan (e.g., slope breakers, energy-dissipating devices, dewatering structures), minor field realignments per landowner needs, and requirements which do not affect other landowners or sensitive environmental areas such as wetlands. Examples of alterations that would require approval and submittal include all route realignments and facility location changes resulting from:

1. implementation of cultural resources mitigation measures;
2. implementation of endangered, threatened, or special concern species mitigation measures;
3. recommendations by state regulatory authorities; and
4. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.

Within sixty (60) days of the approval of the Right-of-Way Grant and before construction begins, PCGP will file an initial Environmental Inspection, BMP and Construction Compliance Implementation Plan with the federal land-managing agencies' Authorized Office for review and written approval in accordance with the POD stipulations. PCGP would file revisions to the plan as schedules change. The Implementation Plan will identify the following:

1. how PCGP addressed environmental protection requirements into the construction contracts, specifications and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;
2. the number of environmental inspectors assigned per spread, and how the PCGP will ensure that sufficient personnel are available to implement the environmental mitigation;
3. PCGP personnel, including environmental inspectors and contractors, who will receive copies of the appropriate material;
4. the training and instructions PCGP will give to all personnel involved with construction and restoration (initial and refresher training as the Pipeline progresses and personnel change), with the opportunity for FERC and other federal land-managing staff to participate in the training session;
5. the company personnel (if known) and specific portion of PCGP's organization having responsibility for compliance;
6. the procedures (including use of contract penalties) PCGP will follow if

- noncompliance occurs; and
7. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:
 - a. the completion of all required surveys and reports;
 - b. the mitigation training of onsite personnel;
 - c. the start of construction; and
 - d. the start and completion of restoration.

2.1 Federal Land Use Notification

PCGP will provide the detailed construction schedule(s) at least 90 days in advance of using all federal lands, roads, trails, or waterways that may require temporary closure or restriction orders to protect public health and safety. Closure or restriction requests shall specify the period of time during which the closure or restriction will apply and the personnel who are exempt from the closure or restriction. PCGP will follow the rules of conduct established by the Agency for the protection of federal lands and resources and for the protection, comfort, and well being of the public. Federal road closure notifications guidelines and requirements are discussed in Section 3.0 of the Transportation Management Plan (Appendix Y to the POD).

3.0 CONSTRUCTION REPORTING

3.1 Weekly Construction Status Reports

PCGP will file updated status reports prepared by the Pipeline's Lead Environmental Inspector with the Agency Official on a weekly basis until all construction and restoration activities are completed. The weekly status reports will begin as soon as FERC issues a Notice to Proceed for the Project. These status reports will be provided to BLM, FS and Reclamation. Status reports will include:

1. the current construction status of the Pipeline, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;
2. a listing of all problem areas encountered and each instance of noncompliance observed by the environmental inspectors during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
3. a description of corrective actions implemented in response to all instances of problem areas or noncompliance, and their cost;
4. the effectiveness of all corrective actions implemented;
5. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
6. copies of any correspondence received by PCGP from other federal, state or local permitting agencies concerning instances of problem areas or noncompliance, and PCGP's response.

Table 1 provides an example of a construction progress schedule that will be submitted to the federal land-managing agencies to provide a status of the Pipeline Project's various construction activities. This table, or its equivalent, will be filed for each of the five construction spreads. The name, number, and email address of the point of contact responsible for reporting

the various activities for each construction spread will be included with each table.

**Table 1
Construction Progress
Construction Spread #**

Activity	Start Date	Percent Complete	Notes
Survey			
Clearing			
Grading			
Ditch			
Stringing			
Welding			
Coating			
Clean-up			
Seeding			

3.2 Two-Week Work Projections

The report will include a description of work to be accomplished in the following two weeks. The projection would focus on work that is expected to occur in environmentally sensitive areas and would estimate the progress expected for initial ground-disturbing activities such as clearing and grading activities as well as restoration activities, including clean-up and reseeding efforts. The purposes of these projections are to provide adequate communications and expected timelines to allow federal land-managing agencies sufficient lead time to schedule field staff, if necessary.

3.3 In-Service Notification

PCGP will provide BLM, FS and Reclamation with a copy of FERC's notice allowing service on the Pipeline to commence.

4.0 POST CONSTRUCTION REPORTING

4.1 Quarterly Status Reports

After restoration is completed and the pipeline is in-service, PCGP will initiate monitoring and reporting to the federal land-managing agencies on a quarterly basis once FERC has requested or approved this reporting schedule. PCGP will continue reporting until all disturbed areas have been successfully stabilized and restoration is complete. During the quarterly reporting period, PCGP will provide the following information to the federal land-managing agencies:

1. Summary of restoration status and any right-of-way repair or maintenance requirements that are necessary and the anticipated schedules to complete the repair/maintenance work;
2. Problems that are encountered and any instances of non-compliance; and

3. Copies of correspondence concerning non-compliance from regulatory agencies.

5.0 OPERATION REPORTING

During the operation phase of the Pipeline, PCGP will make every effort to notify the federal agency 90 days prior to performing operational construction activities on federal lands, trails, or waterways that may require ground-disturbing activities or that may require a temporary road shutdown. Where overriding code requirements commit PCGP to respond in a shorter timeframe or handle an emergency condition on the right-of-way, PCGP will notify the federal agency as soon as the problem is identified. Corrective action will then be taken to remedy the situation, keeping the federal agencies informed throughout the process.

Attachment 1

Federal Land-Managing Agency Notification Contacts

Table 1 Forest Service District Coordinator Contact Information		
National Forest	MPs	District Coordinator
Forest Service – Umpqua	99.31 to 99.83 100.39 to 100.68 101.20 to 101.89 102.32 to 102.85 104.10 to 113.20	David Krantz 541-618-2082
Forest Service – Rogue River-Siskiyou	153.81 to 154.93 155.45 to 168.01	Jeff VonKienast 541-560-3406
Forest Service – Fremont-Winema	168.01 to 169.37 170.04 to 171.39 171.59 to 172.71 173.11 to 174.81 174.95 to 175.37	Catherine Callaghan 541-947-6326
¹ See Environmental Alignment Sheets for NFS lands within the mileposts for each National Forest.		

Table 2 BLM District Coordinator Contact Information		
BLM District	MPs¹	District Coordinator
Coos Bay District	0.00 to 45.70	Aimee Hoefs 541-756-0100
Roseburg District	45.70 to 109.10	Dorothy Dickey 541-440-4930
Medford District	109.10 to 166.41	Miriam Liberatore 541-618-2200
Lakeview District	166.4 to 228.81	Terry Austin 541-883-6916
¹ See Environmental Alignment Sheets for BLM-managed lands within the mileposts for each BLM District.		

Table 3 KBAO Coordinator Contact Information		
Bureau of Reclamation	MPs¹	Coordinator
KBAO – Klamath Project	200.53 to 213.87	Lila Black 541-883-6935
¹ See Environmental Alignment Sheets for Bureau of Reclamation-managed lands within the mileposts for the Klamath Project.		

Appendix H

Emergency Response Plan Concept Paper



Pacific Connector Gas Pipeline, LP

Emergency Response Plan Concept Paper

Pacific Connector Gas Pipeline Project

January 2018

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Attachment A	Example Event Notification Plan (forthcoming)
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Attachment C	Example Flowchart of Notifications (forthcoming)
Attachment D	Example Environmental Spill Notification Flowchart (forthcoming)
Attachment E	Example PCGP Key Personnel (forthcoming)

1.0 INTRODUCTION

The purpose of this Emergency Response Plan is to identify the standards and criteria which Pacific Connector Gas Pipeline, LP (PCGP) will follow to minimize the hazards during pipeline operation resulting from a gas pipeline emergency in accordance with the Pipeline and Hazardous Materials Safety Administration's regulations in 49 CFR 192.615 and 192.617.

It is important that all PCGP employees and its contractors, local and community emergency response personnel, and federal land-managing agencies who could be involved in an emergency are notified and prepared to respond to the emergency in an expeditious, and safe and timely manner. It is equally important to ensure that all precautions are taken to minimize actual and potential dangers to the public, environment, property, company personnel, customers and facilities, and to see that emergency response personnel have the tools, materials and instructions to enable them to perform those functions necessary to meet gas pipeline related emergencies. Prior to the Pacific Connector Gas Pipeline (Pipeline) being placed into service, both a company internal Emergency Plan and Preparedness Manual and Public Safety Response Manual will be created. The Public Safety Response Manual will be distributed to all applicable emergency response organizations and training meetings will be held prior to the Pipeline being placed in-service. On-going training and drills will be conducted as necessary to ensure local emergency response personnel are adequately educated and prepared to respond to an emergency situation.

The Emergency Plan and Preparedness Manual will contain the following information, and will act as an internal PCGP manual:

- Emergency Response Priorities
- Emergency Responders and Responsibilities
- Onsite Emergency Equipment and Materials
- Post Emergency Evaluation
- Emergency Response Team
- Root Cause Analysis
- Training
- Site Specific Information
- Index of Forms
- OSHA Emergency Response and Incident Reporting – Fatalities and Serious Injuries Resulting in Hospitalization
- EPA Spill Prevention and Contingency Planning
- Agencies and resources contact information

The Public Safety Response Manual will contain the following information, and will be distributed to the appropriate agencies and local authorities:

- General Information and Facts about the Pipeline including:
 - How to identify a gas leak
 - Public Safety
 - How to respond to emergencies such as: Fires, ruptures, bombs, exposed lines, and leaks
 - Key Contact personnel for PCGP
 - Map depicting the Pipeline route

Once the Emergency Plan and Preparedness Manual and Public Safety Response Manual have been developed for the Pipeline, PCGP personnel will begin meetings with state, local, county and federal emergency response personnel, and federal land-managing agency personnel to review and discuss the procedures and contact protocols in the event of a pipeline emergency. As outlined in Section 7.0 below, training for emergency responders and federal land-managing agency personnel will take place on a regularly scheduled basis to ensure each group has the latest information regarding the pipeline emergency response procedures. For emergency responses related to inadvertent spills or leaks of hazardous substances, chemicals, fuels and lubricating oils, please see the Spill Prevention, Containment and Countermeasures Plan in the Plan of Development (see Appendix X).

2.0 EMERGENCY RESPONSE PRIORITIES

If an emergency occurs during construction, operation, maintenance or decommissioning of the Pipeline, immediate actions taken to safeguard the public, environment, emergency responders and company personnel, take precedent over all other activities. Notifications will be made in accordance with the requirements of the Emergency Response Plan and the applicable regulations. The notification will identify the actions taken to address the emergency and whether any injuries have been sustained. In emergencies involving wildfire, PCGP employees, contractors and subcontractors will undertake every reasonable action to prevent and suppress fires on or in the immediate vicinity of the pipeline (see Fire Prevention and Suppression Plan in Appendix K to the Plan of Development). An Incident Command Post and Team will be created to handle all incident activities, strategies and tactics in accordance with the provisions of the ERP. The primary purpose of an Incident Command System is to bring the emergency situation under a single management structure. Documentation will be completed to identify the initial notification and event classification.

Attachment A depicts an example of an Event Notification Plan.

2.1 Prompt and Effective Response

PCGP shall provide for prompt and effective response to each notice or emergency that is directly related to the Pipeline, including but not limited to:

- Gas detected inside or near a building associated with the Pipeline;
- Fire located near or directly involving the Pipeline;
- Explosion involving the Pipeline;
- Natural disasters that have the potential to affect the Pipeline;
- Pipeline emergency – escaping gas or damage to the Pipeline;
- Compressor station emergency; and/or
- Response to credible threats (bomb, extortion, terrorist) against the Pipeline.

When PCGP's Gas Control receives the first information on the emergency, the appropriate people as identified in Section 2.2 below shall be notified immediately.

2.2 Emergency Responders

The major PCGP participants in resolving an emergency are:

- First Responder
- Incident Commander

- District Manager
- All responders
- Gas Control
- Root Cause Investigation Team
- Pipeline Safety
- Media Relations
- Land Representatives
- Legal Department

These participants have responsibilities unique to their roles in protecting life and property, preventing additional damage, regaining control of pipeline facility(s), determining the cause of the emergency, and communicating emergency information to agencies, the public and media.

3.0 ONSITE EMERGENCY EQUIPMENT MATERIALS

To be prepared to cope with and resolve emergency events, the appropriate emergency and safety equipment necessary for fire protection and first aid as required by OSHA and appropriate regulating agencies will be maintained by PCGP for the Pipeline, which includes but is not limited to, the Jordan Cove Meter Station (M/S) (MP 0.00) and Klamath Compressor and M/S (MP 228.81), central reporting locations accessible to all employees (Location TBD), and company vehicles. The equipment will remain onsite at all times and in a location accessible to all employees and will be maintained in good working condition with adequate amounts available and updated as improved items become available. If equipment is not accessible at any one location, then equipment will be utilized from any of the unaffected locations or company vehicles.

4.0 POST EMERGENCY EVALUATION

Immediately after the completion of the emergency response, repairs, return of the facility to normal service, and debriefing of all parties involved in responding to the emergency, the following will be completed:

- An evaluation of the emergency response procedures and any required changes to make the emergency response plan more effective;
- An evaluation of the adequacy of emergency and safety equipment to determine if any changes are needed for the future;
- Additional training required of responders to eliminate mistakes or weak response activities observed during the emergency response;
- Evaluate actions taken by other response groups – fire, police, paramedics, etc.; and
- Complete proper Emergency Response Evaluation documentation.

5.0 EMERGENCY RESPONSE TEAM

The Emergency Response Team for a specific event will be created, along with a list of names and phone numbers that coincide with the team members. The PCGP Gas Control will be the primary contact for any questions related to the Emergency Response Team.

6.0 ROOT CAUSE ANALYSIS

An investigation into the cause of the emergency event, called a root cause analysis, will occur if the significance of the event warrants an investigation. A root cause analysis will be

conducted after any event resulting in harm to people, damage to property or the environment, or loss to of, or interruption to operations. The root cause analysis will be composed of an overview of the incident, a list identifying the analysis team members, all factual information, a list of all immediate causes to identify all corresponding acts and conditions of the job site, personal factors and job factors which allow the immediate causes to occur, additional observations related to the incident, and all suggested actions to address each of the immediate causes, root causes and additional observations identified.

7.0 ANNUAL REVIEW AND TRAINING

All field personnel will receive emergency response training, including the review of the Emergency Plan and Preparedness Manual and Public Safety Response Manual every year. The goals of emergency response training will be to assess the adequacy of emergency response plans and procedures, determine the readiness of emergency response participants, resolve questions about coordination with response agencies, clarify roles and responsibilities, and promote awareness of potential hazards.

PCGP will establish and maintain liaison with the appropriate fire, police and other public officials to learn the responsibility and resources of each government organization that may respond to a gas pipeline emergency, acquaint the officials with the operator's ability in responding to a gas pipeline emergency, identify the types of gas pipeline emergencies of which the operator notifies the officials, and plan how the operator and officials can engage in mutual assistance to minimize hazards to life or property along the Pipeline right-of-way.

PCGP will certify to the ODOE that the company is in compliance with all the requirements of the Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11001 et. seq., prior to receiving the PCGP Right-of-Way grant.

8.0 SITE SPECIFIC INFORMATION

Site specific information will be provided in the Emergency Plan and Preparedness Manual as listed below:

- Directions to Facilities
 - Includes maps showing directions to facilities
- Alignment Sheets or Route Maps
 - Includes all alignment sheets/maps of PCGP facilities
- Emergency Notification Lists
 - Includes landowners, if applicable, in the area, fire departments, local and state police, hospitals/paramedics, local emergency planning coordinators, ambulance service, telephone companies, utility companies, railroad companies, county/city emergency numbers, PCGP emergency numbers, customer/producer numbers; PCGP personnel pager, mobile, and home telephone numbers
 - Attachment B depicts examples of Emergency Notification Lists that will be filled appropriately
- Compressor Station Fire Protection and First Aid Station Locations
 - Includes site specific drawings or references to existing drawings showing location of fire extinguishers, fire hydrants, and fire system pumps
- District Compressor Station Gas Flow Diagram
 - Includes site specific diagrams
- District Mainline, Lateral, Compressor Station Block Valves and Meter Station

- Includes list of valves with normal operating position
- District Site-Specific Emergency Procedures
 - Includes any PCGP specific procedures such as Offshore river crossings, Gas Storage that may be needed in the Emergency Plan and Preparedness Manual
- Equipment On Hand Directory
 - Includes emergency equipment that is currently on-hand or with a contractor in a nearby geographic location that could be used in an emergency
- Physical Security Standards, Security Conditions and Response Measures
 - Includes general and specific security measures for all facilities and operations. Identifies any “Business Critical Facility” and related security measures.

9.0 INDEX OF FORMS

All emergency response related forms to be filled out by PCGP personnel will be located in this section. These forms are as listed, but not limited to:

- Manned Facilities Site Security Inspection Form
- Initial Notifications and Event Classification Record Form
- First Aware/First Responder Checklist and Action Documentation Form
- Emergency Response Training Record
- Emergency Response Evaluation Record
- Business Unit Personnel Notification List
- Customers/Producers Notification List
- District Personnel Notification List
- Security Incident Form

10.0 OSHA EMERGENCY RESPONSE AND ACCIDENT REPORTING – FATALITIES AND SERIOUS INJURIES RESULTING IN HOSPITALIZATION

The purpose of this procedure will be to provide a system for effectively dealing with events that result in the death or hospitalization of an employee, contractor, customer, or member of the general public, and ensure adherence to all relevant Federal, State, and local regulations including the Occupational Safety and Health Administration (OSHA). This document supplements the PCGP Emergency Plan and Preparedness Manual. Attachment C depicts an example Flowchart of notifications.

11.0 EPA SPILL PREVENTION AND CONTINGENCY PLANNING

The purpose of this procedure is to establish a standardized method of ensuring PCGP adheres to all relevant Federal, State, and local regulations related to the preparedness and prevention of regulated materials being released into the environment. Attachment D depicts an example Environmental Spill Notification Flowchart.

12.0 PUBLIC SAFETY RESPONSE MANUAL

The Public Safety Response Manual will be distributed to the appropriate agencies and local authorities prior to the Pipeline being placed into service. Its goal is to provide the public with general information about PCGP, how to identify and respond to emergencies, a general map depicting the Pipeline route, and contacts for PCGP Key Personnel. Attachment E depicts an example list of contacts for PCGP Key Personnel. When a potential emergency arises and/or is

encountered along the Pipeline, PCGP must be notified immediately. All agencies must contact the 24 Hour Emergency Number as listed in the PCGP Key Personnel document. This will trigger an internal chain of events and communications to ensure the proper response is executed. Assisting agencies will retain statutory responsibilities for the protection of the public and its property.

Attachment A
Example Event Notification Plan
(forthcoming)

Attachment B
Example Emergency Notification Lists
(forthcoming)

Attachment C
Example Flowchart of Notifications
(forthcoming)

Attachment D

Example Environmental Spill Notification Flowchart

(forthcoming)

Attachment E
Example PCGP Key Personnel
(forthcoming)

Appendix I

Erosion Control and Revegetation Plan



Pacific Connector Gas Pipeline, LP

Erosion Control and Revegetation Plan (ECRP)

Pacific Connector Gas Pipeline Project

(During the previous NEPA process, PCGP submitted a Plan of Development to meet BLM Right-of-Way Grant requirements based on BLM regulations. These plans will be updated in consultation with the Federal land managing agencies [BLM, USFS, and Reclamation]) during the current NEPA process.)

October 2017

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Attachment C	Typical BMP Drawings
Attachment D	Equipment Cleaning Inspection Checklist
Attachment E	Winterization Plan
Attachment F	Culvert Crossing BMP

1.0 INTRODUCTION

This Erosion Control and Revegetation Plan (“ECRP”) outlines the erosion control and revegetation procedures that PCGP Gas Pipeline, LP (“PCGP”) will utilize during construction of the Pipeline to minimize erosion, sedimentation and enhance revegetation success on all lands crossed by the Pipeline.

The goal of this ECRP is to identify and specify the Best Management Practices (“BMPs”) that will be utilized to protect soil productivity and water quality by controlling soil erosion, mass wasting, soil displacement and the loss of surface organic matter. This ECRP also describes the measures that will be implemented to minimize impacts from potential soil compaction. The revegetation measures outlined in this ECRP have been prescribed to stabilize disturbed areas and to revegetate the right-of-way to a condition which supports the preconstruction land use (i.e., forest lands, rangelands, croplands, hayfields and pasturelands) as quickly as possible following construction. Measures outlined in this ECRP have also been designed to mitigate impacts to wildlife habitat, wetlands, and riparian areas. In addition to the restoration measures outlined in this ECRP, the Aesthetics Management Plan, included as Appendix A of the Plan of Development (“POD”), provides additional restoration measures that would be implemented to minimize the Pipeline’s visual impacts at various Key Observation Points located on federal lands. The Contaminated Substances Discovery Plan (Appendix E of the POD) also provides site-specific erosion control measures that would be applied between about MPs 109 and 111 on the Umpqua National Forest, where the alignment crosses the historic Thomason cinnabar claim group. These site-specific erosion control measures have been recommended by the Forest Service, despite the low levels of mercury in recent soil samples, to prevent the potential mobilization of naturally-occurring mercury. The 2015 FERC FEIS (Appendix L - Biological Evaluation) also provides specific conservation measures to restore Bellinger’s meadowfoam habitat near MP 154.8 on the Rogue River National Forest.

The erosion control and revegetation procedures outlined in this plan were developed using the Federal Energy Regulatory Commission’s (“FERC’s”) Upland Erosion Control, Revegetation, and Maintenance Plan (“Upland Plan”) and FERC’s Wetland and Waterbody Construction and Mitigation Procedures (“Wetland and Waterbody Procedures”) which are provided in Attachments A and B of this plan. In addition, this ECRP incorporates erosion control and revegetation recommendations provided by the U.S.D.A. Forest Service (“Forest Service”) and Bureau of Land Management (“BLM”) for their respective federally-managed lands. Erosion control and revegetation guidelines provided by the Natural Resource Conservation Service (“NRCS”) have also been incorporated for use on private lands. Appendix 7B to Resource Report 7 included in PCGP’s Certificate application provides the specific erosion control and revegetation recommendations provided by the Forest Service, BLM, and NRCS. This plan has been reviewed extensively by various agencies, including the Forest Service and BLM, during the FERC pre-filing process initiated in 2006, the 2007 FERC Certificate application process, the Plan of Development process, and again during the FERC pre-filing process initiated in 2012, the 2013 FERC Certificate application process, as well as the Oregon Department of Environmental Quality’s (“ODEQ’s”) 401 Water Quality Certification and 1200-C Stormwater permit processes; agency review comments have been incorporated into this plan.

1.1 Project Description

The Pipeline will involve construction of approximately 229 miles of 36-inch diameter pipeline within Coos, Douglas, Jackson, and Klamath counties in southwestern Oregon. The Pipeline

will be capable of transporting approximately 1,200,000 dekatherms per day (Dth/d) of natural gas from interconnections with two existing interstate natural gas pipelines (Ruby Pipeline LLC's Ruby Pipeline and Gas Transmission Northwest LLC's GTN Pipeline) near Malin, Oregon, to the proposed Jordan Cove Liquefied Natural Gas ("LNG") export facility ("LNG Terminal") being developed by Jordan Cove Energy Project, L.P. ("JCEP").

Aboveground facilities associated with the Pipeline include:

- the Klamath Compressor Station with two operating compressor units totaling approximately 61,200 ISO horsepower (with one additional standby unit of 31,100 ISO horsepower) at MP 228.81;
- Three meter station locations (3 interconnects: Jordan Cove Meter Station/MP 0.00; Klamath-Beaver Meter Station [GTN]/MP 228.81; and Klamath-Eagle Meter Station [Ruby]/MP 228.81);
- five new pig launcher/receiver units (co-located with other aboveground facilities);
- 17 mainline block valves spaced along the Proposed Route (Coos, Douglas, Jackson, and Klamath counties, Oregon) according to DOT safety requirements; and
- new communications towers and equipment buildings and usage of existing communications towers and equipment buildings along the Proposed Route (Coos, Douglas, Jackson, and Klamath counties, Oregon).

Because these permanent aboveground fenced facilities will be located within PCGP's permanent operational right-of-way and will be stabilized by gravel, these facilities will not be discussed further in this ECRP.

Detailed topographic maps (USGS 7.5-minute topographic quadrangles) of the alignment and photo-based Environmental Alignment Sheets are included in the Mapping Supplement, Appendix G.1 and Appendix H.1 to Resource Report 1, respectively. The Environmental Alignment Sheets show the proposed alignment, construction right-of-way, temporary extra work areas ("TEWAs"), and uncleared storage areas ("UCSAs") that are required for construction. The alignment sheets (1":200') provide 2016 aerial photography of the alignment and show contours, ownership, legal locations, jurisdiction, locations of wetland and waterbodies as well as other pertinent environmental information.

2.0 EXISTING SITE CONDITIONS

The topography in the Pipeline project area varies from flat to gently sloping and rolling to rugged and steep. On the west end, the topography is generally flat to gently sloping within the floodplains and terraces of narrow river and slough valleys. The topography along the eastern portion where the proposed pipeline alignment traverses the eastern footslopes of the Cascades and the Klamath Basin is also characterized as flat to gently sloping. However, the topography becomes more rugged and steep through the Southern Coast Range and Cascade foothills where there are numerous steeply dissected drainages that must be negotiated as the alignment proceeds in a southeasterly direction toward the terminus near Malin, Oregon. The topography traversed by the proposed Pipeline is shown on the topographic maps and the Environmental Alignment Sheets. Section 11.0 of this ECRP describes the routing and planning efforts that were implemented, as well as construction methods and restoration and erosion control measures that will be utilized to ensure the safety, stability, and long-term integrity of the Pipeline in areas where the alignment crosses steep and rugged terrain. These measures will

also minimize the potential for the Pipeline to increase mass wasting, erosion and subsequent direct or indirect resource impacts.

The climate across the Pipeline project area varies and influences the properties of the soils that are traversed by the alignment. For example, precipitation varies between a high of more than 100 inches/year in the Coast Range to a low of between 10 to 18 inches/year in the Klamath Basin east of the Cascades. Temperatures and the length of the growing season, which affect soil formation, also vary considerably in the Pipeline project area between the coast, the Cascades and the interior Klamath Basin. Many soils form because of the microclimates which result from the differences in elevation, air drainage, and topography, including slope gradient and aspect. In addition to climate, changes in other factors such as parent material, relief, and time further increase the number of different soils in the Pipeline project area. Soil formation or development in the Pipeline project area relates mainly to the length of time the other four soil-forming factors have interacted. As soils increase in age, significant changes occur in their chemical and physical characteristics through soil weathering. Because of these varying climatic and soil differences the erosion control and revegetation measures identified and specified in this ECRP have been developed and prescribed to ensure their effectiveness across a wide variety of conditions. Further, the erosion control and revegetation measures that have been identified and specified in this ECRP have been developed to minimize the extent and duration of Pipeline-related disturbances, as have FERC's Upland Plan and Wetland and Waterbody Procedures (see Attachments A and B) which have been specifically developed for linear pipeline projects.

The Pipeline will affect 346 waterbodies. Of the 346 waterbodies affected, 66 are perennial, 168 are intermittent, 98 are ditches, 10 are lakes or stock ponds, and 4 are estuarine (Coos Bay/2 crossings and one HDD pullback and the Coos River). Many of the intermittent streams and ditches are expected to be dry during the proposed summer construction schedule. Including waterbodies, the Pipeline will cross 6.4 miles of wetlands in 428 wetland/waterbody systems. Because of the potential for the Pipeline to directly and indirectly impact water quality, wetlands, and riparian areas, erosion control and revegetation measures outlined in this ECRP have been developed to minimize potential impacts to these resources from mass wasting, soil erosion, sedimentation, soil displacement, and compaction. The revegetation measures specified in this plan have been developed to mitigate impacts to these sensitive areas while ensuring pipeline safety standards and operational requirements.

3.0 PROPOSED CONSTRUCTION ACTIVITIES

The Pipeline will be designed, constructed, tested, operated, and maintained to conform with U.S. Department of Transportation ("DOT") requirements, 49 CFR Part 192; FERC's regulations, 18 CFR § 380.15; PHMSA's regulations; and other applicable federal and state regulations. In addition to the DOT requirements, PCGP will construct and restore areas disturbed by the Pipeline and aboveground facilities in accordance with FERC's Wetland and Waterbody Procedures and Upland Plan (see Attachments A and B).

3.1 Pipeline Routing and Design

To minimize overall impacts, PCGP employed extensive routing and design efforts to ensure that the proposed route was feasible for the construction, safety, and reliability of maintaining and operating a large-diameter high pressure natural gas pipeline. The route was selected to ensure stability by avoiding landslides and areas of potential mass wasting (see Resource Report 6/Geologic Hazards and Mineral Resources Report) and to minimize impacts to sensitive

resources. The alignment follows ridgelines and slope contours where possible to ensure stability. This ridgeline alignment minimizes waterbody crossings by following watershed boundaries and reduces grading and necessary cut and fill requirements during construction. Side slopes were avoided where feasible to minimize grading, overall clearing and disturbance, and to ensure pipeline stability. Minimizing the overall length of the alignment was also an objective during the routing process. Additional length inherently increases the overall acreage of disturbance (i.e., vegetation clearing, grading, trenching); affects more landowners during construction; requires more permanent easements; typically increases potential impacts to sensitive resources; and generally increases overall costs. Once the route was selected, PCGP designed the proposed construction footprint to minimize the area of disturbance while providing adequate space to construct safely and efficiently.

3.2 Construction Schedule

PCGP anticipates starting construction in fourth quarter 2019 when civil surveys and access road improvements will be initiated. PCGP plans to conduct clearing in some forested areas starting in 2020 prior to mainline construction in 2021. Horizontal directional drills of five waterbodies (Coos Bay Estuary/2 crossings; Coos River; Rogue River; and Klamath River) and Direct Pipe® installation technology for a sixth waterbody (South Umpqua River) are scheduled for 2021. Figure 1.3-2 in Resource Report 1 provides a general schedule for the Pipeline.

Mainline and facility construction is planned to begin spring 2021 with the in-service date scheduled for fourth quarter 2022. Restoration of construction disturbance in each given area is expected to begin once construction is completed in that area; restoration will be completed by the end of the winter season when forest, wetland, and riparian plantings will be installed. Depending on site-specific conditions, it may be necessary to continue restoration through the spring. Timber clearing in areas of northern spotted owl (“NSO”) and marbled murrelet (“MAMU”) will be conducted outside the critical breeding seasons¹. Construction activities are scheduled to take advantage of the drier periods of the year to minimize winter construction and to reduce potential environmental impacts and construction safety risks. Attachment E to the ECRP provides the winterization measures that PCGP will implement in areas where final restoration has not been completed and which will occur in the spring to ensure disturbed areas are stabilized and erosion and potential sedimentation are minimized.

PCGP plans to conduct forest clearing starting fourth quarter 2020 prior to mainline construction, to minimize overall work space and TEWA requirements. TEWA requirements have been minimized by proposing a two-year construction window because the same work areas used to stage right-of-way logging timber clearing activities and provide log storage and decking space would then be utilized for pipeline construction activities. Logging concurrently with pipeline construction would require additional space to work safely and efficiently, and potential clearing delays could force construction activities into the winter rainy season, increasing the potential for erosion and safety hazards. Therefore, scheduling clearing and mainline pipeline construction activities over a two-year period will minimize winter construction requirements resulting from seasonal and biological construction windows. The detailed schedule for clearing activities will include areas of known seasonal restrictions along the route. Temporary erosion control and stabilization measures will be installed where necessary in areas of disturbance. These measures will be maintained throughout construction until the Pipeline is in-service and disturbed areas are stable. Dividing construction into two years is a BMP that will

¹ Timber clearing in areas of active NSO sites would occur between 10/1 and 2/28 and in areas of known MAMU between 9/16 and 3/31.

minimize the area required for construction and winter/rainy season (i.e., November 1 to April 30) construction, which will significantly reduce impacts.

3.3 Pipeline Construction Sequence

To efficiently construct the 229-mile long Pipeline, PCGP proposes to use five construction spreads. Within each spread, the construction sequence will typically proceed systematically as follows:

- preconstruction survey, marking and staking;
- access road improvement;
- forest/timber clearing;
- grading;
- installation of erosion control BMPs;
- topsoiling (where required);
- trenching;
- pipe stringing;
- welding and coating pipe;
- lowering pipe and backfilling;
- strength (hydrostatic) testing; and
- restoration.

The construction activities for each spread will generally occur in sequence or in assembly-line fashion along the right-of-way with one crew following the next from clearing until final cleanup. Each spread is planned to encompass all construction activities within a specific milepost range (see Table 3.3-1). Dividing the Pipeline into five construction spreads is a BMP that will minimize winter/rainy season (i.e., November 1 to April 30) construction activities and will significantly reduce potential impacts.

**Table 3.3-1
Spread Locations**

Spread	Milepost Range
1	0.00-51.60
2	51.60-94.67
3	94.67-132.47
4	132.47-169.50
5	169.50-228.81

3.3.1 Preconstruction Survey

Prior to construction, the construction right-of-way limits including the boundaries of TEWAs shown on the Environmental Alignment Sheets will be clearly marked/staked. Details of the preconstruction survey and right-of-way marking are described in the Right-of-Way Marking Plan provided in Appendix T of the POD. Prior to the start of construction, Environmental Inspectors ("EIs") will verify the limits of the staked construction areas. On federal lands the authorized federal agency representative may also verify the limits of the staked construction areas. The Right-of-Way Marking Plan describes the procedures that would be implemented on federal lands to identify and stake the construction limits. Consistent with Section IV.A.1 of FERC's Upland Plan, PCGP will confine disturbance to those areas shown on the Environmental Alignment Sheets or approved through a Notice to Proceed from FERC. No disturbance will be allowed to occur outside of these areas without appropriate surveys (cultural,

threatened and endangered species, residential, etc.), other federal, state, or local permits and prior written approval from FERC.

Access roads, overhead utilities, and buried utilities will be located, marked and signed to prevent accidental damage during pipeline construction. Sensitive areas to be protected from disturbance will be marked with t-posts and brightly colored rope, flagging, or construction fence so as to be visible to equipment operators. These areas will also be located on the Environmental Alignment Sheets issued for construction and presented during preconstruction environmental training. Equipment will only be allowed to enter and operate within the delineated limits of disturbance, access roads, etc. Flagging, signs and other markings identifying the limits of disturbance will be maintained through all phases of construction and routinely checked by the EIs. Construction will primarily use a 95-foot wide construction right-of-way corridor and associated TEWAs. However, in specified areas such as wetlands, sensitive visual areas and in residential areas the construction right-of-way will be reduced to 75 feet wide to minimize disturbance. In most cases, except where topographical constraints occur, TEWAs have also been located at least 50 feet away from wetland boundaries to minimize impacts to wetland buffers and riparian areas. PCGP has proposed a 95-foot wide construction right-of-way to minimize overall disturbance where other similar diameter pipeline projects (i.e., 30-inch or greater) typically utilize a 100-foot or wider temporary construction right-of-way configuration. As an example, the 712-mile Rockies Express Pipeline (West) Project (FERC Docket CP05-31-000) used a 125-foot wide construction right-of-way to construct the 42-inch diameter pipeline across the Rocky Mountain and Plains states, and the recently completed 675-mile, 42-inch Ruby Pipeline, which extended from southwest Wyoming to Malin, Oregon and utilized a 115-foot wide construction right-of-way (FERC Docket No. CP09-54-000).

3.3.2 Forest/Timber Clearing

During forest clearing, all operations and tree falling will occur within the certificated construction work area limits. Trees within the certificated construction work area limits will be felled or sheared so as to prevent damage to adjacent trees, facilities, or structures and will also be felled away from wetlands, waterbodies, and riparian reserves. As required by OSHA regulations, PCGP will cut hazard/danger trees² on the edges of the certificated construction work limits that have been designated by PCGP's qualified representative (arborist). Any debris entering a waterbody as a result of felling and yarding of timber will be removed as soon as practical after entry into the waterbody and will be placed outside the 100-year floodplain where practical. Logs and slash will not be yarded across perennial streams unless fully suspended. During logging/clearing operations, the direction of log or slash movement will be conducted to minimize sediment delivery to waterbodies, including intermittent streams. Logs firmly embedded in the bed or bank of waterbodies that are in place prior to felling and yarding of timber will not be disturbed, unless they prevent trenching and fluming operations. Any existing logs that are removed from waterbodies to construct the pipeline crossing will be returned to the waterbody after the pipeline has been installed, backfilling is complete, and during the time the streambanks are being restored. Landings for clearing operations will not be located in wetlands or riparian reserves on federal lands, and, where feasible, logs yarded out of wetlands or riparian zones will be skidded with at least one end suspended from the ground so as to minimize soil disturbance. All timber cleared from the right-of-way will be cut and cleared in accordance with landowner and land management agency requirements, where practical. If, based on site-specific conditions, the landowner or land management agency-approved timber

² [OAR 437, Division 7 Forest Activities - Oregon OSHA](#): Danger tree – A standing tree, alive or dead, that presents a hazard to personnel due to deterioration or physical damage to the root system, trunk (stem), or limbs, and the degree and direction of lean.

harvesting method is not feasible, an alternate timber harvesting method will be utilized with approval from the landowner or land managing agency.

Merchantable timber will be cut and removed from the construction right-of-way and TEWAs to ensure that these areas are cleared prior to construction. TEWAs have been identified for log storage and decking along the alignment that are located in existing cleared areas adjacent to existing roads where feasible where log storage could occur for extended periods, if necessary. The construction right-of-way has been designed to minimize additional TEWAs which will reduce overall disturbance. The construction footprint is not large enough in many areas to accommodate both the logs cleared from the right-of-way and accomplish efficient construction activities simultaneously. Therefore, cut timber must be removed from the right-of-way to avoid delays due to right-of-way congestion. Avoiding construction and restoration delays and construction activities in the late fall and winter rainy season are important BMPs that PCGP plans to implement to avoid potential and unnecessary impacts.

PCGP expects that the use of all logging methods may be necessary during construction to efficiently remove timber from the right-of-way depending on the specific location. Ground-based skidding and cable (where feasible) logging methods will likely be the standard method; however in some isolated rugged topographic areas with poor access, helicopter logging may be utilized. At the request of the federal land-managing agencies, PCGP has developed a “desk top” analysis that details how right-of-way clearing is to be completed (see the Right-of-Way Clearing Plan - Appendix U of the POD). The purpose of the Right-of-Way Clearing Plan is to outline methods that PCGP will implement to remove the timber along the construction right-of-way and TEWAs. PCGP has identified and documented the existing timber conditions on all federal lands crossed by the Pipeline and documented the acreage of each type of forest product by land owner parcel. As part of this Plan, PCGP has also developed timber clearing scenarios and methods to remove the timber from the construction right-of-way and TEWAs. The specific logging methods will not be determined until a contractor has been selected through the bidding process for each spread. Cable and helicopter logging methods will minimize the potential for soil compaction. Where log skidding is accomplished by machine methods, the following practices will be employed where feasible to minimize detrimental soil disturbance (compaction and displacement):

- Low-ground weight (pressure) vehicles will be used as much as possible.
- Logging machinery would be restricted to the 50-foot permanent right-of-way where practical, to prevent soil compaction, subject to topographic, safety and other construction considerations.
- The removal of soil duff and surface slash layers will be minimized so that a cushion exists between equipment or logs and the mineral soil.
- Designated skid trails will be used to restrict detrimental soil disturbance (compaction and displacement) to a smaller area of the construction right-of-way (preferably over the pipeline trenching area).
- Compacted landing, yarding, and load-out areas used for timber harvesting during Year One construction will be scarified after use and prior to the rainy season where the potential for sediment delivery to waterbodies is possible. Scarification will promote infiltration, minimize run-off and the potential for sedimentation.

Any timber cleared from the right-of-way that will be used for instream or upland wildlife habitat diversity structures will be stored on the edge of the right-of-way or in TEWAs for later use during restoration efforts. Information regarding placement, size, and species of trees that will be proposed for instream large woody debris (“LWD”) will be included in the Applicant-Prepared

Draft Biological Assessment (“APDBA”). Where LWD (with root wads) is acquired for instream habitat use, this material will only be obtained from the certificated construction limits and will be collected outside riparian zones to maintain root structure within the riparian zone. The exception is where the LWD can be obtained from the trenchline or right-of-way cut areas where root systems would be removed during trench excavation or grading operations. As outlined in the Leave Tree Protection Plan (see Appendix P of the POD), prior to clearing operations, the EI or PCGP’s authorized representative will flag existing snags on the edges of the construction right-of-way or TEWAs where feasible and they are not designated as a hazard to save from clearing. These snags will be saved as mitigation to benefit primary and secondary cavity nesting birds, mammals, reptiles and amphibians. During this process other large diameter trees on the edges of the construction right-of-way and TEWAs would also be flagged to save/protect as green recruitment or habitat/shade trees, where feasible and if they do not create a hazard. Some of these trees would be girdled to create snags to augment the number of snags along the right-of-way to benefit cavity nesting birds, mammals, reptiles and amphibians. Also, as noted in the Aesthetics Management Plan (see Appendix A of the POD), some trees on the edge of the construction right-of-way and TEWAs at Key Observation Points on federal lands will be salvaged, where feasible, to aid in shaping the linear edges to blend in with the existing landscape and reduce contrast. The feasibility to salvage snags and trees on the edges of the construction right-of-way and TEWAs will be based on the ability to not hinder construction activities or the potential safety of construction personnel. This decision will ultimately be made by PCGP’s Chief Inspector if there is disagreement between inspectors.

Treatment of Forest Slash. Residual slash from timber clearing will be placed at the edge of the right-of-way and scattered/redistributed across the right-of-way during final cleanup and reclamation according to BLM and Forest Service fuel loading specifications to minimize fire hazard risks (see Section 10.2). However, much of the slash generated during timber clearing operations in 2020 construction will remain on the ground and in place to provide cover to minimize erosion over the winter of between 2020 and mainline construction in 2021. PCGP has designated UCSAs that will not be cleared of trees along the route. The UCSAs will be used to store forest slash, stumps, and dead and downed log materials generated during clearing and construction operations that will be scattered across the right-of-way after construction. These UCSAs were designed to reduce the overall Pipeline clearing and disturbance footprint which will minimize impacts to forested areas, including late successional reserves (“LSRs”). Slash will not be permanently stored in UCSAs in riparian reserves on federal lands. However, large or coarse woody debris materials that would be redistributed across the right-of-way within riparian reserves during restoration would be temporarily stored in the UCSAs to minimize the movement of this material out of and then back into the riparian reserves, which would minimize the loss of this material. Temporary storage of this material within the UCSA will also minimize overall equipment disturbance to riparian reserves by minimizing heavy equipment use and tracking. PCGP EIs would coordinate with the federal agency representative regarding temporary slash storage within riparian reserves. Section 4.0 of the Leave Tree Protection Plan (see Appendix P of the POD) provides a detailed description of the UCSAs. Minimizing overall disturbance will also reduce the potential for erosion especially on steep slopes. These UCSAs are shown on the Environmental Alignment Sheets.

Off-site disposal of slash materials is also expected, and, if feasible, burning would be the preferred disposal procedure. Where material disposal is necessary, disposal would occur in accordance with federal, state, and local regulations. In areas where slash has been concentrated, such as on landings, and cannot be evenly scattered across the right-of-way according to the fuel loading standards, the slash may be mechanically or hand piled and burned according to state burning requirements and landowner, BLM, and Forest Service

stipulations. PCGP has developed a Prescribed Burning Plan (see Appendix R of the POD) that describes the proposed burning of forest slash as a disposal method. Wood chips may also be generated during clearing operations which will be scattered across the right-of-way with the cull logs and slash. Scattering the material will enhance soil stability and revegetation success as described in Section 10.2. Further, the Forest Service has noted that wood chips can be the most effective means to protect soils from surface and fluvial erosional processes.

After timber clearing operations, the EI will determine appropriate temporary BMPs that will be installed to minimize potential erosion and sedimentation impacts. These measures may include:

- Scarification or subsoiling with a self-drafting winged subsoiler to relieve soil compaction, where practical, to promote infiltration and reduce runoff;
- Use of slash/brush piles (i.e., slash filter windrows) at appropriate locations to prevent off-site runoff and sedimentation;
- Installation of temporary slope breakers at appropriate locations and at spacings to shorten slope lengths, prevent concentrated flow and to divert runoff to stabilized areas;
- Installation of silt fences or certified weed free straw bale sediment barriers;
- Temporary seeding (using appropriate quick-germinating cover crops such as annual ryegrass or other appropriate quick-growing temporary cover species; this measure would not occur on federal lands where introduced species are restricted); and/or
- Selective mulching of areas without effective surface cover.

On federal lands, the EI would coordinate with the authorized federal agency representative to determine the appropriate temporary BMPs that would be installed.

3.3.3 Clearing and Grading

Clearing of non-forested lands and grading activities will generally occur in 2021 construction. The flagged limits of disturbance will be maintained throughout all construction phases and will be monitored by PCGP's EIs so activities are restricted to certificated limits. Grading of the construction right-of-way in upland areas will be limited to the minimum required to provide a safe working area necessary to construct the pipeline. Vegetation in wetlands will be cut off at ground level, leaving existing root systems in place. Pulling of tree stumps and grading activities will be limited to directly over the trenchline in wetlands. PCGP will not grade or remove stumps or root systems from the rest of the right-of-way in wetlands unless it is determined that safety-related construction constraints require removal of tree stumps from under the working side of the right-of-way. Minimizing stump and root system removal in wetlands will accelerate restoration efforts by allowing sprouting species to reestablish from existing root systems. In upland forests, PCGP will also limit stump removal to the trenchline and working areas where grading is necessary to construct a safe level working plane. Minimizing stump removal in upland areas, where feasible, will minimize soil disturbance and erosion potential and increase soil strength by maintaining soil root structure. Where standing stumps occur on the right-of-way, PCGP will use grinders where practical to construct a safe level working plane to minimize grading and soil disturbance.

3.3.4 Installation of Erosion Control BMPs

Temporary erosion control measures will be installed after vegetation clearing and immediately prior to/after initial soil disturbance. Installation of temporary erosion control measures prior to clearing/logging is ineffective because trees and brush must be cleared to allow proper

installation of the BMPs, and the BMPs are typically damaged or destroyed during the clearing activities and must then be re-installed. Near waterbodies and wetlands, it will be determined in the field by the EIs if it is necessary to install temporary erosion control measures (i.e., sediment barriers) prior to clearing activities to minimize the potential for runoff to enter a wetland or waterbody. On federal lands, the EI would coordinate with the authorized federal agency representative on the appropriate placement and installation timing of these BMPs. All erosion control devices will be routinely inspected and any damaged or temporarily removed structures will be replaced at the end of each working day. Temporary erosion control measures will be maintained until successful revegetation has been achieved. Section 4.0 of this ECRP describes in detail the temporary erosion control procedures or BMPs that will be implemented during construction to minimize potential impacts from erosion and sedimentation.

3.3.5 Topsoiling

Topsoil segregation will be performed over the trenchline and subsoil storage area in croplands, hayfields, pastures, and residential areas. PCGP will stockpile topsoil from the trenchline and subsoil storage area separately from all subsoil and will replace the two horizons in the proper order during backfilling and final grading. Topsoil segregation will be performed in these areas to prevent mixing of the soil horizons in order to prevent the potential loss of soil fertility or incorporation of excess rock into the topsoil. Topsoil segregation will also be performed over the trenchline in non-saturated wetlands. Implementation of proper topsoil segregation will help to ensure post-construction crop productivity and revegetation success.

PCGP requested to not salvage topsoil on all forested lands, which is a modification from Section IV.B.1.d. of FERC's Upland Plan that specifies topsoil stripping at the landowner's or land managing agency's request. However, PCGP will salvage topsoil in wetlands on all forested lands according to FERC's Wetland and Waterbody Procedures.

Areas where topsoil will be segregated are identified in Resource Report 7 and are shown on the Environmental Alignment Sheets. PCGP will also salvage topsoil in wetland areas according to FERC's Wetland and Waterbody Procedures (see Attachment B Section VI.B.2.h.).

3.3.6 Trenching

The depth of the trench will be sufficient to allow for at least three feet of cover on top of the pipe in normal soils. However, the trench depth will be greater in agricultural areas, at stream crossings, and at road crossings. Crossing depths for roads, railroads, and waterbody crossings will typically be five feet unless specified otherwise by the managing agency/owner or potential stream scour requirements.

3.3.7 Pipe Stringing

After trenching is complete, individual joints of pipe will be strung along the right-of-way adjacent to the excavated trench and arranged so they are accessible to construction personnel. A mechanical pipe-bending machine will bend individual joints of pipe to the desired angle at locations where there are significant changes in the natural ground contours or where the pipeline route changes direction.

3.3.8 Welding and Coating Pipe

After stringing and bending are complete, the sections will be aligned, welded together, and placed on temporary supports along the edge of the trench. All welds will be visually and radiographically inspected and repaired, if necessary. Line pipe, normally mill-coated prior to

stringing, will require field-applied coating at the welded joints prior to final inspection. Prior to the final installation, the entire pipeline coating will be inspected and tested to locate and repair any faults or voids.

3.3.9 Lowering Pipe and Backfilling

The pipe assembly will be lowered into the trench by side-boom tractors and backhoes. The trench will be backfilled using a backfilling machine or bladed equipment. No foreign substance, including skids, welding rods, containers, brush, trees or refuse of any kind, will be permitted in the backfill. Following backfilling, a small crown of material may be left to account for any future soil settling that might occur. A gap in crowning would occur where pre-existing cross-drainages are restored to preconstruction conditions to facilitate natural surface drainage patterns.

Trench breakers will be installed in the trench on slopes prior to backfilling to prevent water from flowing along the pipeline and eroding trench backfill materials (see Section 4.2.1). Trench breakers will be generally spaced according to the spacing in Table 4.2-1, unless directed otherwise by the EI or authorized company representative. Trench breakers will also 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 and in areas where necessary to prevent potential effects to groundwater flows. PCGP will utilize sandbags (foam trench breakers may be used if approved by the authorized company representative) for trench breaker construction (see Section 4.2.1 for additional trench breaker details). Topsoil will not be used to fill the bags. Where necessary, PCGP will use trench plugs constructed of bentonite at appropriate locations to prevent flow from wetlands or streams into the trench and to preserve the original wetland, waterbody and/or groundwater hydrology. The contractor will backfill and stabilize areas as soon as possible according to FERC's Upland Plan (Section V. A. 1.) which specifies that final grading topsoil replacement and installation of permanent erosion control structures will be completed within 20 days after backfilling the trench (10 days in residential areas). However, if seasonal or other weather causes delays, temporary erosion control measures (temporary slope breakers and sediment barriers) will be maintained until conditions allow completion of cleanup.

3.3.10 Hydrostatic Testing

After backfilling, the pipeline will be strength and leak tested according to DOT 49 CFR Part 192 to ensure that the system is capable of operating at the design pressure. Should a leak or break occur, the line would be repaired and retested until the required specifications are achieved. Hydrostatic test water will be released at a rate to prevent scour, erosion, and sediment migration to sensitive resources such as wetlands and waterbodies. The test water will be released into a dewatering device such as a straw bale structure to dissipate energy of the test water flow, filter the test water, and to allow release of the test water as sheet flow back onto the ground. PCGP will follow the procedures outlined in the Hydrostatic Testing Plan (see Appendix M of the POD) and FERC's Wetland and Waterbody Procedures (Section VII. C. 4.) to minimize potential effects from these activities.

3.3.11 Restoration

After the pipeline is backfilled and tested, disturbed areas will be restored, as nearly as possible, to their original contours. Permanent erosion control measures will be installed and revegetation will occur as discussed in Sections 4.0 and 10.0 of this ECRP.

4.0 BEST MANAGEMENT PRACTICES

This ECRP will be used by contractors as a primary reference during construction on all lands crossed by the Pipeline. This ECRP provides guidelines for installing temporary and permanent BMPs to prevent or minimize erosion and to protect water quality. Attachment C provides typical BMPs that may be used during construction. BMP materials will be stored at the designated yards or staging areas along the construction right-of-way.

In exceedance of Section II.A of FERC's Upland Plan (see Attachment A.), PCGP will employ a lead EI and multiple EIs per spread for each of the five pipeline spreads. The lead EIs will be responsible for agency notifications and reporting requirements within each construction spread and will have oversight and ultimate authority over assistant EIs. The lead EIs will also conduct routine meetings and maintain communications to uphold consistencies and compliance with the appropriate federal, state, and local regulations and permit requirements. All EIs will be on-site during active construction and will have peer status with all other activity inspectors. The EIs will have authority to stop activities that violate the measures set forth in this ECRP as well as other permits and authorizations and will have the authority to order corrective action. The lead EI would coordinate with the authorized federal agency representative to ensure that they are involved in all appropriate decisions for which the EI is responsible on federal lands. PCGP will adequately staff additional EIs on each spread depending on the length and complexity of each spread. At a minimum, each EI will be responsible for:

- Ensuring compliance with the measures set forth in this ECRP, the requirements of FERC's Upland Plan and Wetland and Waterbody Procedures, and all other environmental permits and approvals, as well as environmental requirements in landowner agreements, including the federal right-of-way grant and the multiple Plans comprising the POD;
- Identifying, documenting, and overseeing corrective actions, as necessary, to bring an activity back into compliance;
- Verifying that the limits of authorized construction work areas and locations of access roads are properly marked before clearing;
- Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
- Verifying the location of drainage and irrigation systems;
- Identifying erosion/sediment control and stabilization needs in all areas;
- Locating dewatering structures and slope breakers to ensure they will not direct water into known cultural resource sites or locations of sensitive species;
- Verifying that trench dewatering activities are located such that water is allowed to infiltrate whenever possible, turbid water does not reach waters of the state, and dewatering does not result in the deposition of sand, silt, and/or sediment. If such deposition is occurring, the dewatering activity will be stopped and immediate corrective action taken to prevent reoccurrence;

- Testing subsoil and topsoil in agricultural, residential, and other areas where it has been requested by the land management agency or landowner to measure compaction and determine the need for corrective action;
- Advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- Ensuring restoration of contours and topsoil;
- Approving any imported soils for use in agricultural and residential areas and verifying that the soil is certified free of noxious weeds and soil pests;
- Approving straw bales for use in dewatering structures, mulch, and/or erosion control and verifying that the straw is certified free of noxious weeds and soil pests;
- Determining the need for and ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, and sensitive areas and onto roads. This would include evaluating controls prior to a predicted storm event whenever possible and installing additional measures as needed to control storm water and sediment;
- Inspecting and ensuring the maintenance of temporary erosion control measures at least daily in areas of active construction or equipment operation, on a weekly basis in areas with no construction or equipment operation and within 24 hours of each 0.5 inch or greater rainfall. Inspections will be recorded and records maintained for review upon request;
- Ensuring the repair of all ineffective temporary erosion control measures as soon as possible but not longer than 24 hours after identification;
- Keeping records of compliance with conditions of all environmental permits and approvals (including the measures set forth in this ECRP) during active construction and restoration;
- Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase; and
- Verifying that the locations for any disposal of excess construction materials for beneficial reuse comply with section III.E. of FERC's Upland Plan.

During construction and restoration, PCGP would also utilize additional personnel as needed to support the EIs to ensure that the EIs' responsibilities are appropriately addressed. Support personnel may include, among others: biologists, wetland scientists, soil scientists, agronomists, foresters, reclamation specialists, visual resource specialists, hydrologists or geologists, who have the appropriate, education, training, and expertise to effectively address the EIs responsibilities outlined in the ECRP.

4.1 Temporary Erosion Control Measures

Temporary erosion controls will be installed after vegetation clearing and immediately prior to/after soil disturbance and will be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or restoration is complete. Near

waterbodies and wetlands, it will be determined in the field by the EI if it is necessary to install temporary erosion control measures (i.e., sediment barriers) prior to initial disturbance to minimize the potential for sediment to enter a wetland or waterbody. On federal lands, the EI would coordinate with the authorized federal agency representative regarding the appropriate placement of temporary erosion control BMPs outlined in this section of the ECRP.

4.1.1 Construction Ingress and Egress

PCGP has identified ingress/egress points to the construction right-of-way using existing public and private roads. These ingress/egress points are shown on the Environmental Alignment Sheets. To the extent that PCGP can control landowner or public use of the right-of-way on BLM and National Forest System ("NFS") Lands, access will be limited to those vehicles necessary for construction to ensure public safety (see Safety and Security Plan, Appendix V of the POD). Traffic will move along the construction right-of-way within the construction right-of-way limits.

In designated areas, as determined by the EI, PCGP will install construction entrances at right-of-way access points that intersect paved roads to reduce sediment transport onto the roadway. A typical drawing of a construction entrance access pad is provided as Drawing 3430.34-X-0001 in Attachment C.

During the detailed engineering design phase for the Pipeline, existing culverts will be investigated along all identified access roads. This investigation will determine the condition and integrity of existing culverts and identify any location that may require mitigative measures to ensure construction activities do not damage or impair the existing function of the culverts. Mitigative measures may be required prior to access road use to allow safe construction equipment travel and prevent damage to the culverts. In select locations, replacement and/or modification of a culvert may be necessary. The measures outlined in PCGP's Culvert Crossing Best Management Practices (see Attachment F) and appropriate erosion control and revegetation measures outlined in the ECRP would be implemented during any road improvement activities. The Culvert Crossing BMP has been developed based on consultation with Oregon Department of Fish and Wildlife ("ODFW") and includes a typical culvert replacement design that would meet ODFW fish passage criteria (OAR 635-412-0035). Implementation of PCGP's Culvert Crossing BMP would ensure that each road crossing of a stream, that could potentially support fish, would meet ODFW fish passage standards.

4.1.2 Sediment Barriers

Sediment barriers will be used to confine sediment to the construction right-of-way and will be constructed primarily of silt fence (see Drawing 3430.34-X-0002 in Attachment C) although biobags and straw wattles (see Drawing 3430.34-X-0002 in Attachment C) may also be used. Generally, silt fence will be used where sediment barriers are required parallel to the right-of-way. Drivable berms will generally be used in locations where sediment barriers are required to cross the construction right-of-way along the travel lane such as at road, waterbody, and wetland crossings. Occasionally, straw bales may be used across the construction right-of-way travel lane based on an evaluation of site specific conditions. The straw bales utilized for sediment barriers will be clean straw that does not contain noxious weeds or other undesirable species that could interfere with the existing land use. In forested areas, during timber clearing/right-of-way grading operations slash-filter windrows may be constructed on the downhill edge of the construction right-of-way and TEWAs, as directed by the EI (see Drawing 3430.3-X-0002 in Attachment C). Slash-filter windrows will be constructed of logging slash, including cull logs, tree tops, limbs, and branches laid parallel to the right-of-way to effectively

filter sediment, reduce runoff velocities, and prevent stream sedimentation. Sediment barriers would generally be placed as follows:

- at the base of slopes adjacent to road, wetland and waterbody crossings where sediment could flow from the construction right-of-way onto the road surface or into the wetland or waterbody;
- adjacent to wetland and waterbody crossings, as necessary, to prevent sediment flow in the wetland consistent with the requirements of FERC's Wetland and Waterbody Procedures; and
- on the down slope side of the right-of-way where it traverses steep side slopes.

Drawing 3430.34-X-0003 in Attachment C shows the placement of temporary sediment barriers adjacent to road crossings. An example of sediment control in ditches and swales is shown on Drawing 3430.34-X-0004 in Attachment C. Examples of sediment barrier installations during construction at wetlands and streams are shown on Drawings 3430.34-X-0005, 3430.34-X-0006, and 0007 in Attachment C. PCGP's EI will determine where it may be necessary to provide added protection at these locations as well as at other areas along the construction right-of-way to ensure that runoff is properly treated and that sediment is properly contained on the right-of-way. The EI will also determine those areas along the construction right-of-way where silt fence installation may require additional support/reinforcement through the use of wire mesh backing or by adding straw bales behind the silt fence for added support/reinforcement. On federal lands, PCGP would treat all intermittent streams that are not flowing at the time of construction as perennial streams and would stabilize them with temporary sediment barriers.

The EI will inspect temporary erosion control structures at least on a daily basis in areas of active construction and equipment operation. In areas where active construction and equipment operation are not occurring, inspections will be made at least weekly. All structures will be inspected by the EI within 24 hours of 0.5 inch or greater of rainfall. The EI will be responsible for ensuring that ineffective temporary erosion control measures are repaired as soon as possible but no more than 24 hours after discovery. Whenever possible, the EI will inspect erosion control measures in advance of predicted storm events and take preventative measures to minimize the potential for off right-of-way sedimentation.

Temporary sediment barriers will be maintained in place until permanent revegetation measures are determined successful or until the upland areas adjacent to wetlands, waterbodies or roads are stabilized. The structures will be removed once the area has been successfully restored.

4.1.3 Temporary Slope Breakers

PCGP will install temporary slope breakers to reduce runoff velocity, concentrated flow and to divert water off the construction right-of-way to avoid excessive erosion (see Drawing 3430.34-X-0008 in Attachment C). Temporary slope breakers may be constructed of materials such as soil, silt fence, staked straw bales, straw wattles, or sand bags. The outfall of each temporary slope breaker will be to a stable, well-vegetated area or to an energy-dissipating device at the end of the slope breaker and off the construction right-of-way. The outfall of the slope breakers will be positioned to avoid sedimentation of wetlands, waterbodies and other sensitive areas. PCGP has consulted with the NRCS as well as the Forest Service and BLM regarding spacing of temporary and permanent slope breakers. While these agencies provided recommendations for the spacing of permanent slope breakers, they deferred to the spacing provided in FERC's

Upland Plan for temporary slope breakers. Therefore, PCGP will install temporary slope breakers on all slopes greater than 5 percent according to the spacing in Table 4.1-1, unless the EI determines that a closer spacing is required.

**Table 4.1-1
Temporary Slope Breaker Spacing**

Slope Percent	Spacing (feet)
0-5	None Required
>5-15	300
>15-30	200
>30	100

Temporary slope breakers will also be installed as determined necessary by PCGP's EI in skid trails or cable logging haul routes (roads) to minimize erosion potential from these areas during clearing operations in 2020 construction. Additionally, the EI will coordinate with the authorized agency representative in determining the spacing intervals of temporary slope breakers within areas of highly erosive granitic terrain, as well as on the Umpqua National Forest between about MPs 109 and 110, where the alignment crosses the historic Thomason cinnabar claim group.

4.1.4 Mulch

Consistent with FERC's Upland Plan (Section IV.F.3.) if it becomes necessary to delay final cleanup, including final grading and installation of permanent erosion control measures, beyond 20 days (10 days in residential areas) after the trench is backfilled in a specific area, PCGP will apply mulch on all disturbed slopes before seeding. Mulch (certified weed free) will also be applied if construction and restoration activities are interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions. In these areas mulch will be applied uniformly over the area to cover the ground surface at a rate of two tons/acre of straw or hay or its equivalent. In addition, the mulch application rate will also be increased to 3 tons/acre on all slopes within 100 feet of waterbodies and wetlands. The mulch will consist of certified weed-free straw or wood fiber hydromulch. On federal lands, in the event that construction activities are extended beyond the dry season (i.e., May 1 to October 31), soil disturbance in excess of 0.5 acre will have effective ground cover provided (see Table 10.15-1) or other effective BMPs will be utilized as discussed in this ECRP to prevent sedimentation beyond the approved construction right-of-way and associated TEWAs or into wetlands and waterbodies. Effective ground cover is considered to be the amount of cover necessary for maintaining a disturbed site in a low hazard category for erosion as specified in Table 10.15-1. Depending on the location and site conditions, PCGP's EI may also determine that temporary covering of spoil stockpiles at site-specific locations may be necessary to minimize the potential of sedimentation to sensitive resources. Drawing 3430.34-X0023 in Attachment C provides examples for temporary soil stockpile coverings.

4.1.5 Dust Control

During summer construction, fugitive dust may be a potential impact along the construction right-of-way and where construction occurs near residential areas, although these areas have been significantly avoided by the Pipeline. To control dust in residential areas and other areas where the dust may be considered a safety or public nuisance, the EI will direct watering along the right-of-way, as necessary. Watering trucks will spray only enough water to control the dust or to reach the optimum soil moisture content to create a surface crust. Run-off should not be

generated during this operation. Dust will be controlled on paved roadways by sweeping, scraping, or water washing (either by machine or hand). During sweeping the EI will determine if water needs to be sprayed to control dust. Any sediment generated from sweeping or scraping will be disposed of properly. Water for dust control purposes will be obtained from an authorized, permitted, commercial or municipal source. Appendix B of the POD provides PCGP's Air, Noise and Fugitive Dust Control Plan that describes the BMPs that would be utilized to control fugitive dust in more detail.

During development of the Right-of-Way Grant, the Forest Service noted a potential safety risk where fugitive dust is generated during pipeline construction in areas where asbestos may be present on the Tiller Ranger District if serpentine rock and soil are disturbed. Naturally-occurring asbestos ("NOA") includes fibrous minerals found in certain types of rock formations (serpentine and Ultramafic rock). PCGP addressed the Forest Service's concern regarding NOA in the Air-Noise and Fugitive Dust Control Plan (see Appendix B of the POD). The Plan describes NOA, areas where potential serpentine rock and soils are crossed by the Pipeline, and regulatory requirements as well as BMPs for minimizing exposure to NOA.

4.2 Permanent Erosion Control Measures

Permanent erosion control measures that will be used to reduce stormwater discharges will be implemented after all construction phases have been completed. Post-construction BMPs consist of permanent features and operational practices designed to minimize sediment discharges from the site after construction is complete.

4.2.1 Trench Breakers

Trench breakers will be installed in the trench and keyed into trench walls on slopes prior to backfilling to slow the flow of subsurface water along the trench to prevent erosion of trench backfill materials (see Drawing 3430.34-X-0011 in Attachment C). In addition, where the pipeline trench may drain a wetland, trench breakers will be installed and/or the trench bottom sealed as necessary to maintain the original wetland or waterbody hydrology and in areas where necessary to prevent potential effects to groundwater flows. PCGP will install a trench breaker at the base of slopes near the wetland boundary between the wetland and adjacent upland area. A permanent slope breaker and a trench breaker will be installed at the base of slopes near the boundary between the wetland and adjacent upland areas. The trench breaker will be installed immediately upslope of the slope breaker and in areas where necessary to prevent potential effects to groundwater flows.

Trench breakers will be keyed into the trench sidewall and generally spaced according to the spacing in Table 4.2-1, unless directed otherwise by the EI or authorized company representative.

**Table 4.2-1
Trench Breaker Spacing**

Slope Percent	Spacing (feet)
10-15	500
15-20	300
20-30	150
>30	100

Trench breakers will consist of approved sacks filled with sand. Foam trench breakers may be used if approved by the authorized company representative.

4.2.2 Permanent Slope Breakers

Permanent slope breakers (waterbars) will be installed across the right-of-way on slopes. The purpose of these structures is to minimize erosion by reducing runoff velocities by shortening slope lengths, preventing concentrated flow, and by diverting water off the right-of-way. Slope breakers are also intended to prevent sediment deposition into sensitive resources.

Slope breakers will be constructed with a two to eight percent outslope so that water does not pool or erode behind the breaker. Outflow will be diverted to a stable area off the right-of-way consistent with FERC's Upland Plan. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. If a stable area is not present, a temporary energy-dissipating device will be installed at the end of the slope breaker.

Slope breakers will be installed along the right-of-way based on slope gradient and soil characteristics (see Table 4.2-2). The frequency of slope breakers will be installed based on a combination of FERC's Upland Plan (see Attachment A) and input from the Forest Service and BLM. Because of the range in variation between agency recommendations and because of the complex landownership pattern, a single slope breaker spacing was developed based on slope gradient and soil type to ensure installation practicality across the various private and federal lands. The permanent slope breakers will be installed in all areas except agricultural fields, hayfields, pastures, and lawns. A typical drawing of a slope breaker is provided in Attachment C as Drawing 3430.34-X-0008.

**Table 4.2-2
Permanent Slope Breaker Spacing**

Slope Percent	Spacing Based on Soil Characteristics ¹	
	Highly Erosive Granitic Soils ² (feet)	Moderate/Low Erosion Soil Types (feet)
0-5	None Required	None Required
>5-15	100	200 to 300
>15-30	50 to 75	75 to 100
>30	50	50

¹ Actual spacing will be determined at the time of installation based on site-specific topographic conditions on the right-of-way to ensure proper slope breaker construction and proper drainage to stable off-site areas. On the Umpqua National Forest between about MPs 109 and 110, where the alignment crosses the historic Thomason cinnabar claim group, waterbars are to be installed at 50-foot intervals as recommended by the Forest Service (see the Contaminated Substances Discovery Plan/Appendix E of the POD).

² Granitic formations are crossed by the alignment between about: MPs 79.1 to 80.5; 81.6 to 82.2; 87 to 88.8; 97.0 to 101.2; 103.0 to 105.4; and 114.8 to 115.

4.2.3 Soil Compaction

Resource Report 7 of PCGP's Certificate application describes the potential for the Pipeline to cause soil compaction during clearing and construction activities and identifies the specific areas of the construction right-of-way that are susceptible to potential soil compaction from these activities. PCGP will minimize rutting and compaction by scheduling the majority of the clearing and construction activities during the dry season. During forest clearing activities in 2020 construction, the potential for soil compaction will be minimized where cable and helicopter logging methods are used. Where log skidding occurs, the following practices will be employed, where feasible, to minimize the potential for soil compaction:

- Low-ground weight (pressure) vehicles will be used as much as possible.
- The removal of soil duff and surface slash layers will be minimized so that a cushion exists between equipment or logs and the mineral soil.
- Designated skid trails will be used to restrict soil compaction to a smaller area of the right-of-way (preferably the pipeline trenching zone/ permanent right-of-way).
- Compacted landing, yarding, and load-out areas used for timber harvesting during 2020 will be scarified after use and prior to the rainy season where the potential for sediment delivery to waterbodies is possible. Scarification will promote infiltration, minimize run-off and the potential for sedimentation.

Construction activities (i.e., grading, excavation, scarification, and restoration) that will occur during mainline construction in 2021 are expected to fully mitigate areas of potential compaction caused from forest clearing activities that are completed in 2020 to prevent long-term impacts. During right-of-way restoration activities to be completed in 2021, most compacted surfaces from mainline construction activities will be relieved or mitigated by typical regrading, recontouring, scarifying, and final cleanup activities. Mitigating compaction will promote infiltration, reduce surface water runoff, minimize erosion, and enhance revegetation efforts. PCGP will test for soil compaction in agricultural areas (e.g., active croplands, hayfields, and pastures), residential areas, and on NFS and BLM lands. Soil compaction testing will be conducted on the same soil type under similar moisture and surface conditions as specified in Section V.C.1 of FERC's Upland Plan. On NFS and BLM lands, detrimental compaction will not exceed 15 percent or more over adjacent undisturbed soils. On NFS lands, within 100 feet of perennial or intermittent streams, detrimental compaction will not exceed 10 percent of the activity area within 100 feet of each stream, to assure maintenance/re-establishment of 90% of pre-disturbance infiltration rates within 100 feet of streams as confirmed through compaction testing. The EI will also test for soil compaction on UCSAs on federal lands to determine appropriate measures necessary to mitigate compacted areas.

Pursuant to Section II.B.8 of FERC's Upland Plan, the EI will be responsible for conducting soil compaction testing and determining corrective measures, including localized deep scarification or ripping to an average depth of up to 18 inches where feasible utilizing appropriate winged-tipped rippers. In forested areas, deep scarification over the trenchline will be precluded for pipeline safety reasons; however, the potential for compaction in this portion of the construction right-of-way is low since the trench will be excavated and then backfilled, and there is generally limited heavy equipment traffic in this area of the right-of-way. The trench line does not receive repeated heavy equipment traffic like the working side of the right-of-way, consequently the potential for compaction to occur over the trench line is limited. Furthermore, the trench is backfilled with excavated trench material toward the end of construction activities, just before restoration activities. Backfilling is the next to last step in the construction sequence which would limit traffic and the potential for compaction to occur over the backfilled trench. These measures will ensure that compaction is mitigated; that long-term impacts to soil productivity do not occur; and that the potential for increases in surface water runoff, soil erosion, and sediment delivery from pipeline construction is minimized. On federal lands, the EI will coordinate with the authorized agency representative to determine the appropriate measures to mitigate compacted areas, where necessary, based on test results.

4.2.4 Revegetation

Revegetation will be performed as outlined in Section 10.0 of this ECRP.

5.0 WATERBODY CROSSINGS

Overall impacts to waterbodies from construction have been significantly avoided by routing efforts. Although the proposed alignment crosses large waterbodies 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 waterbody and wetlands crossed as the route proceeds in a southeasterly direction from Coos Bay over these mountain ranges toward the Klamath Compressor Station near Malin, Oregon. Many of the unnamed waterbodies that are crossed by the Pipeline are intermittent headwater streams that are expected to be dry during the summer construction activities.

Waterbody crossings will generally be completed using a dry crossing method (typically flume or dam and pump) (see Drawing 3430.34-X-0006 and 3430.34-X-0007 in Attachment C) consistent with the requirements of federal, state, and local agencies with specific authority to regulate the waterbody crossings. Appendix BB of the POD provides detailed descriptions of the BMPs that will be utilized during flumed and dam and pump waterbody crossings to minimize potential water quality impacts.

Waterbody crossings will be made nearly perpendicular to the axis of the waterbody channel, where practicable, based on engineering and routing constraints to minimize parallel stream alignments and multiple stream crossings. In most cases, PCGP has been successful in designing each crossing such that TEWAs are not closer than 50 feet from waterbody boundaries, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. Where TEWAs are located closer than 50 feet from a waterbody and the adjacent upland does not support cultivated or rotated cropland or other disturbed land, a modification from FERC's Wetland and Waterbody Procedures (Section V.B.2.a. & b.) has been requested.

PCGP will utilize temporary construction bridges during all phases of construction to cross waterbodies. These structures will be constructed according to FERC's Wetland and Waterbody Procedures as well as according to the U.S. Army Corps of Engineers, Oregon Department of State Lands, ODFW, BLM, and Forest Service approvals. 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 constructed to withstand and pass the highest flow expected to occur while the bridge is in place, and, where feasible, bridges will be constructed to span the entire Ordinary High Water Mark ("OHWM") of the waterbody. If it is not possible to span the OHWM with the bridge, a temporary culvert or pier may be required. The culvert or pier would have sufficient strength to support all anticipated loads. These culverts/piers would be installed to minimize flow restrictions that may deflect stream flow to banks to prevent streambank erosion or scour and would be design to not restrict fish passage. The temporary bridges may include:

- equipment mats and culvert(s);
- equipment mats or railroad car bridges without culverts;
- clean rock fill and culvert(s); and
- flexi-float or portable bridges.

PCGP Contractor's may utilize other alternatives for equipment bridges that achieve the same performance and objective where approved by PCGP. Drawing 3430.34-X-0010 in Attachment C provides a typical drawing of a temporary crossing bridge and includes the minimum

performance/design standards PCGP's contractor will follow to ensure resource damage is minimized. PCGP's contractors will be responsible to ensure that the performance standards are met and resource damage is minimized. PCGP's EI, or authorized representative, will review all bridge placements to verify bridge safety, ensure the performance standards are observed and resource damage is minimized to the extent practical based on site specific crossing conditions and engineering constraints. On federal lands, the BLM's or Forest Service's authorized officer may verify that the temporary bridge installation performance standards, as defined on Drawing 3430.34-X-0010, are observed to ensure resource damage is minimized. All stream crossings on NFS lands (whether intermittent or perennial, 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. Temporary bridges will be set during clearing operations in 2020 construction as well as during mainline construction in 2021. The temporary bridges set during clearing operations would be temporarily removed after clearing is complete and will not be left in place across a waterbody over the 2020/2021 winter, during the period of high seasonal flows. During mainline construction in 2021, the temporary bridges will be reset and will be removed as soon as possible after permanent seeding. If there will be more than one 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 Wetland and Waterbody Procedures (Section V. B. 5. f.).

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, PCGP will not allow clearing equipment to cross waterbodies prior to bridge placement. Furthermore, where feasible, PCGP's contractors will attempt to lift, span, and set the bridges from the streambanks. However, 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. Resource Report 3 (and the Draft BA) provides a table that lists each waterbody and whether it is potentially necessary for equipment to cross the waterbody to install a temporary bridge.

Sediment barriers will be installed immediately after clearing and prior to initial ground disturbance (i.e., grading). Sediment barriers will be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete and revegetation has stabilized the disturbed areas. The contours of the streambed, shoreline and streambanks will be restored to preconstruction configurations (i.e., contour/elevations) to restore the physical integrity/conditions of these features. At some stream crossings, steep, eroding streambanks may need to be regraded to a stable slope (3:1) to ensure physical integrity as shown on drawing 3430.34-X-0014. PCGP's Stream Crossing Risk Analysis (GeoEngineers, 2017/Appendix O.2 to Resource Report 2) provides site-specific BMPs to restore stream bed and banks for long-term stability and to restore aquatic habitat. This Risk Assessment also provides a stream crossing monitoring plan to ensure long term success of stream restoration, maintenance of fish passage, and to identify channel erosion, scour or migration that could destabilize the site or expose the pipeline. Streambank revegetation measures are outlined in Section 10.0. Appropriate restoration BMPs, outlined in the Site-Specific Stream Crossing Prescriptions for the Perennial Streams on BLM and National Forest lands (North State Resources 2014), will also be incorporated during construction and

restoration in consultation with the agency's authorized representative and PCGP's EI or authorized representative.

6.0 WETLAND CROSSINGS

All wetlands will be crossed in accordance with FERC's Wetland and Waterbody Procedures (see Attachment B). Drawing 3430.34-X-0005 in Attachment C shows the typical wetland crossing methods that will be utilized during construction. Wetlands crossed by or in close proximity to the Pipeline are shown on the Environmental Alignment Sheets. In most cases except where topographical or other constraints occur, TEWAs have been located at least 50 feet away from wetland boundaries as required by FERC's Wetland and Waterbody Procedures (V.B.2.a). Where setbacks from waterbodies or wetlands could not be achieved based on site-specific constraints, modifications have been requested.

Sediment barriers will be installed immediately after clearing and prior to initial ground disturbance (i.e., grading). Sediment barriers will be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Where necessary, sediment barriers will be installed across the entire construction right-of-way immediately upslope of the wetland boundary to prevent sediment flow into the wetland. Where wetlands are adjacent to the construction right-of-way, sediment barriers will be installed along the edge of the construction right-of-way, as necessary, to prevent sediment flow into the wetland. These sediment barriers will be removed after restoration is complete and revegetation has stabilized the disturbed areas.

In wetlands where standing water or saturated soils are present or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, PCGP will use low-ground-weight construction equipment or will operate normal equipment on timber riprap or standard prefabricated equipment mats. Equipment mats are comprised of wood and serve to distribute the weight of the equipment. Rocks, soil imported from outside the wetland, tree stumps, or brush riprap will not be used to support equipment on the construction right-of-way. If trees are utilized as timber riprap or equipment mats to support equipment in saturated areas on the right-of-way, they will be obtained from clearing operations and will not be cut outside of the approved construction work areas. All materials utilized to support equipment on the construction right-of-way will be removed after construction.

The duration of construction-related disturbance within wetlands will be minimized and construction equipment operating in wetland areas limited to that needed to clear the right-of-way, dig the trench, fabricate and install the pipe, backfill the trench, and restore the right-of-way. All other construction equipment will use access roads located in upland areas to the maximum extent practicable. Where access roads in upland areas do not provide reasonable access, PCGP will limit all other construction equipment to one pass through wetlands that cannot be appropriately stabilized using the right-of-way. To allow multiple passes through wetlands, PCGP will stabilize the right-of-way through wetlands as prescribed in Section VI.B.d. of FERC's Wetland and Waterbody Procedures by using timber riprap, prefabricated equipment mats, or terra mats. Stabilization will not occur where wetland soils are firm enough to avoid rutting. Wetland restoration is discussed in Section 10.

6.1 Spill Prevention and Equipment Fueling and Maintenance

PCGP has developed a Spill Prevention, Containment, and Countermeasures ("SPCC") Plan that describes measures to prevent and control any inadvertent spill of hazardous materials

such as fuels, lubricants, and solvents that could contaminate soils and affect water quality. The SPCC Plan will be updated with site-specific information prior to construction. All employees will receive SPCC training. The SPCC Plan is provided in Appendix X of the POD.

Equipment fueling and storage of oil, fuel or other materials near waterbodies or wetlands could create a soil contamination and water quality impact if a spill were to occur. Leaks from equipment and vehicles could also cause impacts to surface waters. Vehicle fueling and maintenance and equipment storage will take place along the entire construction right-of-way. However, certain areas are restricted from these activities. Hazardous materials, chemicals, fuels, and lubricating oils will be stored in upland areas at least 150 feet from waterbodies and wetlands. Restricted fuel storage and no fueling areas will be clearly marked in the field. On federal lands, the storage of hazardous substances, chemicals, fuels, or lubricating oils, including the parking of all equipment overnight or during times of non-use and refueling would be at least 150 feet from waterbodies and wetland boundaries. On federal lands, any variance would require prior approval from the federal authorized representative. Concrete coating, refueling, and equipment maintenance activities will also be conducted according to FERC's Wetland and Waterbody Procedures. Concrete trucks will not be washed on the right-of-way. All hazardous materials will be handled in accordance with the SPCC Plan. If a spill occurred during construction, PCGP would implement the procedures outlined in the SPCC Plan (see Appendix X of the POD).

6.2 Material Delivery and Storage

PCGP will use various contractor yards for material delivery and storage. Materials will be brought onto the right-of-way as they are needed and will be stored away from waterbodies and wetlands. Secondary containment will be provided for fuel, lubricating oils, and other potential contaminating liquids.

7.0 MAINTENANCE AND PERIODIC EVALUATION

Erosion control structures will be maintained in accordance with FERC's Upland Plan (see Attachment A). The EI will inspect temporary erosion control structures at least daily in areas of active construction. In areas where active construction is not occurring, inspections will be made at least weekly. All structures will be inspected by the EI within 24 hours of 0.5 inch or greater of rainfall or as required by state and local jurisdictions. Whenever possible, the EI will evaluate erosion control measures prior to a predicted storm event and implement measures needed to prevent off right-of-way sedimentation. Inspections will be documented and available for agency review upon request.

The EI will be responsible for ensuring that ineffective temporary erosion control measures are repaired within 24 hours of discovery. If poor weather conditions prevail, the EI will notify construction crews when to initiate precautionary measures. The EI will ensure that the contractor has adequate equipment, materials, and crews available to respond rapidly to storm events. It is the responsibility of the EI to advise the Chief Inspector when wet weather or other conditions make it advisable to restrict construction activities to avoid excessive rutting in sensitive areas. Section 4.0 of this ECRP contains a list of the EIs' responsibilities.

8.0 HYDROSTATIC TEST WATER AND DEWATERING

After backfilling, the pipeline will be strength and leak tested as required by DOT under 49 CFR Part 192 to ensure that the pipeline is capable of operating at design pressure. Each HDD and

Direct Pipe (“DP”) will require pre-installation and post-installation strength (hydrostatic) testing. Should a leak or break occur, the pipeline will be repaired and retested until the required specifications are achieved. All hydrostatic test water will be obtained from commercial or municipal sources, private supply wells, or surface water sources permitted through the Oregon Department of Water Resources. PCGP’s Hydrostatic Testing Plan, provided in Appendix M of the POD, provides details on hydrostatic testing methods and protective measures.

During construction there is the potential, in areas of high groundwater, that trench dewatering may be required. Generally, these areas are associated with floodplains and wetlands. 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.

Hydrostatic test water or water from trench dewatering will not be discharged directly to waterbodies. The water from these activities will be directed to a dewatering structure to dissipate energy, to prevent erosion, and to filter the release in order to avoid sedimentation (see Drawing 3430.34-X-0012 and Drawing 3430.34-X-0013 in Attachment C). Water will be released to an appropriately sized dewatering structure based on the expected quantity of water. Proposed hydrostatic test water dewatering locations are provided on the Environmental Alignment Sheets. Hydrostatic test manifolds have been located outside of wetlands and riparian areas to the maximum extent practical based on engineering and testing parameters according to FERC’s Wetland and Waterbody Procedures (Section VII.C.4.). Similarly, hydrostatic dewatering locations have been located in uplands and at an appropriate distance from wetlands and waterbodies to promote infiltration and to ensure that sedimentation of wetlands, waterbodies, or other sensitive areas does not occur. PCGP’s EIs will visually monitor the release of hydrostatic test water and trench dewatering activities to ensure that no erosion or sedimentation occurs. In addition, the EIs will ensure that turbid water is not discharged to waters of the state. If an EI or authorized agency representative determines that a discharge is occurring from trench dewatering or hydrostatic testing, the receiving water will be visually monitored for turbidity. If turbidity is observed, the trench dewatering operations would be immediately adjusted/reinstalled/maintained to ensure that the discharge to surface water is stopped and water quality standards are not exceeded.

9.0 NON-STORMWATER DEWATERING

As previously described, the only non-stormwater releases associated with construction of the pipeline are trench and hydrostatic test dewatering. All water associated with trench dewatering will be pumped to a structure similar to Drawing 3430.34-X-0013 in Attachment C that is appropriately sized for the volume. Water associated with trench dewatering and hydrostatic testing will not be directly discharged to waterbodies. Potential areas requiring trench dewatering would likely occur near wetlands and areas of shallow ground water. Wetlands crossed by the Pipeline are shown on the Environmental Alignment Sheets. Resource Report 7 of PCGP’s Certificate application also identifies soils mapping units that are crossed that have a seasonal high water table where trench dewatering may be necessary. PCGP will minimize the potential for trench dewatering by scheduling the majority of construction activities during the dry season.

10.0 RESTORATION AND REVEGETATION

Initial reclamation of disturbed areas will begin as soon as possible after construction. Waterbody crossings will be stabilized and temporary sediment barriers will be installed within 24 hours of completion of backfilling in accordance with Section V.C.2 of FERC’s Wetland and

Waterbody Procedures (see Attachment B). On dry open cut crossings (flume or dam and pump) streambed and streambank stabilization will be completed before returning flow to the waterbody channel. On federal lands, PCGP would treat all intermittent waterbodies not flowing at the time of construction as perennial streams and would stabilize them with temporary erosion control measures and reseeding. Final grading and permanent erosion control measures of upland areas will be completed within 20 days (10 days in residential areas) after the trench is backfilled, weather and soil conditions permitting. During final cleanup and initial reclamation, permanent repairs of fences, gates, drainage ditches, and other structures removed or damaged during construction will be completed. Drain tiles will be repaired before backfilling. All drain tiles crossed by the Pipeline will be probed to check for damage. Cut or damaged drain tiles will be repaired to their original or better condition. PCGP will use a qualified specialist to test tiles for damage and to conduct any necessary repairs. Filter-covered drain tiles will not be used during repairs unless the local NRCS authorities and the landowner approve its use. All repairs will restore the drain tiles to the same or better condition that existed prior to construction.

PCGP will work with individual landowners to address restoration of active agricultural areas such as croplands, orchards, nurseries, and vineyards as well as residential lawns, ornamental shrubs, gardens, and other landscaping, if affected by the Pipeline. In active agricultural areas, PCGP will encourage the landowner to complete final restoration efforts in these areas and will compensate the landowner for these efforts. In residential areas, PCGP will utilize contractors familiar with local horticultural and lawn establishment procedures for reclamation work or will compensate the landowner to restore these areas. Specific reclamation procedures will be determined during negotiations with individual landowners. As described in the Aesthetics Management Plan (see Appendix A of the POD), various visual mitigation measures will also be incorporated into the restoration efforts to minimize visual impacts at Key Observation Points on federal lands.

10.1 Recontouring

All graded areas associated with construction will be regraded and recontoured as feasible to blend into the surrounding landscape and to reestablish 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. Recontouring to the original grade in disturbed wetlands is especially critical so that the wetland hydrology is not altered. Existing culverts that are damaged or removed during construction will be replaced to their original or better condition. No other culverts will be installed except those permitted or required by the appropriate federal, state, and local agencies. Consistent with FERC's Wetland and Waterbody Procedures (Section V.C.3.), during streambank restoration/recontouring the streambanks will be returned to their preconstruction contours or to a stable configuration with slopes that do not exceed 3H:1V (Horizontal:Vertical) as shown on Drawing 3430.34-X-0014 in Attachment C, or as specified by site-specific streambank stabilization design measures outlined in the Stream Crossing Risk Analysis (GeoEngineers, 2017/Appendix O.2 to Resource Report 2). PCGP will install erosion control fabric (such as jute or excelsior) on streambanks at the time of recontouring (see Drawing 3430.34-X-0009 in Attachment C). The fabric will be anchored using staples or other appropriate devices. The erosion control fabric to be used on streambanks will be designed for the proposed use and will be approved by the EI(s). On federal lands the EI would coordinate with the authorized agency representative regarding the erosion control fabric to use on streambanks. Additionally, as described in Section 11.0 of this ECRP, where the

alignment traverses steep, sharp and narrow ridgelines, the contours will be regraded to ensure stability as well as to reestablish preconstruction drainage patterns.

10.2 Construction Debris Disposal

During final cleanup, all construction debris (e.g., mats, garbage, drilling fluids) will be cleared from the right-of-way and disposed of in accordance with state and local regulations. Excess rock and spoil materials will be distributed along the construction right-of-way or disposed of in existing quarries and in permanent disposal sites that have been identified along the construction right-of-way. Appendix Q of the POD provides PCGP's Overburden and Excess Material Disposal Plan which describes how these materials would be stored and disposed of on federal lands. Resource Report 8 of PCGP's Certificate application also identifies the permanent disposal areas that would be located on private lands. Non-merchantable logs/stumps may be utilized along the construction right-of-way, within the certificated construction limits, as off-highway vehicle ("OHV") barriers or scattered/piled on the right-of-way as wildlife habitat diversity features, where approved by the EI or PCGP's authorized representative and the landowner or land management agency. PCGP's Recreation Management Plan (see Appendix S of the POD) provides the measures and examples of OHV barriers that would be used to prevent unauthorized OHV access to the right-of-way.

Treatment of Forest Slash. PCGP has determined that the quantity of slash material that will be generated during forest clearing operations will be significant. The typical size of the trees that will be cut and cleared from the construction right-of-way and TEWAs are too large to conduct whole tree yarding and, therefore, require the trees to be cut, topped, limbed, and bucked on site where the trees are fallen. Generally, only the logs will be yarded to a landing for decking, loadout, and transport and the slash (tree tops and limbs) will remain on the construction right-of-way where the tree was initially cut. During grading and trenching, stumps would also be generated which are also considered slash. The timber clearing and grading processes are expected to generate a significant quantity of slash that will be impractical to completely remove. During logging, limbs and tops will also be broken/crushed during tree falling and yarding operations, creating a large volume of smaller slash material that is impractical to remove because of the expected large quantity, size and distribution of this material. Further, the slash generated during timber clearing operations will remain on the ground and in place to provide important cover to minimize erosion over the winter prior to main line construction. The retained slash that will be stored on the edges of the construction right-of-way, TEWAs, and UCSAs will then be pulled back and redistributed/scattered across the right-of-way after construction during final cleanup after seeding during reclamation (according to BLM and Forest Service fuel loading limits) to minimize fire hazard risks. If during redistribution significant disturbance occurs to the seeded areas, the EI will ensure that supplemental hand broadcast seeding occurs to ensure adequate seed coverage for erosion control.

Where it is not feasible to pull the slash back onto the right-of-way after seeding, seeding in these areas (broadcast or hydroseeding) will occur with specifications to ensure adequate seed coverage. Scattering the slash across the right-of-way will return organic materials back to the right-of-way soil and provide effective ground cover for erosion control to minimize erosion. The scattered slash will also discourage OHV traffic on the right-of-way.

On NFS Lands the maximum amount of slash that will be scattered across the right-of-way will be 12 tons per acre, which will be distributed over the following fuel loading size classes:

Fuel Loading by Size Class	
Size Class (Diameter)	Tons/Acre
0-1/4"	< 1
1/4– 3"	4-8
3-8"	7-12
Maximum Total Loading	12

On BLM and private lands the fuel load specifications will be:

Fuel Loading by Size Class	
Size Class (Diameter)	Tons/Acre
0-1/4"	< 1 ¹
1/4 -8"	5-8 ¹
>8"	10-15
¹ Adapted from Forest Service Fuel Loading Standards	

As provided by the Forest Service, dead and downed woody debris greater than 16 inches in diameter does not contribute to fire hazard and will be maintained on site. Slash may also be chipped and scattered across the right-of-way provided that the average depth of wood chips covering the area does not exceed one inch following application. This chip depth will be sufficient to stabilize the soil surface from erosion while allowing grass seed to germinate and seedlings to develop and is not expected to significantly increase fuel hazards as long as the maximum tonnage for fuel loading does not exceed 12 tons per acre. The Forest Service has also noted that wood chips can be the most effective means to protect soils from surface and fluvial erosional processes. PCGP has requested a modification from Section IV.F.4.e. of FERC's Upland Plan because the BLM and Forest Service fuel loading standards differ from FERC's Upland Plan.

In areas where the fuel loading exceeds these standards, PCGP will machine or hand pile and burn the excess material depending on the site location. Burning will occur during the appropriate burning season and according to the permits issued by the BLM, Forest Service, and Oregon Department of Forestry (OAR 629-615-300). A Prescribed Burning Plan is included as Appendix R of the POD that describes these activities during the construction phase. Off-site disposal of slash materials may also occur in accordance with federal, state, and local regulations.

10.3 Soil Compaction

PCGP will mitigate and test for potential soil compaction as described in Section 4.2.3.

10.4 Scarification

Prior to respreading the topsoil, the right-of-way will be scarified (where necessary as determined by the EI) by disking, ripping, or chiseling to loosen compacted areas from equipment traffic. Scarifying the subsoil will also promote water infiltration and improve soil aeration and root penetration. Brush blades, rippers, chisel plows, agricultural disks, or other appropriate equipment will be used to reduce shallow soil compaction.

Scarification will occur in areas where the EI determines that the soil compaction is unacceptable. Disturbed areas that may require scarification primarily include the work lane and may also include portions of the passing lane or some TEWAs. Scarification will occur on average to a depth of up to 18 inches deep where feasible with rippers spaced not more than 16

inches apart. Ripping and chisel plowing will also occur when materials are dry enough to promote shattering of compacted layers. Ripper shanks with wing attachments will be used in areas where ripping with normal equipment does not adequately reduce the amount of soil compaction. Other subsoiling equipment, such as multipurpose subsoiling excavator attachments (i.e., subsoiling grappling rake or subsoiling excavator bucket) (Monk, B. 2009), may also be used to mitigate compaction in appropriate areas along the construction right-of-way.

In wetlands, scarification is not anticipated because traffic will be limited in these areas to that needed to clear the right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the right-of-way. All other equipment will be limited to one pass through the wetland using the right-of-way. Equipment mats will be utilized in wetlands where soils are saturated or where standing water is present to further minimize compaction. The need for scarification in wetland areas will be determined by the EI. Scarification will not be conducted in wetlands where it may adversely affect the wetland hydrology. On federal lands, the EI would consult with the authorized agency representative to determine areas requiring scarification as noted in Section 4.2.3.

10.5 Soil Replacement

All salvaged topsoil will be uniformly spread over the portions of the right-of-way from where the soil was salvaged. If compaction occurs during this operation that might not be relieved during seedbed preparation, all compacted areas will be scarified. Topsoil spreading will not occur during wet periods when soils are easily compacted and all travel over re-topsoiled areas will be restricted. The EI will be responsible for ensuring that topsoil imported into residential and cropland areas for replacement is free of noxious weeds or other deleterious materials (such as rock). If for an unforeseen reason topsoil replacement is required on federal lands, the EI would consult with the authorized agency representative to ensure the topsoil is suitable for use.

10.6 Rock Removal

FERC's Upland Plan requires the removal of excess rock from the top 12 inches of soil to the extent practicable in all rotated and permanent croplands, hayfields, pastures, residential areas, and other areas upon landowner request. In these areas, PCGP will clean up excess rock to a condition similar to adjacent portions of the construction right-of-way (e.g., size, density, and distribution of rock) unless the landowner and PCGP negotiate different stipulations. Excess rock and spoil materials will be distributed along the construction right-of-way or disposed of in existing quarries and in permanent disposal sites that have been identified along the construction right-of-way. Appendix Q of the POD provides PCGP's Overburden and Excess Material Disposal Plan which describes how these materials would be stored and disposed of on federal lands. Resource Report 8 of PCGP's Certificate application also identifies the permanent disposal areas that would be located on private lands. Any other new disposal location will require approval of the landowner or land managing agency. Large rocks and boulders may be used as OHV barriers along the right-of-way and at road crossings to block access at OHV points to restrict traffic on the right-of-way (see Appendix S of the POD/Recreation Management Plan). Additionally, large rocks and boulders may be piled in upland areas along the right-of-way to create habitat diversity features where approved by the EI or PCGP's authorized representative and the landowner or land management agency. The use of alternate disposal locations will be approved by FERC, and, if on federal lands, the respective land-managing agency.

10.7 Seedbed Preparation

Seedbed preparation will be conducted, where necessary, immediately prior to seeding to prepare a firm seedbed conducive to proper seed placement and moisture retention. Seedbed preparation will also be performed to break up surface crusts and to eliminate weeds which may have developed between initial reclamation and seeding.

A seedbed will be prepared in disturbed areas, where necessary, to a depth of three to four inches using appropriate equipment to provide a seedbed that is firm, yet rough. A rough seedbed is conducive to capturing or lodging seed when broadcasted or hydroseeded, and it reduces runoff and erosion potential. The rough seedbed will retain soil moisture for seedling germination and establishment.

In most areas, final right-of-way cleanup procedures are sufficient because they leave a surface smooth enough to accommodate a drill seeder pulled by a farm tractor and rough enough to catch broadcasted seed and trap moisture and runoff. However, additional preparation such as chisel plowing or disking may be necessary to prepare an adequate seedbed. Where residential and cropland areas are disturbed, more intensive ground and seedbed preparations may be required including rock collection, grading, and soil preparation/amending. The EI will be responsible to determine where seedbed preparation measures are required prior to seeding. On federal lands, the EI would coordinate with the authorized federal agency representative to determine where seedbed preparation measures are required.

10.8 Fertilization

Based on the Oregon State University Extension Service recommended fertilization rate for nitrogen fertilizer on new pasture seedlings (OSUES 2000), PCGP will use a standard fertilization rate of 200 pounds per acre bulk triple-16 fertilizer (16:16:16 - nitrogen, potassium and phosphorus) on all disturbed areas to be reseeded. This fertilization rate will apply 32 pounds per acre of elemental nitrogen, potassium, and phosphorus. The elemental nitrogen rate will also satisfy FERC's requirement to add nitrogen where wood chips are used as mulch (see Section IV.F.4.e.). Where fertilizer is applied by mechanical broadcast methods, the fertilizer will be incorporated into the top two inches of soil, where feasible. PCGP does not anticipate using aerial broadcast methods to apply fertilizers. However, if this application method is used, application would only occur with the approval of the appropriate federal land-managing agency. Where fertilizer is applied by hydroseeding, the fertilizer will be applied with the hydroseeding slurry. The NRCS did not recommend the addition of lime or other soil pH modifiers. Fertilizers would not be applied in wetlands, unless required in writing by the appropriate land management or state agency pursuant to FERC's Wetland and Waterbody Procedures (Section VI.C.4.) and would not be applied within 100 feet of flowing streams that have domestic use or support fisheries. Application would be avoided during heavy rain or when wind speed could cause drift. All fertilizers would be stored and equipment loaded away from streams and outside Riparian Reserves.

10.9 Seed Mixtures

As required by FERC's Upland Plan, PCGP has consulted with the NRCS and land management agencies regarding recommended seed mixtures for the Pipeline project area. The seed mixtures developed for the Pipeline are based on these agency recommendations and are provided in Tables 10.9-1, 10.9-2, and 10.9-3 and include Seed Mixtures 1 through 17. The seed mixtures were developed with the primary intent to stabilize disturbed areas and control erosion and were based on precipitation ranges and landownership (i.e., federal – BLM and NFS lands and private lands). Seed mixtures have also been developed for hayfield, pasture, and rangeland areas crossed by the Pipeline so that these areas are returned to their preconstruction land uses as quickly as possible. During right-of-way negotiations, private landowners may also request other seed mixtures than those proposed in Table 10.9-1. These specific landowner requested/specified seed mixtures will be documented in landowner right-of-way agreements. Seed mixtures have also been developed as mitigation measures for site-specific areas where federally listed plants or other special status plants (Kincaid's Lupine, Applegate's, Milk-vetch, Gentner's Fritillary as well as Cox's Mariposa Lily) have been identified along the right-of-way. These seed mixtures are included in the PCGP's Federally-Listed Plant Conservation Plan (see Appendix J of the POD). The BLM seed mixtures have been developed based on the BLM's Instruction Memo-2001-014 (Native Seed Policy) which states:

Native species shall be used unless, through the NEPA process, it is determined that: (1) Suitable native species are not available; (2) The natural biological diversity of the proposed management area will not be diminished; (3) Exotic and naturalized species can be confined within the proposed management area; (4) Analysis of ecological site inventory information indicates that a site will not support reestablishment of a species that historically was part of the natural environment; (5) Resource management objectives cannot be met with native species (See BLM Manual 1745.06).

While BLM Districts have prescribed native seed mixes for erosion control, there may be instances in highly erosive soils on steep slopes where mixing sterile perennials like sterile wheatgrass species or non-persistent annual grasses like annual ryegrass could be appropriate.

The seed mixture seeding rates are based on Pure Live Seed (PLS). All seed will be used within one year from testing date. The seed will be free of noxious weeds, and the quantity of total weed seed will be low or within the limits allowed by Oregon seed laws and labeling. The EI will review all seed tags prior to use to ensure that these procedures are implemented. The seeding rates specified in Tables 10.9-1, 10.9-2, and 10.9-3 are based on drilling rates (unless specified otherwise). If broadcast seeding methods are used, the seeding rate will be doubled. If hydroseeding is used, the broadcast seeding rate will be used plus any adjustment the hydroseeding company recommends based on their equipment specifications. The total quantities of Seed Mixtures 1 through 17 have been estimated and provided in Tables 10.9-1, 10.9-2 and 10.9-3. These estimates were based on GIS analysis considering the disturbed area (acres) where each seed mixture would be applied, landowner jurisdiction, vegetation type, county, milepost range, and other conditions specified for each seed mixture. Areas of roads and industrial areas, that are located within the construction right-of-way and TEWAs which would not be seeded were not included in the seed mixture estimates; nor were aboveground facilities that would be graveled and not seeded or UCSAs that would not be disturbed. Pipe yards, which are existing industrial areas that would not be reseeded, were also not included in the seeding acreage estimates.

PCGP would acquire the seed through commercial source where available and would contract with vendors to collect native species where these species are not commercially available. The

BLM and Forest Service will specify genetically appropriate seed sources/seed zones for all species to be planted/seeded on their managed lands. Native seed would be collected during the two years prior to construction as well as during the two years of construction to ensure that an adequate quantity of seed is available for reseeding efforts. Seed collected in the years prior to construction would be dried, stored in labeled, sealed bags and appropriately stored to preserve viability. It is anticipated that adequate seed will be collected to allow for direct re-seeding without the need for farm-increasing, however, some vendors may choose to grow out a quantity of the seed they have collected for PCGP's use to minimize collection efforts and to ensure appropriate quantities of seed are available.

**Table 10.9-1
Recommended Seed Mixtures for Private Lands**

Seed Mixture 1 – Erosion Control – Upland Right-of-Way Areas for Coos, Douglas, and Jackson Counties¹						
Common Name	Scientific Name	lbs/ac (PLS)				
Perennial Grasses						
Bentgrass	<i>Agrostis spp.</i>	0.5				
Red Fescue	<i>Festuca rubra</i>	6.0				
Fescue, Tall (endophyte free)	<i>Festuca arundinacea</i>	6.0				
Orchardgrass	<i>Dactylis glomerata</i>	6.0				
Ryegrass, Annual or Italian	<i>Lolium multiflorum</i>	6.0 ²				
Ryegrass, Perennial	<i>Lolium perenne</i>	4.0				
Timothy	<i>Phleum pretense</i>	2.0				
Legumes						
Clover, Red	<i>Trifolium pretense</i>	3.0				
Clover, White	<i>Trifolium repens</i>	2.0				
Trefoil, Birdsfoot	<i>Lotus corniculatus</i>	3.0				
Total PLS lb/acre		38.5				
Total Acres Estimated for Seed Mixture: 1435 acres		Total lbs (PLS) 55,248.0				
¹ Mountain or California brome (<i>Bromus marginatus</i> or <i>B. carinatus</i>) and Blue Wildrye (<i>Elymus glaucus</i>) to be added to the mixture at 5 lbs/acre PLS each in substitute for Timothy between MPs 65.6 – 88.3.						
² On slopes greater than 20 percent or where seeding occurs after September 30 th annual ryegrass will be increased to 10 lbs/acre.						
Seed Mixture 2 – Pasture and Hayland Mixes (Coos, Douglas, and Jackson Counties)						
Common Name	Scientific Name	lbs/ac (PLS)				
Perennial Grasses		Mix A¹	Mix B¹	Mix C¹	Mix D¹	
Fescue, Tall (endophyte free)	<i>Festuca arundinacea</i>		20.0			
Orchardgrass	<i>Dactylis glomerata</i>	10.0			16.0	
Ryegrass, Perennial or English	<i>Lolium perenne</i>	10.0		25.0		
Ryegrass, Annual or Italian	<i>Lolium multiflorum</i>	3.0	3.0	3.0	3.0	
Legumes						
Clover, Red	<i>Trifolium pratense</i>	2.0	2.0	2.0	2.0	
Clover, ladino ²	<i>Trifolium repens</i>	2.0	2.0	2.0	2.0	
Total PLS lb/acre		27.0	27.0	32.0	23.0	
Total Acres Estimated for Seed Mixtures: 176 acres		Total lbs (PLS) @ 27 lbs/ac = 4,743.0				
¹ Seed Mix 2-A will be utilized as the primary pasture mixture unless landowners request other specific mixtures or a single species pasture mixture is requested such as Mix 2-B, 2-C, or 2-D.						
² In Coos County, substitute New Zealand white clover for ladino white clover at 3 lbs/acre. New Zealand white clover is more slug resistance than Ladino white clover. Big trefoil can also be substituted or supplemented in the mixture (6-10 lbs/acre) on poorly drained, strongly acidic soils. Lundin, F. 1996. Pasture Management Guide. Coastal Pastures in Oregon and Washington. Oregon State University Extension Service. EM8645.						

Seed Mixture 3 – Irrigated Pasture and Hayland Mixes (Klamath County) ¹					
Common Name	Scientific Name	lbs/ac (PLS)			
Perennial Grasses		Mix A	Mix B	Mix C	Mix D
Orchardgrass	<i>Dactylis glomerata</i>		8.0		
Tall fescue (endophyte free)	Festuca arundinacea	15.0			15.0
Ryegrass, Perennial	<i>Lolium multiflorum</i>		8.0		
Intermediate Wheatgrass	<i>Elytrigia intermedia</i> ssp. <i>Intermedia</i>			12.0	
Ryegrass, Annual or Italian	<i>Lolium multiflorum</i>	2.0	2.0	2.0	2.0
Legumes					
Alfalfa	<i>Medicago L.</i>			2.0	
Clover, ladino	<i>Trifolium repens</i>	2.0	2.0	2.0	2.0
Clover, Red	<i>Trifolium pratense</i>	2.0	2.0		
Strawberry clover	<i>Trifolium fragiferum</i>				1.0
Trefoil, Birdsfoot	<i>Lotus corniculatus</i>				1.0
Total Bulk lb/acre		21.0	22.0	18.0	21.0
Total Acres Estimated for Seed Mixtures: 445 acres		Total lbs (PLS) @ 21 lbs/ac = 9,350.0			
¹ University of California Division of Agriculture and Natural Resources. 1993. Intermountain Irrigated Pastures and Mountain Meadows. Intermountain Workgroup, University of California Cooperative Extension. Mix A – Recommended for pastures that receive winter feeding operations (high yield forage with reasonable quality and a strong sod). Recommended for horse pastures. Mix B – High yield, high quality pasture mixture. Mix C – Recommended on irrigated pastures with marginal water supply. Mix D – Recommended on alkaline irrigated pastures (use Fawn tall fescue)					
Seed Mixture 4 – Erosion Control – Upland Right-of-Way Areas for Jackson County (non-federal land) MPs 113.2 to 150.45, precipitation ranges between 24 and 36 inches					
Common Name	Scientific Name	lbs/ac (PLS)			
Perennial Grasses					
Mountain or California brome	<i>Bromus marginatus</i> or <i>B. carinatus</i>	4.0			
Blue Wildrye	<i>Elymus glaucus</i>	4.0			
Red fescue	<i>Festuca rubra</i>	3.0			
Orchardgrass	<i>Dactylis glomerata</i>	6.0			
Ryegrass, Annual or Italian	<i>Lolium multiflorum</i>	6.0			
Legumes					
Pine or Sickle-Keel Lupine ¹	<i>Lupinus albicalus</i>	4.0			
Clover, White	<i>Trifolium repens</i>	2.0			
Subclover	<i>Trifolium subterranean</i>	1.0			
Total PLS lb/acre		30.0			
Total Acres Estimated for Seed Mixture: 323 acres		Total lbs (PLS) 9,688.0			
¹ To be applied if readily available from commercial sources.					
Seed Mixture 5 – Erosion Control – Upland Right-of-Way Areas for Jackson and Klamath Counties (non-federal land) MPs 169.4 to 181.0 precipitation ranges between 20 and 36 inches					
Common Name	Scientific Name	lbs/ac (PLS)			
Perennial Grasses					
Mountain or California brome	<i>Bromus marginatus</i> or <i>B. carinatus</i>	5.0			
Orchardgrass	<i>Dactylis glomerata</i>	6.0			
Timothy	<i>Lolium multiflorum</i>	4.0			
Red fescue	<i>Festuca rubra</i>	3.0			
Ryegrass, Annual or Italian	<i>Lolium multiflorum</i>	4.0			
Legumes					
Clover, White	<i>Trifolium repens</i>	2.0			
Subclover	<i>Trifolium subterranean</i>	2.0			
Total PLS lb/acre		26.0			
Total Acres Estimated for Seed Mixture: 92 acres		Total lbs (PLS) 2,397.0			

Seed Mixture 6 – Erosion Control – Upland Right-of-Way Areas Control for Klamath County (non-federal land) MPs 181.0 to 198.0 precipitation ranges between 16 and 20 and inches			
Common Name	Scientific Name	lbs/ac (PLS)	
Perennial Grasses			
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	4.0	
Slender wheatgrass	<i>Elymus trachycaulus</i>	4.0	
Blue wildrye	<i>Elymus glaucus</i>	4.0	
Idaho fescue	<i>Festuca idahoensis</i>	3.0	
Orchardgrass	<i>Dactylis glomerata</i>	3.0	
Legumes			
Clover, White	<i>Trifolium repens</i>	2.0	
Shrubs			
Antelope bitterbrush	<i>Purshia tridentata</i>	1.0	
Birchleaf mountain mahogany	<i>Cercocarpus montanus</i>	1.0	
Total PLS lb/acre		22.0	
Total Acres Estimated for Seed Mixture: 58 acres		Total lbs (PLS) 1,269.0	
Seed Mixture 7 – Rangeland Mixture for Klamath County MPs 198 to 228 precipitation ranges between 10 and 16 inches			
Common Name	Scientific Name	lbs/ac (PLS)	
Perennial Grasses			
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	6.0	
Canby bluegrass	<i>Poa canbyi</i>	1.0	
Sheep fescue	<i>Festuca ovina</i>	1.0	
Legumes			
Alfalfa	<i>Medicago L.</i>	1.0	
Shrubs			
Antelope bitterbrush	<i>Purshia tridentata</i>	2.0	
Total PLS lb/acre		11.0	
Total Acres Estimated for Seed Mixture: 143 acres		Total lbs (PLS) 1,571.0	
Seed Mixture 8 – Ditch and Canal Banks < 16 inches precipitation – Klamath County			
Common Name	Scientific Name	lbs/ac (PLS)	
Perennial Grasses			
		Mix A	Mix B¹
Streambank wheatgrass	<i>Elymus lanceolatus ssp. Psammophilus</i>	20.0	5.0
Tall wheatgrass	<i>Elytrigia elongata</i>		15.0
Sheep fescue	<i>Festuca ovina</i>	4.0	4.0
Total PLS lb/acre		24.0	24.0
Total Acres Estimated for Seed Mixture: 7.7 acres		Total lbs (PLS) 185.0	
¹ moist or subirrigated, saline areas			
Seed Mixture 9 – Seed Mixture for Disturbed Emergent Wetlands (Pastures) – Coos County			
Common Name	Scientific Name	lbs/ac (PLS)	
Perennial Grasses			
Ryegrass, Annual	<i>Lolium multiflorum</i>	10.0	
Bentgrass, Colonial	<i>Agrostis tenuis (Agrostis capillaries)</i>	6.0	
Legumes			
Trefoil, Birdsfoot	<i>Lotus corniculatus</i>	8.0	
New Zealand White Clover	<i>Trifolium repens</i>	2.0	
Total PLS lb/acre		26.0	
Total Acres Estimated for Seed Mixture: 38.6 acres		Total lbs (PLS) 1,004.0	

Seed Mixture 10 – Seed Mixture for Disturbed Emergent Wetlands Klamath County		
Common Name	Scientific Name	lbs/ac (PLS)
Perennial Grasses		
Ryegrass, Annual	<i>Lolium multiflorum</i>	10.0
Hairgrass, Tufted	<i>Deschampsia caespitosa</i>	3.0
Barley, Meadow ¹	<i>Hordeum brachyantherum</i>	5.0
Creeping bentgrass	<i>Agrostis stolonifera</i>	0.4
Garrison creeping foxtail	<i>Alopercurus arundianceus</i>	2.0
Total PLS lb/acre		20.4
Total Acres Estimated for Seed Mixture: 1.5 acres		Total lbs (PLS) 31.0

Seed Mixture 11 – Seed Mixture for Disturbed Emergent Wetlands (Pastures) – Douglas, Jackson, and Klamath Counties		
Common Name	Scientific Name	lbs/ac (PLS)
Perennial Grasses		
Ryegrass, Annual	<i>Lolium multiflorum</i>	10.0
Meadow foxtail	<i>Alopercurus pratensis</i>	8.0
Creeping bentgrass	<i>Agrostis stolonifera</i>	1.0
Legumes		
Trefoil, Birdsfoot	<i>Lotus corniculatus</i>	2.0
Total PLS lb/acre		21.0
Total Acres Estimated for Seed Mixture: 87 acres		Total lbs (PLS) 1,827.0

Seed Mixture 12 – Wetland Seed Mixture		
Common Name	Scientific Name	lbs/ac (PLS)
Perennial Grasses		(broadcast seeding rate)
Ryegrass, Annual	<i>Lolium multiflorum</i>	10
Quick Guard		40
Fescue, Fine or Creeping Red	<i>Festuca rubra</i>	2.0
Hairgrass, Tufted	<i>Deschampsia caespitosa</i>	2.0
Mannagrass, Reed ¹	<i>Glyceria grandis</i>	2.0
American sloughgrass ¹	<i>Beckmannia syzigachne</i>	2.0
Barley, Meadow ¹	<i>Hordeum brachyantherum</i>	5.0
Western Mannagrass ¹	<i>Glyceria occidentalis</i>	2.0
Fowl bluegrass ¹	<i>Poa palustris</i>	1.0
Total PLS lb/acre		66.0
Total Acres Estimated for Seed Mixture: 39.6 acres		@ 58 lbs/ac 2,297.0

¹ These species may be included in the seed mixture if they are readily available from a commercial seed supplier.

Table 10.9-2

Bureau of Land Management Coos Bay, Roseburg, Medford, and Lakeview Districts Seed Mixtures
Seed Mixture 13 – Coos Bay BLM Lands - Erosion Control - Upland Right-of-Way Areas

Californian brome	<i>Bromus carinatus</i>	8
Blue Wildrye	<i>Elymus glaucus</i>	12
Regreen or Quickguard ¹		
Total PLS lb/acre		40
Total Acres Estimated for Seed Mixture: 143 acres		Total lbs (PLS) 5,723

¹ The use of native seed mix is preferred; however, there may be instances in highly erosive soils on steep slopes, where mixing sterile perennials such as sterile wheatgrass species or non-persistent annual grasses like Annual Rye could be appropriate. In these areas the PCGP will include Regreen, Quickguard or annual ryegrass in the seeding mixture at 20 lbs/acre for erosion control, if approved, or at a rate specified by the BLM.

Seed Mixture 14 – Roseburg BLM Lands

The seeding rate will be 30 seeds Pure Live Seed per square foot (30 seeds PLS/ft²). The seed mix must include at least two species of grasses and at least two species of forbs. Species may include any of those listed below or a different species upon approval by the Roseburg BLM. The seed mix ratio will consist of 60% grasses and 40% forbs. Dominant species proposed by PCGP are footnoted (¹). The other species listed will be utilized where the proposed species are not available. Other species may also be used upon approval by the BLM.

Common Name	Scientific Name	Variety	Mixture Percentage
Grasses			
California brome	<i>Bromus carinatus</i>	Native ¹	25%
Blue wildrye	<i>Elymus glaucus</i>	Native ¹	35%
California fescue	<i>Festuca californica</i>	Native	
Roemer's fescue	<i>Festuca roemerii</i>	Native	
Harford's onion-grass	<i>Melica harfordii</i>	Native	
Forbs			
big deervetch	<i>Lotus crassifolius</i>	Native	
sickle-keeled lupine	<i>Lupinus albicaulis</i>	Native ¹	20%
silver lupine	<i>Lupinus albifrons</i> var. <i>eminens</i>	Native	
miniature lupine	<i>Lupinus bicolor</i>	Native	
slender goldenbanner	<i>Thermopsis gracilis</i> var. <i>gracilis</i>	Native	
tomcat clover	<i>Trifolium willdenowii</i>	Native	
grassy tarweed	<i>Madia gracilis</i>	Native ¹	20%
woodland tarweed	<i>Madia madioides</i>	Native	
Regreen or Quickguard ²			20 lbs/acre
Total Acres Estimated for Seed Mixture: 219 acres			Total lbs (PLS) 4,643

Note: where slopes exceed 25 percent, PCGP proposes to include Regreen or Quickguard in the seeding mixture at 20 lbs/acre for erosion control. Prior to application of Regreen or Quickguard, PCGP would receive approval from the Roseburg BLM.

Seed Mixture 15a–Medford BLM Lands – Oak woodland, Grasslands, Chaparral Types

Common Name	Scientific Name	Variety
Grasses²		
Roemer's fescue	<i>Festuca roemerii</i>	Native ¹
California Oatgrass	<i>Danthonia californica</i>	Native
Prairie Junegrass	<i>Koeleria macrantha</i>	Native
Pine bluegrass	<i>Poa secuda</i>	Native
California brome	<i>Bromus carinatus</i>	Native ¹
Blue wildrye	<i>Elymus glaucus</i>	Native ¹
Total Acres Estimated for Seed Mixture: 77 acres		Total lbs (PLS) 517.0 total lbs

Seed Mixture 15b – Medford BLM Lands - Conifer stands		
Common Name	Scientific Name	Variety
California fescue	<i>Festuca californica</i>	Native
Western fescue	<i>Festuca occidentalis</i>	Native
Harford's onion-grass	<i>Melica hardfordii</i>	Native
Blue wildrye	<i>Elymus glaucus</i>	Native ¹
Total Acres Estimated for Seed Mixture: 157.5 acres		Total lbs (PLS) 666.0 total lbs
Regreen/Quickguard or annual ryegrass ²		20 lbs/acre
Seed Mixture 15c – Medford BLM Lands – Wet Sites		
Slender hairgrass	<i>Deschampsia elongate</i>	Native
Note: Seeding rates – The seeding rate will be 10-20 seeds Pure Live Seed per square foot (10-20 seeds PLS/ft ²). Other species may also be used upon approval by the BLM. The BLM will specify genetically appropriate seed sources/seed zones for all species to be planted/seeded.		
¹ Dominant species proposed by PCGP are footnoted (¹).		
² The use of native seed mix is preferred; however, there may be instances in highly erosive soils on steep slopes, where mixing sterile perennials like sterile wheatgrass species or non-persistent annual grasses like Annual Rye could be appropriate. In these areas the PCGP will include Regreen, Quickguard or annual ryegrass in the seeding mixture at 20 lbs/acre for erosion control, if approved, or at a rate specified by the BLM.		

Seed Mixture 16a – Lakeview BLM Lands¹ (MPs 176 – 181)			
Common Name	Scientific Name	Variety	lbs/ac (PLS)
Perennial Grasses			
Blue wildrye	<i>Elymus glaucus</i>	Native	4.5
California fescue	<i>Festuca californica</i>	Native	4.5
California Brome	<i>Bromus carinatus</i>	Native	4
Total PLS lb/acre			13.0
Total Acres Estimated for Seed Mixture: 14.83 acres			193 Total lbs
Seed Mixture 16b – Lakeview BLM Lands¹ (MPs 215 – 220)			
Perennial Grasses			
Idaho Fescue	<i>Festuca idahoensis</i>	Native	2.0
Bluebunch wheat grass	<i>Pseudoroegneria spicata</i>	Native	3.0
Sandberg bluegrass	<i>Poa secunda</i>	Native	2.0
Basin Wildrye	<i>Leymus cinereus</i>	Native	1.0
Thurber's needlegrass	<i>Achnatherum thurberianum</i>	Native	1.0
Ross sedge	<i>Carex rossii</i>	Native	1.0
Squirreltail	<i>Elymus elymoides</i>	Native	1.0
Prairie junegrass	<i>Koeleria macrantha</i>	Native	1.0
Total PLS lb/acre			12.0
Total Acres Estimated for Seed Mixture: 3.57 acres			43 Total lbs
¹ The BLM will specify genetically appropriate seed sources/seed zones for all species to be planted/seeded. Native substitutions would be acceptable in consultation with the BLM.			

**Table 10.9-3
National Forest Seed Mixture**

Seed Mixture 17 ¹			Umpqua NF, Rogue River-Siskiyou NF Rate (lbs/ac)	Fremont-Winema NF Rate (lbs/ac)
Common Name	Scientific Name	Variety	lbs/ac (PLS)	
Perennial Grasses				
Blue wildrye	<i>Elymus glaucus</i>	Native	4	4.5
California fescue	<i>Festuca californica</i>	Native	4	4.5
California Brome	<i>Bromus carinatus</i>	Native	4	4
Legumes²				
Big deervetch ²	<i>Lotus crassifolius</i>	Native	1 (one or more of these listed species)	0
California tea ²	<i>Psoralea physodes</i>	Native		0
Woodland milkvetch ²	<i>Astragalus umbraticus</i>	Native		0
Total PLS lb/acre			13.0	13.0
Regreen or Quickguard ³			20	20
Total Acres Estimated for Seed Mixture: 433 acres			357 acres/ 5,629 Total lbs	76.2 acres/991.0 Total lbs
¹ The Forest Service will specify genetically appropriate seed sources/seed zones for all species to be planted/seeded. Native substitutions would be acceptable in consultation with the Forest Service. ² Do not use these species on the Rogue River-Siskiyou NF ³ Where slopes are > 25 percent, include Regreen or Quickguard in the seeding mixture at 20 lbs/acre for erosion control.				

10.10 Seeding Timing

Disturbed areas will be seeded within six working days of final grading, weather and soil conditions permitting, consistent with FERC's Upland Plan (Section V. D. 3. d.). It is expected that seeding of restored right-of-way areas may begin as early as mid-August and will proceed until all areas have been reseeded which may extend into the winter months. Seeding and other restoration work in high elevation areas will receive top priority for completion prior to the onset of winter conditions.

10.11 Seeding Methods

Seeding will be conducted using a mechanical broadcast seeder, hydroseeder, or seed drill according to the guidelines in FERC's Upland Plan. The seed application rates will be as specified for drilling rates and doubled if using broadcast seeding. Fertilizer, lime, or mulch will not be used in wetlands.

Broadcast Seeding

Broadcast seeding will be the preferred seeding method on steep slopes or other areas that cannot be accessed with other seeding equipment; areas that will be covered with erosion control fabric; and other areas determined appropriate for broadcast seeding by the EI and the authorized federal agency representative on federal lands. Seed will be broadcast with a mechanical seeder immediately after the seedbed has been prepared and the soil is loose. This will allow the seeds to be lightly covered as the soil settles. The seeding will be lightly dragged with chains or other appropriate harrows to lightly cover the seed in areas where it is possible, as determined by the EI. Broadcast seeding will occur immediately prior to installation of erosion control fabric or application of mulch (straw or wood).

Hydroseeding

Hydroseeding will be used in upland areas that can be safely accessed with hydroseeding equipment and other areas that are determined appropriate by the EI. Hydroseeding equipment will be equipped with sufficient tanks, pumps, nozzles, and other devices required for mixing and hydraulically applying the seed, wood fiber mulch, and tackifier mix in slurry form onto the prepared ground. The hydroseeding equipment will have built-in agitators which will keep the seed, mulch, tackifier, and water mixed homogeneously until pumped from the tank. Fertilizer may be included in the hydroseeder slurry for hydroseeded areas that are difficult to access for fertilizer application and incorporation, as determined by the EI and the authorized federal agency representative on federal lands. Hydroseeding and hydromulching will occur in one application unless PCGP's authorized representative specifies that they occur as two separate applications.

Where hydroseeding and hydromulching occur as two applications, the hydroseeding slurry will contain tackifier at 25 percent of the manufacturer's recommended rate and 300 pounds of wood fiber mulch to mark the seeded locations and the evenness of the application. The hydromulching will occur immediately following hydroseeding on the same day, where feasible. Hydroseeding and hydromulching will be done from two directions (e.g., left and right or up and down), where possible, to ensure maximum coverage of the soil.

Hydroseeding rates will be at the rates specified for broadcast seeding plus any adjustment the hydroseeding company recommends based on their equipment specifications.

Drill Seeding

Drill seeding will be used as an alternative to broadcast seeding in gently sloping areas such as pastures where PCGP is completing the revegetation work at the landowner's request. The drill seeding equipment will be a type that is appropriate for the location being seeded. The quantity of seed applied by drill seeding will be as specified for each seed mixture.

10.12 Supplemental Wetland and Riparian Plantings

To mitigate impacts in wetland and riparian areas, PCGP will plant native shrubs and trees in areas where these species existed prior to construction. Table 10.12-1 provides a list of suggested native trees and shrubs that are common in the Pipeline project area in these habitats and which would be planted after final restoration and cleanup during appropriate planting periods (during the winter and late spring after 2021 construction). To complete these restoration plantings, PCGP will select a local restoration contractor that is knowledgeable of wetland and riparian ecosystems as well as with the species' characteristics and site growth requirements for those species listed in Table 10.12-1. The shrubs and trees planted at each site will be determined at the time of planting based on the moisture regimes and site-specific conditions at each planting location and based on the plant spacing provided in Table 10.12-1. On federal lands, PCGP's restoration contractor will coordinate with the authorized agency representative and/or the agency botanists to determine appropriate planting species. Disturbed wetland and riparian areas will be replanted with tree and shrubs according to FERC's Wetland and Waterbody Procedures (Section V.C.7. and VI.C.5) provided in Attachment B. Shrubs will be planted and allowed to grow within 5 feet of the centerline and trees will not be planted within 15 feet of either side of the centerline to facilitate corrosion and leak surveys and to prevent roots from damaging pipe coatings.

**Table 10.12-1
Native Shrub and Tree Plantings for Restoring Wetland and Riparian Areas ¹**

Common Name	Scientific Name	Planting size ²	Plant Spacing ³
Shrubs			
Wet Sites			
Red-osier dogwood	<i>Cornus stolonifera</i>	36" cuttings	3'
Willow spp	<i>Salix spp.</i>	36" cuttings	3'
Moist Sites			
Pacific ninebark	<i>Physocarpus capitatus</i>	1 gal	8'
Red elderberry	<i>Sambucus racemosa</i>	1 gal	8'
Blue elderberry	<i>Sambucus cerulean</i>	1 gal	8'
Vine maple ⁴	<i>Acer circinatum</i>	1 gal	6'
Salmonberry	<i>Rubus spectabilis</i>	1 gal	4'
Nootka rose/woods rose	<i>Rosa nutkana/ Rosa woodsii</i>	1 gal	4'
Golden Currant	<i>Ribes aureum</i>	1 gal	6'
Dry Sites			
Snowberry	<i>Symphoricarpos albus</i>	1 gal	4'
Serviceberry ⁴	<i>Amelanchier alnifolia</i>	1 gal	8'
Oceanspray ⁴	<i>Holodiscus discolor</i>	1 gal	8'
Beaked hazelnut	<i>Corylus cornuta</i>	1 gal	8'
Lewis' mock orange	<i>Philadelphus lewisii</i>	1 gal	8'
Redstem Ceanothus ⁴	<i>Ceanothus sanguineus</i>	1 gal	8'
Deerbrush ⁴	<i>Ceanothus integerrimus</i>	1 gal	8'
Wedge-leaf ceanothus ⁴	<i>Ceanothus cuneatus</i>	1 gal	8'
Oregon Grape	<i>Mahonia aquifolium</i>	1 gal	4'
Salal	<i>Gaultheria shallon</i>	1 gal	4'
Kinnikinnik	<i>Arcostaphylos uva-ursi</i>	1 gal	6'
Hairy manzanita ⁴	<i>Arcostaphylos columbiana</i>	1 gal	8'
Trees			
Wet Sites			
Oregon ash	<i>Fraxinus latifolia</i>	1 gal	10'
Red alder	<i>Alnus rubra</i>	1 gal	10'
Sitka spruce	<i>Picea sitchensis</i>	2 gal or bare root	15'
Western red cedar ⁵	<i>Thuja plicata</i>	2 gal or bare root	12'
Oregon crabapple	<i>Malus fusca</i>	1 gal	10'
Black cottonwood	<i>Populus balsamifera ssp. trichocarp</i>	36" cuttings or poles	10'
Moist Sites			
Cascara buckthorn	<i>Frangula purshiana</i>	1 gal	8'
Western hemlock ⁵	<i>Tsuga heterophylla</i>	1 gal	12'
Dry Sites			
Douglas' fir ⁵	<i>Pseudotsuga menziesii</i>	1 gal or bare root	12'
Big-leaf maple	<i>Acer macrophyllum</i>	2 gal	15'
¹ The Forest Service and BLM will specify genetically appropriate seed sources/seed zones for all species to be planted. ² Planting stock sizes may include bare root equivalents. ³ Shrubs will be installed in clusters of 5 to 10, while trees will be individual specimens. ⁴ Shrubs to be planted on NFS Lands 15 feet each side of the centerline and the outer edge of the construction limits (see Table 10.13-1). ⁵ Riparian areas on the BLM's Coos Bay District lands will be replanted with a coniferous mixture of 50% Douglas-fir, 25% western hemlock, and 25% western red cedar on a 15 ft x 15 ft spacing. Note: The Umpqua NF requested the following species be planted to provide additional habitat elements: <i>Asclepias cordifolia</i> (heartleaf milkweed) for monarch butterflies, and <i>Lonicera ciliosa</i> (orange honeysuckle) for humming birds. These species will be included in the shrub clusters, or planted separately in appropriate habitats scattered along the construction right-of-way. Heartleaf milkweed will primarily be planted by seed or rhizome cuttings. Orange honeysuckle will be planted as containerized stock or bare root specimens.			

In riparian areas on private lands, shrubs and trees will be planted across the right-of-way for a width based on Oregon Department of Forestry's Riparian Management Area (RMA)¹ widths, which are based on stream size and type, subject to the 15-foot (trees) restrictions on either side of the centerline. The riparian planting area on private lands will occur to specific RMA buffer widths¹, or to the limit of the existing riparian vegetation where the riparian vegetation does not extend to 100 feet.

Riparian Management Area Widths for Streams of Various Sizes and Type¹

	Type F	Type D	Type N
Large	100 feet	70 feet	70 feet
Medium	70 feet	50 feet	50 feet
Small	50 feet	20 feet	Apply specified water quality protection measures, and see OAR 629-640-0200

¹ OAR 629-635-0000: http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_629/629_635.html

Drawing 3430.34-X-0015 and Drawing 3430.34-X-0016 in Attachment C provide schematics of the planting and maintenance areas within wetlands and riparian areas. On federal lands, PCGP has committed to extending the riparian strip plantings along all streams (perennial or intermittent) within federally-designated Riparian Reserves to 100 feet from the OHWM (subject to the 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 the riparian vegetation does not extend to 100 feet. Appropriate restoration BMPs as outlined in the Site-Specific Stream Crossing Prescriptions for the Perennial Streams on BLM and National Forest lands (North State Resources 2014) will be incorporated during construction and restoration in consultation with the federal agency's authorized representative and PCGP's EI or authorized representative.

Additionally, as specified in PCGP's Gas Pipeline Project Technical Memo for Water Temperature Impacts Assessment (April 3, 2009), PCGP would install supplemental transplanted trees that are root pruned a year in advance of restoration/replanting on the Umpqua National Forest within the riparian areas of East Fork Cow Creek and tributaries including: Hydrofeatures C (WW-111-001 - GW014 - MP 109.17), G (GSP019 - MP 109.47), J (MP 109.69), K (MP 109.78), and N (ESI069 - MP 110.96) as well as on the South Fork Little Butte Creek on the Rogue River-Siskiyou National Forest (ASP 165 - MP 162.45). Root pruning a year in advance of replanting is expected to increase the survival success rate of the transplanted stock. Trees that would be root pruned would be selected from areas along the edge of the construction right-of-way or TEWAs that can remain in place without disturbance until the restoration phase. Tree species type and diversity will be the same as what is presently growing at each site. The EI or PCGP's representative and the authorized agency representative will identify and flag the appropriate trees to be used for transplanting purposes. PCGP contracted with North State Resources to conduct the modeling efforts for the April 3, 2009 water temperature impact assessment. Based on these modeling efforts North State Resources developed Table 10.12-2 which provides the planting distance for the 15-20-foot tall root-pruned trees that would be planted on each streambank.

Table 10.12-2
Optimal Planting Distance of 15-20-foot Transplanted Root-Pruned Trees

Site Identifier	Waterbody	Milepost	Jurisdiction	Proposed Planting Distance (feet) from Stream Channel High Water Mark	
				Left Bank ¹	Right Bank ¹
WW-111-001 (GW014/ FS-HF-C)	Trib. to East Fork Cow Creek	109.17	Umpqua National Forest	12	12
GSP019/ FSHF-G	East Fork Cow Creek	109.47	Umpqua National Forest	15	12
FS-HF-J	Trib. to East Fork Cow Creek	109.69	Umpqua National Forest	18	25
FS-HF-K	Trib. to East Fork Cow Creek	109.78	Umpqua National Forest	19	26
ESI068/ FS-HF-N	Trib. to East Fork Cow Creek	110.96	Umpqua National Forest	12	12
ASP 165	South Fork Little Butte Creek	162.45	Rogue River-Siskiyou National Forest	18	12

¹ Looking downstream

These optimal distances were calculated based on site-specific topography and aspect conditions. In order to achieve maximum effective shade to the stream course and to avoid further impacts to impacted riparian areas, specific criteria were used to calculate planting distances as follows:

- 15-foot tall deciduous tree used for vegetation type;
- At a minimum during the first year, the transplanted trees would provide effective shade between the tree base and the wetted channel at all daylight hours on August 5 except between the hours of 10 am and 2 pm. This method assumes that on August 5 the maximum stream temperature is achieved and effective shade would be cast on the riparian area during all but four hours of daylight;
- Planting distances from the waters edge are maximized to avoid further impacts to the affected riparian zone using the physical features of each water course; and
- Tree planting density was estimated from the existing site data and spacing will likely be 15 to 20 feet.

Effective shade was determined along both stream banks at each hydrofeature using the methods described in *Determining Individual Tree Shade Length: A Guide for Silviculturalists*. (Geier-Hayes, Hayes, and Basford, 1995). The guide provides a method for determining shadow length from the tree base to shadow tip during the hottest portion of the year (May 10 - October 11) for differing slopes, aspects, and northern latitudes. Using the aforementioned referenced techniques, individual tree shade length was calculated at each hydrofeature using the following data:

- **Stand Variables**
 - *Latitude*: 42 degrees north used for all sites;

- *Aspect of Topography (Azimuth)*: determined for each hydrofeature using aspect derived in GIS from 10 meter DEM data;
 - *Percent Slope*: determined for each hydrofeature using slope derived in GIS from 10 meter DEM data; and
 - *Target Date*: August 5 (assumed date of maximum water temperature) for all hydrofeatures.
- **Tree Variables**
 - Tree Height: total height of tree. Assumed 15 foot tree height for all hydrofeatures;
 - Cone Length: vertical length of tree that contains branches and leaves. Assumed a 10 foot crown length at all hydrofeatures; and
 - Crown Radius: the distance from trunk to edge of crown. Assumed that crown had a diameter equal to one-third of tree height, 5 feet, and radius was 2.5 feet for all hydrofeatures.
 - **Determine Tree Length Factor**: using the stand and tree variables, an adjustment coefficient is determined for each stand (Geier-Hayes, Hayes, and Basford, 1995).

The techniques described above were used to calculate the shade length created on each bank of a given hydrofeature. The calculated shade length was used to determine the minimum planting distances required to meet the aforementioned planting criteria. These planting distances were calculated for each hydrofeature and are generally too close to a stream course to allow mechanized equipment work without entering the stream channel. Minimum planting distances were modified to account for flow regime and to provide working space for mechanized equipment along the pipeline corridor.

The transplanted root-pruned trees will be monitored annually according to FERC's Wetland and Waterbody Procedures. If the success rate drops below 80 percent, a Forest Service authorized representative will be informed and a plan will be developed between the Forest Service and PCGP to restock these sites.

10.13 Supplemental Forest Plantings

In forest lands disturbed by the Pipeline, PCGP will replant according to state and federal (BLM and Forest Service) reforestation requirements. Reforestation planting prescriptions provided by the BLM and Forest Service were used to develop the reforestation prescriptions provided in Table 10.13-1. Reforestation efforts will occur in the first winter/spring after 2021 construction between about December and April. On all forest lands crossed by the Pipeline, trees will be replanted across the construction right-of-way and permanent easement up to 15 feet from either side of the centerline, allowing a 30-foot strip centered over the centerline to be void of trees to facilitate corrosion and leak surveys and protect the pipeline from root damage. The permanent (operational) easement will be maintained in a condition where trees or shrubs will be controlled (cut or trimmed) within 15 feet either side of the centerline (for a total of 30 feet cleared of trees). Trees will be allowed to mature within the remainder of the permanent pipeline easement. Drawing 3430.34-X-0017 in Attachment C provides a schematic of the areas of the construction right-of-way that will be reforested.

**Table 10.13-1
Reforestation Planting Prescriptions**

Landowner/ Jurisdiction	BLM District Recommended Planting Prescriptions				Forest Service Prescriptions ¹	Private ²
	Coos Bay District ⁴	Roseburg District	Medford District ³	Lakeview District	Umpqua, Rogue River-Siskiyou, and Fremont-Winema National Forests	
Upland Tree Species and age (bare root) All planting stock to be from genetically appropriate source material⁵	Plant 1+1 or P-1 Douglas fir	Plant mixture of 1+1 Douglas-fir, plug +1 ponderosa pine, and plug + 1 incense-cedar seedlings appropriate to site-specific areas (80%-10%-10%, respectively)	1+1 Douglas-fir, Ponderosa pine, and plug+1 incense cedar planting ratios based on elevation and aspect. ³	Plant mixture of 60% 2+1 Ponderosa pine, 20% 2+1 Incense cedar and 20% 2+1 Douglas fir.	1+1 Douglas fir, white fir, ponderosa pine incense cedar, rust-resistant sugar pine, Shasta red fir and oak, depending on site conditions. ¹ Shrubs noted in Table 10.12-1 to be planted from 15 feet each side of the pipeline centerline to the outer edge of the construction limits. In addition, the Umpqua NF requests the following species be planted to provide additional habitat elements: <i>Asclepias cordifolia</i> (heartleaf milkweed) and <i>Lonicera ciliosa</i> (orange honeysuckle) ⁶	Plant mixture of 1+1 Douglas-fir, plug + 1 ponderosa pine, and plug + 1 incense-cedar seedlings appropriate to site-specific areas.
Plant Spacing	10 ft X 10 ft spacing (about 400 - 435 seedlings per acre).				15 ft X 15 ft spacing (about 200 seedlings per acre).	10 ft X 10 ft spacing (about 400 - 435 seedlings per acre).
Plant Protection	Install vexar plastic mesh tubing (26"X3.5") on each seedling with 36" bamboo stake.		None			
Fertilizers		Slow release in-hole fertilizer packets should be used on serpentine, decomposed granite, or other poor soils.	Slow release in-hole fertilizer packets should be used on serpentine, decomposed granite, or other poor soils.	Slow release in-hole fertilizer packets should be used on serpentine, decomposed granite, or other poor soils		
Monitoring	Monitor seedling growth/survival the first fall following planting. Replant/interplant areas where tree stocking falls below minimum acceptable levels (300 trees per acre)			Monitor seedling growth/survival the first and third fall following planting. Replant/interplant areas where tree stocking falls below minimum acceptable levels (300 trees per acre).	Monitor seedling growth/survival the first fall and third growing seasons following construction to ensure target stocking of 100-150 trees per acre.	Monitor seedling growth/survival the first fall following planting. Replant/interplant areas where tree stocking falls below minimum acceptable levels according to (ODA 629-610-00200)

¹ Silvicultural prescriptions will be developed in accordance with the Forest Service Silvicultural Practices Handbook (FSH 2409.17) and the Reforestation Handbook (2409.26b-92-5), and approved by a Forest Service Certified Silviculturist.

² Silvicultural prescriptions will be developed in accordance with Oregon Department of Forestry Forest Practice Administrative Rules and Forest Practice Act, Chapter 629.

³ Lower elevation sites (<2500 ft) with S, SW, W aspects should contain proportionally more PP (i.e., - 50% PP, 25% DF, 25% IC); Mid-elevation sites (2500 - 4000') with S, SW, and W aspects should still contain a strong proportion of PP (i.e., - 25%PP, 50DF, 25 IC); Lower elevation sites (<2500') with more favorable aspects (E, NE, N, and NW) should be targeted toward a higher percentage of DF (i.e., - 60% DF, 25% PP, 15% IC); Mid-elevation sites with favorable aspects should contain progressively more DF and eliminate the pine component (i.e., - 85% DF, 15% IC). DF=Douglas Fir, PP=Ponderosa Pine, and IC=Incense Cedar. Between approximately MPs 152.32 and 152.39 plant primarily IC within PP Plantation and seasonally saturated soils.

⁴ Upland reforested Planting Prescriptions within Late-Successional Reserve land use designations on Coos Bay District: replant with a coniferous mixture of 50% Douglas-fir, 25% western hemlock, and 25% western red cedar on a 15 ft x 15 ft spacing.

⁵ The Forest Service and BLM will specify genetically appropriate seed sources/seed zones for all species to the planted/seeded.

⁶ On the Umpqua National Forest the following species will be planted with the supplemental shrub plantings: *Asclepias cordifolia* (heartleaf milkweed) for monarch butterflies and *Lonicera ciliosa* (orange honeysuckle) for humming birds. These species will be included in the planted shrub clusters, or planted separately in appropriate habitats scattered along the right-of-way. Heartleaf milkweed maybe planted as seed.

10.14 Other Habitat Diversity Features

As indicated in Sections 10.2 and 10.6, downed logs, unmerchantable woody debris, and slash (greater than 16-inches in diameter) including large rocks and boulders may also be stacked/piled along the right-of-way to provide habitat diversity features. These habitat diversity features would be created within the certificated construction limits where approved by the EI or PCGP's authorized representative and the landowner or land management agency. The Forest Service and BLM will specify habitat diversity features to be created within the right-of-way using downed logs, unmerchantable woody debris, slash > 16" in diameter, and large rocks/boulders.

10.15 Mulch

Mulch will be applied on all slopes where necessary to stabilize the soil. The source of mulch will be native wood mulch, straw, or hydromulch. It is anticipated that native wood mulch and manufactured wood fiber mulch will be the major sources of mulch used on the construction right-of-way. These wood mulch materials are also preferred by the Forest Service and will be used on NFS lands, unless other mulch materials are approved by the authorized agency representative.

Native Wood Mulch

The majority of the native wood mulch used for restoration work will be slash, brush, chips, and non-merchantable timber cleared from the construction right-of-way during the timber clearing phase. This material will be stored on the edge of the construction right-of-way, within TEWAs and UCSAs. This material will be lopped and scattered across the right-of-way after seeding to act as mulch to reduce erosion and enhance revegetation success. This slash material will be redistributed according to BLM and Forest Service fuel loading requirements as provided in Section 10.2 (Treatment of Forest Slash). In addition, the Forest Service has Effective Ground Cover standards (see Table 10.15-1) to minimize surface soil loss resulting from gravity, water, or wind action. According to these standards, a minimum amount of effective ground cover is to be established within the first year following the end of ground-disturbing activity. PCGP proposes to use these standards in all forested areas along the alignment where slash is to be returned to the construction right-of-way.

**Table 10.15-1
Effective Ground Cover Requirements**

Erosion Hazard Class	Minimum Percent of Effective Ground Cover^{1, 2}
Low	25%
Moderate	45%
High	65%
Very High	85%

¹ Effective ground cover is considered to be all living or dead herbaceous or woody materials, synthetic materials, and rock fragments greater than 3/4" in diameter that is in contact with ground surface and considered to be stable and resistant to downslope movement.

² As recommended by the Forest Service on the Umpqua National Forest, between about MPs 109 and 110 provide 100% post-construction ground cover on all disturbed areas in the area where the alignment crosses the Thomason cinnabar claim group (see Contaminated Substances Discovery Plan/Appendix E of the POD).

PCGP will assume that all areas along the construction right-of-way where slash is redistributed will have a high to very high erosion hazard class, and therefore PCGP will apply slash (including wood chips, where available) at a minimum percent effective cover of 65 to 85 percent of the right-of-way (see Table 10.15-1). PCGP assumes that the soils within the construction right-of-way will be categorized within the high to very high erosion hazard classes because all vegetation within the right-of-way will be removed and soils will be disturbed during grading, trenching, backfilling, and restoration activities.

Native wood mulch will be applied to a depth not exceeding one inch. The wood mulch will not be mixed into the soil. The Forest Service has noted that wood chips can be the most effective means to protect soils from surface and fluvial erosional processes.

Wood Fiber Mulch

Manufactured wood fiber mulch will be applied as hydromulch at 2,000 pounds per acre during hydroseeding. A tackifier or bonding agent recommended by the manufacturer will be used to bond the wood fiber mulch to the soil surface.

The wood fiber mulch will consist of pure wood fibers manufactured expressly from virgin wood chips. The chips will be processed in such a manner as to contain no trace of lead paint, varnish, printing ink, petroleum-based compounds, or seed germination inhibitors. Fiber will not be produced from unknown origin recycled material such as sawdust, paper, cardboard, or residue from chlorine bleached paper mills.

Wood fibers of mulch must maintain uniform suspension in water under agitation. The wood fiber mulch will blend with seed and tackifier to form homogenous slurry. Upon application, the mulch will form a blotter-like mat covering the ground. This mat will have the characteristics of water absorption and percolation and will cover and bond grass seed in contact with the soil. The wood fiber mulch will be dyed green to aid in visual metering during application. The dye will be non-toxic, biodegradable and not inhibit plant growth.

Bonded Fiber Matrix

PCGP will use a bonded fiber matrix ("BFM"), or similar product, on slopes greater than 2.5 to 1 (i.e., 40 percent), where prescribed by the EI or PCGP's authorized representative. BFM is similar to wood fiber mulch, but it has properties that allow it to remain strong and insoluble after its initial drying. BFM reduces erosion by a) absorbing the impact of rainfall while still allowing water to filter through, and b) absorbing water like a sponge to prevent overland water flow and rilling (Mat, Inc, 2017). It creates a strong and durable mat of interlocking fiber strands held together by a bonding agent which is water resistant and which will withstand re-exposure to moisture without re-dissolving or losing its adhesive quality. Once dry, it forms a water-absorbent protective mat which is porous and breathable and secures soil and seed until vegetation is established (Mat, Inc, 2017).

BFM is designed to mix and flow easily when wet and yet remain strong and insoluble once dry, protecting the soil surface from repeated rains and sheet flows. BFM can be applied prior to a rainy season or late in the year as it is formulated to endure the harsh conditions of heavy rains and snow (Mat, Inc, 2017). In time, BFM biodegrades completely into natural organic compounds which are beneficial to plant life. It is safe to use in riparian zones and watersheds. Because BFM is sprayed on, the site remains relatively undisturbed, further reducing the risk of erosion (Mat, Inc, 2017).

Straw Mulch

Straw mulch will be certified weed-free by the appropriate state certification program. In 2009, Oregon established a voluntary pilot Weed Free Forage Program³ which certifies both grass and alfalfa hay and straw. The contractor will deliver weed-free certification documents from this program to the EI prior to applying any straw mulch. However, if the certification program is not in place at the time of construction, or if there are not sufficient quantities of certified weed free straw available, the contractor will request review/inspection of the straw by the local soil and water conservation district, county agent, or other appropriate official or authorized agency representative on federal lands. Any straw that is found to contain noxious weeds during application will be immediately removed from the construction right-of-way and staging areas and properly disposed of in a public landfill.

The mulch will be uniformly applied at a rate of 2 tons/acre to cover the ground surface. Mulching will occur immediately after seeding where broadcast or drill seeding occurs. Anchoring the mulch is not expected to be necessary because strong winds, which could dislodge the mulch, typically occur during the winter rainy season when the moist conditions will bind the straw to the soils. Liquid mulch binders are not expected to be utilized unless hydromulch is applied. Liquid binders will not be used in wetlands or waterbodies.

10.16 Erosion Control Fabric

PCGP will install erosion control fabric (such as jute or excelsior) on streambanks at the time of recontouring (see Drawing 3430.34-X-0009 in Attachment C). The fabric will be anchored using staples or other appropriate devices. The erosion control fabric to be used on streambanks and steep slopes will be designed for the proposed use and will be approved by the EI, and authorized agency representative on federal lands. The EI or authorized company representative and authorized agency representative on federal lands will also determine other appropriate areas along the construction right-of-way where erosion control fabric will be applied based on site-specific conditions, such as steep slopes or reestablished ditches or drainages.

11.0 STEEP AND RUGGED TERRAIN

A significant portion of the Pipeline crosses rugged topography as it traverses the Coast and Cascade Mountain Ranges and foothills. Where the Pipeline passes through the dissected Coast Range and foothills between the Coos River and Myrtle Creek (MPs 9.00 to 81.00) most of the ridgelines run in the opposite direction of the proposed alignment. The orientation of the ridges requires the Pipeline, in numerous areas, to descend and ascend steep ridge slopes to cross stream drainages so that the alignment can proceed in a southeasterly direction toward Myrtle Creek and ultimately the terminus of the pipeline near Malin, Oregon. This similar condition also occurs between MPs 81.00 and 121.00 where the Pipeline traverses the Cascade Range and foothills. During routing, PCGP optimized the alignment along ridgelines, where feasible, to minimize crossing steep slopes and potential geologic hazards, to minimize waterbody crossings, and to minimize the amount of cuts and fill slopes that would be required which reduces the erosion hazard. Areas of steep side slopes (greater than 50% grade) were also avoided as much as practical during routing to minimize the complications associated with construction in these areas as well as potential long-term slope instability hazards.

³ <http://www.oregon.gov/ODA/programs/MarketAccess/MACertification/Pages/WeedFreeForage.aspx>

The Geohazards and Mineral Resources Report (see Resource Report 6) provides a geotechnical hazards review that was conducted during routing and describes the avoidance mitigation measures that were implemented (i.e., minor reroutes) to avoid potential high risk geological hazards areas. Resource Report 7 of PCGP's FERC Certificate application also identifies the miles of soils crossed by the Pipeline which are associated with steep slopes and high erosion hazards. PCGP has noted areas where the proposed route traverses steep, narrow ridges and where it will be infeasible to return these ridges to their original preconstruction contours during final grading. Drawing 3430.34-X-0018 in Attachment C provides a typical construction right-of-way configuration in these sharp ridgeline areas. This drawing shows the construction techniques that will be utilized to ensure safe and feasible construction; minimize overall construction disturbance; and ensure the long-term safety, stability, and integrity of the pipeline. Avoidance of these areas is not feasible because stable alternate pipeline routes were not present along the alignment, except for other similar ridgeline features that would have the same conditions.

During construction across rugged topography, PCGP will utilize the same construction procedures outlined in this ECRP to minimize construction, geologic, and erosion hazards as well as to ensure the integrity of the pipeline. In summary these procedures include:

- routing the pipeline to ensure safety and integrity of the pipeline;
- identifying adequate work areas to safely construct the pipeline;
- utilizing appropriate construction techniques to minimize disturbance and to provide a safe working plane during construction (i.e., two-tone construction; see Drawing 3430.34-X-0019 in Attachment C);
- Spoil storage during trench operations on steep slopes (greater than the angle of repose) will be completed using appropriate BMPs to minimize loss of material outside the construction right-of-way and TEWAs. Examples of BMPs that may be used include the use of temporary cribbing to store material on the slope or temporarily end-hauling the material to a stable upslope area and then hauling and replacing the material during backfilling;
- optimizing construction during the dry season, as much as practicable;
- utilizing temporary erosion control measures during construction (i.e., slope breakers/waterbars);
- installing trench breakers in the pipeline trench to minimize groundwater flow down the trench which can cause in-trench erosion;
- backfilling the trench according to PCGP's construction specifications;
- restoring the right-of-way promptly to approximate original contours or to stable contours after pipe installation and backfilling;
- installing properly designed and spaced permanent waterbars;
- revegetating the slope with appropriate and quickly germinating seed mixtures;
- providing effective ground cover from redistributing slash materials, mulching, or installing erosion control fabric on slopes, as necessary; and
- monitoring and maintaining right-of-way as necessary to ensure stability.

In addition to these typical construction methods, where PCGP identifies steep sideslopes requiring restoration, the fill-slope specifications outlined below will be followed to ensure slope stability:

Fill slopes will be constructed in order to return the site to the approximate pre-construction topography. Fill slopes which exceed a gradient of 3H:1V (Horizontal:Vertical), will be

constructed in accordance with the following specifications under the supervision of PCGP's qualified representative:

Materials

1. Fill materials used for constructing slopes exceeding 3H:1V will be considered structural fill.
2. Materials used as structural fill should be free of roots, organic matter, and other deleterious materials.
3. Fill materials will be at a moisture content suitable for compaction.
4. If on-site soils are unsuitable for use as structural fill, imported structural fill will consist of pit or quarry run rock, crushed rock, crushed gravel and sand, or sand that is fairly well graded between coarse and fine, contains no clay balls, roots, organic matter or other deleterious materials, and has less than 5 percent passing the U.S. No. 200 Sieve.

Slope Preparation

1. Slopes to receive fills will be prepared by stripping the existing organic material and topsoil.
2. Construct steps or benches on existing slopes to receive fills that exceed 3H:1V. The bench height to width ratio will be adjusted to match the existing slope gradient.

Fill Placement and Compaction

1. Fill soils will be compacted at a moisture content that is suitable for compaction. The maximum allowable moisture content varies with the soil gradation, and will be evaluated during construction. Silt and clay and other fine granular soils may be difficult or impossible to compact during persistent wet conditions.
2. Fill material will be placed in uniform, horizontal lifts. Minimum lift thickness will vary based on material compacted and the type of compaction equipment used.
3. Compact each lift by operating, hauling, and spreading equipment uniformly over the full width of each layer until there is no visible deflection under the load of the hauling and spreading equipment. If each lift of fill cannot be accessed by the hauling and spreading equipment to achieve compaction, then other suitable compaction equipment will be used to obtain the required compaction. Alternative compaction equipment and methods may include tamping with a trackhoe bucket, vibratory plate compactors (hoe-pack) or rollers.

12.0 NOXIOUS WEEDS, SOIL PESTS, AND FOREST PATHOGENS CONTROL PLAN

The Oregon Department of Agriculture ("ODA") (Butler 2006), BLM, and Forest Service have been consulted for recommendations to prevent the introduction, establishment, or spread of noxious weeds, soil pests, and forest pathogens. In general, these agencies have recommended that reconnaissance surveys be conducted along the alignment to determine the presence of noxious weeds and forest pathogens so that appropriate BMPs can be developed and applied prior to and during construction to prevent the introduction, establishment, or spread of noxious weeds and forest pathogens. Additionally, these agencies have recommended that construction equipment and vehicles be cleaned prior to moving them onto the construction right-of-way to prevent the import and spread of weeds and that vegetation clearing and grading equipment be cleaned if they pass through known noxious weed infestations. Disturbed areas will be promptly replanted as described in Section 10.9 with

appropriate seed mixtures to help prevent noxious weed germination. The right-of-way will be monitored after construction, and any noxious weed infestations will be controlled in accordance with permit and landowner stipulations. The following section describes in more detail the measures that will be implemented by PCGP during construction to minimize the potential spread of noxious weeds, soil pests, and forest pathogens. These sections of the ECRP were also utilized as the basis for PCGP's Integrated Pest Management Plan (see Appendix N of the POD).

12.1 Reconnaissance Surveys

PCGP conducted initial reconnaissance weed surveys concurrently with wetland and waterbody inventories during the summer and fall of 2006 and 2007. Additional reconnaissance weed surveys were conducted during biological surveys in 2007 and 2008 and various supplemental surveys through 2017. These surveys were conducted by local biologists who were familiar with priority listed noxious weeds. The results of these inventories are provided in the Integrated Pest Management Plan (see Appendix N of the POD), which also provides the state classifications. The reconnaissance surveys will assist in determining where management or pretreatment may be necessary prior to construction to prevent the spread of noxious weeds. As indicated in the Integrated Pest Management Plan, PCGP will also complete preconstruction weed surveys to determine potential pretreatment requirements and construction practices that would be implemented during clearing and grading to minimize and avoid the potential spread of weeds and forest pathogens.

12.2 Pretreatment

Pretreatment will primarily be accomplished by mechanical operations by mowing to the ground level, if appropriate for the targeted weed species. Other appropriate mechanical methods may include disking, ripping, or chopping. Hand pulling methods may also be utilized if the area of infestation is small or where mechanical methods are not feasible. Infested areas will be cleared in a manner to minimize transport of weed seed, roots, and rhizomes or other vegetative materials and soil from the site down the construction right-of-way. Spot treatments with appropriate herbicides will also be conducted where applicable depending on the specific weed and site-specific conditions using integrated weed management principles. Spot herbicide treatment would only be utilized when it could be effective (i.e., plant phenology and effective herbicide treatment windows coincide) prior to construction. Any herbicide treatment would be conducted by a licensed applicator using herbicides labeled for the targeted species and registered for the use. Herbicides would be used where approved by the land-managing agency or landowner. Permits for use of herbicides on federal lands would be obtained prior to use/treatment (see Integrated Pest Management Plan/Appendix N of the POD).

12.3 Equipment Inspection

Prior to transporting construction equipment to the construction right-of-way, all equipment will be inspected to ensure that it is clean and free of potential weed seed or sources (i.e., soil roots or rhizomes) and power washed, if necessary, as determined by the EI or authorized agency representative on federal lands. In addition, initial inspections of all inspector vehicles and construction contractor vehicles will also be performed prior to being allowed on the construction right-of-way. This does not apply to local service vehicles that will stay on the existing roadway, traveling frequently in and out of the Pipeline project area. The EI or PCGP's authorized representative will be responsible for performing inspections and registering or tagging the equipment prior to being transported or moved to the right-of-way. To ensure the equipment is

thoroughly inspected, the EI or authorized representative will use the inspection checklist provided in Attachment D.

12.4 Clearing and Grading

In areas where infestations have been identified or noted in the field, the contractor will stockpile cleared vegetation and salvage topsoil or graded material adjacent to the area from which they are stripped to eliminate the transport of soil-borne noxious weed seeds, roots, or rhizomes. Where practical and feasible, right-of-way grading activities will occur toward any known areas of infestation to minimize the potential spread of noxious weeds or forest pathogens. During reclamation, the contractor will return any graded materials and vegetative material from the infestation sites to the areas from which they were stripped or moved. Any clearing equipment used in areas of priority A and T as well as selected B listed weeds will be cleaned by hand, blown down with air, or pressure washed prior to leaving the site. Equipment cleaning on the right-of-way will occur in an approved cleaning station such as that shown on Drawing 3430.34-X-0020 in Attachment C. The EI will approve the appropriate cleaning station location(s) and will be responsible for determining the effective cleaning method for the grading/clearing equipment (including power washing, if necessary). Infested areas and cleaning station locations will be mapped to ensure that these areas are monitored during construction and to ensure that these weeds are controlled and not spread.

NFS and BLM Lands. Because of the contiguous pattern of NFS Lands crossed by the Pipeline, equipment will be inspected and cleaned at cleaning stations located at the borders of each National Forest prior to clearing and grading activities in addition to being cleaned at cleaning locations adjacent to mapped noxious weed infestation areas that were identified during preconstruction surveys on federal lands and where a treatment plan has been developed in consultation with the authorized agency representative. The cleaning station(s) will be located and approved by the EIs and the authorized agency representative on federal lands. The cleaning station location(s) will also be mapped for future monitoring efforts to determine if potential infestations occur at these sites and, if they do, to ensure that appropriate control treatments are applied.

Because the BLM managed lands are not contiguous and are spread out in a checkerboard pattern, it is not practical to set up inspection and cleaning stations at each entry point. However, where BLM lands are contiguous to NFS Lands, the cleaning station will be located to include the adjacent BLM lands.

12.5 Weed-Free Materials

PCGP will use certified weed-free seed during seeding operations as indicated in Section 10.9 of this ECRP. In addition, PCGP will use certified weed-free straw for mulch and sediment barriers, dewatering structures, or other uses along the right-of-way. The EI or PCGP's authorized representative will be responsible for ensuring that all straw hauled to the construction yards will be certified weed-free⁴. Where straw is to be used on federal lands, the BLM's or Forest Service's authorized officer may also inspect and approve straw materials to verify that the straw is weed-free. Depending on the source of the straw, it is generally advisable to have the straw certified in the county where it was produced prior to shipping. If gravel or other materials are used on NFS Lands, they will be from a weed-free source and approved by the Forest Service's authorized representative.

⁴ <http://www.oregon.gov/ODA/programs/MarketAccess/MACertification/Pages/WeedFreeForage.aspx>

12.6 Weed Control

Where weed control is necessary, PCGP will employ hand and mechanical methods (pulling, mowing, disking, etc.) to prevent the spread of potential weed infestations. To determine if an herbicide is to be used over other control methods, PCGP will base the decision on integrated weed management principles (USDA, 2005). Decisions will be made based on whether other methods or combinations of methods are known to be effective on the species in similar habitats. The choice of herbicides will be based on the invasive species, how it reproduces, its seed viability, the size of its population, site conditions, known effectiveness under similar site conditions, and the ability to mitigate effects on non-target species.

In most cases, if an herbicide is used for control, it would be used in combination with other methods. For example, initial treatment of an invasive species may be done with an herbicide, but then manual or mechanical methods may be implemented as maintenance treatments over the long-term. If herbicides are used to control noxious weed infestations, PCGP will employ a state or federally-licensed herbicide applicator to ensure that the appropriate herbicides are utilized for the targeted weed species during its proper phenological period and at the specified rate. The applicator will ensure that the herbicides are used according to the labeling restrictions and according to all applicable laws and restrictions and according to the appropriate land managing agency decision documents. Permits for the use of herbicides on federal lands would be obtained prior to use/treatment (see Integrated Pest Management Plan/Appendix N of the POD).

The applicator will confirm that the herbicides are used under the proper seasonal and weather conditions to ensure effectiveness and to minimize drift to non-targeted areas. Herbicides will not be applied during precipitation events or when precipitation is expected within 24 hours or as specified on the label. Prior to herbicide application, PCGP and/or their contractor will obtain all required permits from the local jurisdictions/authorities and land-managing agency. The licensed applicator will complete a Herbicide Application Record (see Integrated Pest Management Plan/Appendix N of the POD) when herbicides are applied on federal lands. PCGP will not utilize herbicides on the right-of-way without landowner consent/approval and will use wicking, wiping, injection, or spot spraying as permitted by product labels. PCGP will not use aerial herbicide applications and will not use herbicides for general brush/tree control within the 30-foot maintained operational easement.

Weed Control near Sensitive Areas and Habitats. Herbicides will not be used within 100 feet of a wetland or waterbody, unless allowed by the appropriate agency. PCGP and their applicators will ensure that herbicide use does not impact sensitive species identified during PCGP's biological surveys. To ensure sensitive species/habitats are not adversely impacted by the weed control activities, the Integrated Pest Management Plan (see Appendix 7 to Appendix N of the POD) provides the various sensitive species and/or associated buffers that are crossed or that are in the vicinity of the Pipeline. If noxious weed infestations occur in the vicinity of sensitive sites, the proper treatment buffers will be applied to avoid potential adverse impacts to non-targeted species. In these areas site-specific control will be designed (e.g., application rate and method, timing, wind speed and direction, nozzle type and size, buffers, etc.) to mitigate the potential for adverse disturbance and/or contaminant exposure.

12.7 Soil Pests

In the Klamath Basin there are two organisms of regulatory concern. These include *Verticillium* (fungus), which is a concern in mint and potato fields, and *Meloidogyne chitwoodii* (nematode), which is a concern in potatoes. Both of these organisms inhabit the soil and can be easily

spread on tires, boots, or other soil-moving mechanisms. To minimize the potential spread of these organisms, PCGP will wash all equipment and vehicles before leaving any mint or potato field crossed by the Pipeline.

12.8 Forest Pathogens

Refer to Section 5.0 of PCGP's Integrated Pest Management Plan (see Appendix N).

12.9 Monitoring

After construction PCGP will monitor the right-of-way for infestation of noxious weeds. Monitoring will occur in the areas where noxious weeds were identified prior to construction and were previously mapped to ensure that potential infestations do not reestablish and spread. Monitoring will also occur in areas along the right-of-way where equipment cleaning stations and hydrostatic dewatering sites were located to ensure that infestations at these locations do not occur. Monitoring in these areas will occur for a period of 3 to 5 years on federal lands, and monitoring will also occur in areas where rock, soil and straw was used on federal Lands. PCGP's operational staff or their contractors will be responsible for these monitoring efforts. On NFS lands, PCGP may also develop a fund to support the agency in monitoring weeds on the right-of-way. If infestations occur along the right-of-way, PCGP would make an assessment of the source of the infestation, the potential of the infestation to spread to other adjacent areas, and develop a treatment plan to control the infestation. Where infestations occur on federal lands, this assessment and treatment plan would be developed cooperatively with these agencies. The treatment plan would be developed using integrated weed management principles, and if herbicides are used, all applicable approvals would be obtained prior to their use including landowner approvals. PCGP would consult with the Oregon Department of Agriculture Noxious Weed Control Program/ or local County Weed Program for additional support regarding noxious weed control issues that may occur during operation of the pipeline. PCGP may also contract with local conservation districts to conduct any necessary weed treatment programs that may arise after construction.

Monitoring other areas of the right-of-way where noxious weeds were not known to occur prior to construction will occur as an ongoing function of PCGP's operational personnel during the life of the Pipeline. PCGP's operational staff would also investigate noxious weed issues raised by landowners during operation of the pipeline.

13.0 MAINTENANCE

PCGP will conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation. PCGP will monitor crops for at least two years to determine the need for additional restoration, unless the easement agreement specifies otherwise. Revegetation will be considered successful in upland areas, if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. If vegetative cover and density are not similar or there are excessive weeds after two full growing seasons, PCGP will continue revegetation efforts until revegetation is successful. Repair of erosion control structures will occur until the right-of-way has successfully revegetated and has stabilized. Once the site is stabilized, temporary erosion control measures will be removed.

In wetland areas, revegetation will be considered successful if the affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation); vegetation is at

least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction; and invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction. If revegetation is not successful at the end of 3 years, PCGP will develop and implement (in consultation with a professional wetland ecologist) a remedial revegetation plan to actively revegetate the wetland and will continue revegetation efforts until wetland revegetation is successful.

PCGP will monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in agricultural areas until restoration is deemed successful.

Routine vegetation mowing or clearing will not be done more frequently than every 3 years. However, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the corridor in an herbaceous state. In no case will routine vegetation, mowing, or clearing occur between April 15 and August 1 of any year, during the migratory bird nesting season, unless approved by U.S. Fish and Wildlife Service or the land management agency.

PCGP will not conduct vegetation maintenance over the full width of the permanent right-of-way in wetland and waterbody riparian areas. Where necessary, to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the corridor in a herbaceous state. Trees that are within 15 feet of the pipeline centerline will also be selectively removed to protect the pipeline and to facilitate corrosion and leak surveys. Vegetation maintenance adjacent to waterbodies will allow a riparian strip, as measured from the waterbody's OHWM, to permanently revegetate with native plant species across the entire construction right-of-way (subject to the 15-foot [trees] restrictions on either side of the centerline). Drawing 3430.34-X-0016 in Attachment C provides a schematic of the right-of-way maintenance areas within wetlands and riparian areas. On federal lands, PCGP has committed to extending the riparian strip plantings along all fish-bearing streams within federally-designated Riparian Reserves to 100 feet beyond the OHWM (subject to the 15-foot [trees] restrictions on either side of the centerline). On private lands the riparian strip will be planted and allowed to establish based to a width based on ODF RMA buffer widths (see Section 10.12). PCGP's Stream Crossing Risk Analysis (GeoEngineers 2017) provides the stream crossing monitoring plan that will be implemented to ensure long-term success of the stream crossing restoration.

PCGP will test, operate, and maintain the proposed facilities in accordance with 49 CFR Part 192 and other applicable federal and state regulations. The pipeline right-of-way will be clearly marked where it crosses public roads, railroads, rivers, fenced property lines, and other locations as necessary. All pipeline facilities will be marked and identified in accordance with applicable regulations to avoid accidental excavation.

During the operational life of the Pipeline, PCGP's personnel will be responsible for any unforeseen erosion or potential mass movement that may occur.

14.0 REFERENCES

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ATTACHMENT A

FERC Upland Erosion Control, Revegetation and Maintenance Plan

**UPLAND EROSION CONTROL, REVEGETATION, AND
MAINTENANCE PLAN**

**UPLAND EROSION CONTROL, REVEGETATION, AND
MAINTENANCE PLAN**

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UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN (PLAN)

I. APPLICABILITY

- A. The intent of this Plan is to assist project sponsors by identifying baseline mitigation measures for minimizing erosion and enhancing revegetation. Project sponsors shall specify in their applications for a new FERC authorization and in prior notice and advance notice filings, any individual measures in this Plan they consider unnecessary, technically infeasible, or unsuitable due to local conditions and fully describe any alternative measures they would use. Project sponsors shall also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is authorized, project sponsors can request further changes as variances to the measures in this Plan (or the applicant's approved plan). The Director of the Office of Energy Projects (Director) will consider approval of variances upon the project sponsor's written request, if the Director agrees that a variance:

1. provides equal or better environmental protection;
2. is necessary because a portion of this Plan is infeasible or unworkable based on project-specific conditions; or
3. is specifically required in writing by another federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Sponsors of projects planned for construction under the automatic authorization provisions in the FERC's regulations must receive written approval for any variances in advance of construction.

Project-related impacts on wetland and waterbody systems are addressed in the staff's Wetland and Waterbody Construction and Mitigation Procedures (Procedures).

II. SUPERVISION AND INSPECTION

A. ENVIRONMENTAL INSPECTION

1. At least one Environmental Inspector is required for each construction spread during construction and restoration (as defined by section V). The number and experience of Environmental Inspectors assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected.
2. Environmental Inspectors shall have peer status with all other activity inspectors.
3. Environmental Inspectors shall have the authority to stop activities that violate the environmental conditions of the FERC's Orders, stipulations of other environmental permits or approvals, or landowner easement agreements; and to order appropriate corrective action.

B. RESPONSIBILITIES OF ENVIRONMENTAL INSPECTORS

At a minimum, the Environmental Inspector(s) shall be responsible for:

1. Inspecting construction activities for compliance with the requirements of this Plan, the Procedures, the environmental conditions of the FERC's Orders, the mitigation measures proposed by the project sponsor (as approved and/or modified by the Order), other environmental permits and approvals, and environmental requirements in landowner easement agreements.
2. Identifying, documenting, and overseeing corrective actions, as necessary to bring an activity back into compliance;
3. Verifying that the limits of authorized construction work areas and locations of access roads are visibly marked before clearing, and maintained throughout construction;
4. Verifying the location of signs and highly visible flagging marking the boundaries of sensitive resource areas, waterbodies, wetlands, or areas with special requirements along the construction work area;
5. Identifying erosion/sediment control and soil stabilization needs in all areas;
6. Ensuring that the design of slope breakers will not cause erosion or direct water into sensitive environmental resource areas, including cultural resource sites, wetlands, waterbodies, and sensitive species habitats;

7. Verifying that dewatering activities are properly monitored and do not result in the deposition of sand, silt, and/or sediment into sensitive environmental resource areas, including wetlands, waterbodies, cultural resource sites, and sensitive species habitats; stopping dewatering activities if such deposition is occurring and ensuring the design of the discharge is changed to prevent reoccurrence; and verifying that dewatering structures are removed after completion of dewatering activities;
8. Ensuring that subsoil and topsoil are tested in agricultural and residential areas to measure compaction and determine the need for corrective action;
9. Advising the Chief Construction Inspector when environmental conditions (such as wet weather or frozen soils) make it advisable to restrict or delay construction activities to avoid topsoil mixing or excessive compaction;
10. Ensuring restoration of contours and topsoil;
11. Verifying that the soils imported for agricultural or residential use are certified as free of noxious weeds and soil pests, unless otherwise approved by the landowner;
12. Ensuring that erosion control devices are properly installed to prevent sediment flow into sensitive environmental resource areas (e.g., wetlands, waterbodies, cultural resource sites, and sensitive species habitats) and onto roads, and determining the need for additional erosion control devices;
13. Inspecting and ensuring the maintenance of temporary erosion control measures at least:
 - a. on a daily basis in areas of active construction or equipment operation;
 - b. on a weekly basis in areas with no construction or equipment operation; and
 - c. within 24 hours of each 0.5 inch of rainfall;
14. Ensuring the repair of all ineffective temporary erosion control measures within 24 hours of identification, or as soon as conditions allow if compliance with this time frame would result in greater environmental impacts;
15. Keeping records of compliance with the environmental conditions of the FERC's Orders, and the mitigation measures proposed by the project sponsor in the application submitted to the FERC, and other federal or state environmental permits during active construction and restoration;

16. Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase; and
17. Verifying that locations for any disposal of excess construction materials for beneficial reuse comply with section III.E.

III. PRECONSTRUCTION PLANNING

The project sponsor shall do the following before construction:

A. CONSTRUCTION WORK AREAS

1. Identify all construction work areas (e.g., construction right-of-way, extra work space areas, pipe storage and contractor yards, borrow and disposal areas, access roads) that would be needed for safe construction. The project sponsor must ensure that appropriate cultural resources and biological surveys are conducted, as determined necessary by the appropriate federal and state agencies.
2. Project sponsors are encouraged to consider expanding any required cultural resources and endangered species surveys in anticipation of the need for activities outside of authorized work areas.
3. Plan construction sequencing to limit the amount and duration of open trench sections, as necessary, to prevent excessive erosion or sediment flow into sensitive environmental resource areas.

B. DRAIN TILE AND IRRIGATION SYSTEMS

1. Attempt to locate existing drain tiles and irrigation systems.
2. Contact landowners and local soil conservation authorities to determine the locations of future drain tiles that are likely to be installed within 3 years of the authorized construction.
3. Develop procedures for constructing through drain-tiled areas, maintaining irrigation systems during construction, and repairing drain tiles and irrigation systems after construction.
4. Engage qualified drain tile specialists, as needed to conduct or monitor repairs to drain tile systems affected by construction. Use drain tile specialists from the project area, if available.

C. GRAZING DEFERMENT

Develop grazing deferment plans with willing landowners, grazing permittees, and land management agencies to minimize grazing disturbance of revegetation efforts.

D. ROAD CROSSINGS AND ACCESS POINTS

Plan for safe and accessible conditions at all roadway crossings and access points during construction and restoration.

E. DISPOSAL PLANNING

Determine methods and locations for the regular collection, containment, and disposal of excess construction materials and debris (e.g., timber, slash, mats, garbage, drill cuttings and fluids, excess rock) throughout the construction process. Disposal of materials for beneficial reuse must not result in adverse environmental impact and is subject to compliance with all applicable survey, landowner or land management agency approval, and permit requirements.

F. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in this Plan and/or required by the FERC's Orders.

1. Obtain written recommendations from the local soil conservation authorities or land management agencies regarding permanent erosion control and revegetation specifications.
2. Develop specific procedures in coordination with the appropriate agencies to prevent the introduction or spread of invasive species, noxious weeds, and soil pests resulting from construction and restoration activities.
3. Develop specific procedures in coordination with the appropriate agencies and landowners, as necessary, to allow for livestock and wildlife movement and protection during construction.
4. Develop specific blasting procedures in coordination with the appropriate agencies that address pre- and post-blast inspections; advanced public notification; and mitigation measures for building foundations, groundwater wells, and springs. Use appropriate methods (e.g., blasting mats) to prevent damage to nearby structures and to prevent debris from entering sensitive environmental resource areas.

G. SPILL PREVENTION AND RESPONSE PROCEDURES

The project sponsor shall develop project-specific Spill Prevention and Response Procedures, as specified in section IV of the staff's Procedures. A copy must be filed with the Secretary of the FERC (Secretary) prior to construction and made available in the field on each construction spread. The filing requirement does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

H. RESIDENTIAL CONSTRUCTION

For all properties with residences located within 50 feet of construction work areas, project sponsors shall: avoid removal of mature trees and landscaping within the construction work area unless necessary for safe operation of construction equipment, or as specified in landowner agreements; fence the edge of the construction work area for a distance of 100 feet on either side of the residence; and restore all lawn areas and landscaping immediately following clean up operations, or as specified in landowner agreements. If seasonal or other weather conditions prevent compliance with these time frames, maintain and monitor temporary erosion controls (sediment barriers and mulch) until conditions allow completion of restoration.

I. WINTER CONSTRUCTION PLANS

If construction is planned to occur during winter weather conditions, project sponsors shall develop and file a project-specific winter construction plan with the FERC application. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The plan shall address:

1. winter construction procedures (e.g., snow handling and removal, access road construction and maintenance, soil handling under saturated or frozen conditions, topsoil stripping);
2. stabilization and monitoring procedures if ground conditions will delay restoration until the following spring (e.g., mulching and erosion controls, inspection and reporting, stormwater control during spring thaw conditions); and
3. final restoration procedures (e.g., subsidence and compaction repair, topsoil replacement, seeding).

IV. INSTALLATION

A. APPROVED AREAS OF DISTURBANCE

1. Project-related ground disturbance shall be limited to the construction right-of-way, extra work space areas, pipe storage yards, borrow and disposal areas, access roads, and other areas approved in the FERC's Orders. Any project-related ground disturbing activities outside these areas will require prior Director approval. This requirement does not apply to activities needed to comply with the Plan and Procedures (i.e., slope breakers, energy-dissipating devices, dewatering structures, drain tile system repairs) or minor field realignments and workspace shifts per landowner needs and requirements that do not affect other landowners or sensitive environmental resource areas. All construction or restoration activities outside of authorized areas are subject to all applicable survey and permit requirements, and landowner easement agreements.

2. The construction right-of-way width for a project shall not exceed 75 feet or that described in the FERC application unless otherwise modified by a FERC Order. However, in limited, non-wetland areas, this construction right-of-way width may be expanded by up to 25 feet without Director approval to accommodate full construction right-of-way topsoil segregation and to ensure safe construction where topographic conditions (e.g., side-slopes) or soil limitations require it. Twenty-five feet of extra construction right-of-way width may also be used in limited, non-wetland or non-forested areas for truck turn-arounds where no reasonable alternative access exists.

Project use of these additional limited areas is subject to landowner or land management agency approval and compliance with all applicable survey and permit requirements. When additional areas are used, each one shall be identified and the need explained in the weekly or biweekly construction reports to the FERC, if required. The following material shall be included in the reports:

- a. the location of each additional area by station number and reference to previously filed alignment sheets, or updated alignment sheets showing the additional areas;

- b. identification of the filing at FERC containing evidence that the additional areas were previously surveyed; and

- c. a statement that landowner approval has been obtained and is available in project files.

Prior written approval of the Director is required when the authorized construction right-of-way width would be expanded by more than 25 feet.

B. TOPSOIL SEGREGATION

1. Unless the landowner or land management agency specifically approves otherwise, prevent the mixing of topsoil with subsoil by stripping topsoil from either the full work area or from the trench and subsoil storage area (ditch plus spoil side method) in:
 - a. cultivated or rotated croplands, and managed pastures;
 - b. residential areas;
 - c. hayfields; and
 - d. other areas at the landowner's or land managing agency's request.
2. In residential areas, importation of topsoil is an acceptable alternative to topsoil segregation.
3. Where topsoil segregation is required, the project sponsor must:
 - a. segregate at least 12 inches of topsoil in deep soils (more than 12 inches of topsoil); and
 - b. make every effort to segregate the entire topsoil layer in soils with less than 12 inches of topsoil.
4. Maintain separation of salvaged topsoil and subsoil throughout all construction activities.
5. Segregated topsoil may not be used for padding the pipe, constructing temporary slope breakers or trench plugs, improving or maintaining roads, or as a fill material.
6. Stabilize topsoil piles and minimize loss due to wind and water erosion with use of sediment barriers, mulch, temporary seeding, tackifiers, or functional equivalents, where necessary.

C. DRAIN TILES

1. Mark locations of drain tiles damaged during construction.
2. Probe all drainage tile systems within the area of disturbance to check for damage.
3. Repair damaged drain tiles to their original or better condition. Do not use filter-covered drain tiles unless the local soil conservation authorities and the landowner agree. Use qualified specialists for testing and repairs.
4. For new pipelines in areas where drain tiles exist or are planned, ensure that the depth of cover over the pipeline is sufficient to avoid interference with drain tile systems. For adjacent pipeline loops in agricultural areas, install the new pipeline with at least the same depth of cover as the existing pipeline(s).

D. IRRIGATION

Maintain water flow in crop irrigation systems, unless shutoff is coordinated with affected parties.

E. ROAD CROSSINGS AND ACCESS POINTS

1. Maintain safe and accessible conditions at all road crossings and access points during construction.
2. If crushed stone access pads are used in residential or agricultural areas, place the stone on synthetic fabric to facilitate removal.
3. Minimize the use of tracked equipment on public roadways. Remove any soil or gravel spilled or tracked onto roadways daily or more frequent as necessary to maintain safe road conditions. Repair any damages to roadway surfaces, shoulders, and bar ditches.

F. TEMPORARY EROSION CONTROL

Install temporary erosion controls immediately after initial disturbance of the soil. Temporary erosion controls must be properly maintained throughout construction (on a daily basis) and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration is complete.

1. Temporary Slope Breakers
 - a. Temporary slope breakers are intended to reduce runoff velocity and divert water off the construction right-of-way. Temporary slope

breakers may be constructed of materials such as soil, silt fence, staked hay or straw bales, or sand bags.

- b. Install temporary slope breakers on all disturbed areas, as necessary to avoid excessive erosion. Temporary slope breakers must be installed on slopes greater than 5 percent where the base of the slope is less than 50 feet from waterbody, wetland, and road crossings at the following spacing (closer spacing shall be used if necessary):

<u>Slope (%)</u>	<u>Spacing (feet)</u>
5 - 15	300
>15 - 30	200
>30	100

- c. Direct the outfall of each temporary slope breaker to a stable, well vegetated area or construct an energy-dissipating device at the end of the slope breaker and off the construction right-of-way.
- d. Position the outfall of each temporary slope breaker to prevent sediment discharge into wetlands, waterbodies, or other sensitive environmental resource areas.

2. Temporary Trench Plugs

Temporary trench plugs are intended to segment a continuous open trench prior to backfill.

- a. Temporary trench plugs may consist of unexcavated portions of the trench, compacted subsoil, sandbags, or some functional equivalent.
- b. Position temporary trench plugs, as necessary, to reduce trenchline erosion and minimize the volume and velocity of trench water flow at the base of slopes.

3. Sediment Barriers

Sediment barriers are intended to stop the flow of sediments and to prevent the deposition of sediments beyond approved workspaces or into sensitive resources.

- a. Sediment barriers may be constructed of materials such as silt fence, staked hay or straw bales, compacted earth (e.g., driveable berms across travelways), sand bags, or other appropriate materials.

- b. At a minimum, install and maintain temporary sediment barriers across the entire construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody, wetland, or road crossing until revegetation is successful as defined in this Plan. Leave adequate room between the base of the slope and the sediment barrier to accommodate ponding of water and sediment deposition.
- c. Where wetlands or waterbodies are adjacent to and downslope of construction work areas, install sediment barriers along the edge of these areas, as necessary to prevent sediment flow into the wetland or waterbody.

4. Mulch

- a. Apply mulch on all slopes (except in cultivated cropland) concurrent with or immediately after seeding, where necessary to stabilize the soil surface and to reduce wind and water erosion. Spread mulch uniformly over the area to cover at least 75 percent of the ground surface at a rate of 2 tons/acre of straw or its equivalent, unless the local soil conservation authority, landowner, or land managing agency approves otherwise in writing.
- b. Mulch can consist of weed-free straw or hay, wood fiber hydromulch, erosion control fabric, or some functional equivalent.
- c. Mulch all disturbed upland areas (except cultivated cropland) before seeding if:
 - (1) final grading and installation of permanent erosion control measures will not be completed in an area within 20 days after the trench in that area is backfilled (10 days in residential areas), as required in section V.A.1; or
 - (2) construction or restoration activity is interrupted for extended periods, such as when seeding cannot be completed due to seeding period restrictions.
- d. If mulching before seeding, increase mulch application on all slopes within 100 feet of waterbodies and wetlands to a rate of 3 tons/acre of straw or equivalent.
- e. If wood chips are used as mulch, do not use more than 1 ton/acre and add the equivalent of 11 lbs/acre available nitrogen (at least 50 percent of which is slow release).

- f. Ensure that mulch is adequately anchored to minimize loss due to wind and water.
- g. When anchoring with liquid mulch binders, use rates recommended by the manufacturer. Do not use liquid mulch binders within 100 feet of wetlands or waterbodies, except where the product is certified environmentally non-toxic by the appropriate state or federal agency or independent standards-setting organization.
- h. Do not use synthetic monofilament mesh/netted erosion control materials in areas designated as sensitive wildlife habitat, unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

V. RESTORATION

A. CLEANUP

1. Commence cleanup operations immediately following backfill operations. Complete final grading, topsoil replacement, and installation of permanent erosion control structures within 20 days after backfilling the trench (10 days in residential areas). If seasonal or other weather conditions prevent compliance with these time frames, maintain temporary erosion controls (i.e., temporary slope breakers, sediment barriers, and mulch) until conditions allow completion of cleanup.

If construction or restoration unexpectedly continues into the winter season when conditions could delay successful decompaction, topsoil replacement, or seeding until the following spring, file with the Secretary for the review and written approval of the Director, a winter construction plan (as specified in section III.I). This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

2. A travel lane may be left open temporarily to allow access by construction traffic if the temporary erosion control structures are installed as specified in section IV.F. and inspected and maintained as specified in sections II.B.12 through 14. When access is no longer required the travel lane must be removed and the right-of-way restored.
3. Rock excavated from the trench may be used to backfill the trench only to the top of the existing bedrock profile. Rock that is not returned to the trench shall be considered construction debris, unless approved for use as mulch or for some other use on the construction work areas by the landowner or land managing agency.

4. Remove excess rock from at least the top 12 inches of soil in all cultivated or rotated cropland, managed pastures, hayfields, and residential areas, as well as other areas at the landowner's request. The size, density, and distribution of rock on the construction work area shall be similar to adjacent areas not disturbed by construction. The landowner or land management agency may approve other provisions in writing.
5. Grade the construction right-of-way to restore pre-construction contours and leave the soil in the proper condition for planting.
6. Remove construction debris from all construction work areas unless the landowner or land managing agency approves leaving materials onsite for beneficial reuse, stabilization, or habitat restoration.
7. Remove temporary sediment barriers when replaced by permanent erosion control measures or when revegetation is successful.

B. PERMANENT EROSION CONTROL DEVICES

1. Trench Breakers
 - a. Trench breakers are intended to slow the flow of subsurface water along the trench. Trench breakers may be constructed of materials such as sand bags or polyurethane foam. Do not use topsoil in trench breakers.
 - b. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, trench breakers shall be installed at the same spacing as and upslope of permanent slope breakers.
 - c. In agricultural fields and residential areas where slope breakers are not typically required, install trench breakers at the same spacing as if permanent slope breakers were required.
 - d. At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland. Install trench breakers at wetland boundaries, as specified in the Procedures. Do not install trench breakers within a wetland.

2. Permanent Slope Breakers

- a. Permanent slope breakers are intended to reduce runoff velocity, divert water off the construction right-of-way, and prevent sediment deposition into sensitive resources. Permanent slope breakers may be constructed of materials such as soil, stone, or some functional equivalent.
- b. Construct and maintain permanent slope breakers in all areas, except cultivated areas and lawns, unless requested by the landowner, using spacing recommendations obtained from the local soil conservation authority or land managing agency.

In the absence of written recommendations, use the following spacing unless closer spacing is necessary to avoid excessive erosion on the construction right-of-way:

<u>Slope (%)</u>	<u>Spacing (feet)</u>
5 - 15	300
>15 - 30	200
>30	100

- c. Construct slope breakers to divert surface flow to a stable area without causing water to pool or erode behind the breaker. In the absence of a stable area, construct appropriate energy-dissipating devices at the end of the breaker.
- d. Slope breakers may extend slightly (about 4 feet) beyond the edge of the construction right-of-way to effectively drain water off the disturbed area. Where slope breakers extend beyond the edge of the construction right-of-way, they are subject to compliance with all applicable survey requirements.

C. SOIL COMPACTION MITIGATION

1. Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas disturbed by construction activities. Conduct tests on the same soil type under similar moisture conditions in undisturbed areas to approximate preconstruction conditions. Use penetrometers or other appropriate devices to conduct tests.
2. Plow severely compacted agricultural areas with a paraplow or other deep tillage implement. In areas where topsoil has been segregated, plow the subsoil before replacing the segregated topsoil.

If subsequent construction and cleanup activities result in further compaction, conduct additional tilling.

3. Perform appropriate soil compaction mitigation in severely compacted residential areas.

D. REVEGETATION

1. General

- a. The project sponsor is responsible for ensuring successful revegetation of soils disturbed by project-related activities, except as noted in section V.D.1.b.
- b. Restore all turf, ornamental shrubs, and specialized landscaping in accordance with the landowner's request, or compensate the landowner. Restoration work must be performed by personnel familiar with local horticultural and turf establishment practices.

2. Soil Additives

Fertilize and add soil pH modifiers in accordance with written recommendations obtained from the local soil conservation authority, land management agencies, or landowner. Incorporate recommended soil pH modifier and fertilizer into the top 2 inches of soil as soon as practicable after application.

3. Seeding Requirements

- a. Prepare a seedbed in disturbed areas to a depth of 3 to 4 inches using appropriate equipment to provide a firm seedbed. When hydroseeding, scarify the seedbed to facilitate lodging and germination of seed.
- b. Seed disturbed areas in accordance with written recommendations for seed mixes, rates, and dates obtained from the local soil conservation authority or the request of the landowner or land management agency. Seeding is not required in cultivated croplands unless requested by the landowner.
- c. Perform seeding of permanent vegetation within the recommended seeding dates. If seeding cannot be done within those dates, use appropriate temporary erosion control measures discussed in section IV.F and perform seeding of permanent vegetation at the beginning of the next recommended seeding season. Dormant seeding or temporary

seeding of annual species may also be used, if necessary, to establish cover, as approved by the Environmental Inspector. Lawns may be seeded on a schedule established with the landowner.

- d. In the absence of written recommendations from the local soil conservation authorities, seed all disturbed soils within 6 working days of final grading, weather and soil conditions permitting, subject to the specifications in section V.D.3.a through V.D.3.c.
- e. Base seeding rates on Pure Live Seed. Use seed within 12 months of seed testing.
- f. Treat legume seed with an inoculant specific to the species using the manufacturer's recommended rate of inoculant appropriate for the seeding method (broadcast, drill, or hydro).
- g. In the absence of written recommendations from the local soil conservation authorities, landowner, or land managing agency to the contrary, a seed drill equipped with a cultipacker is preferred for seed application.

Broadcast or hydroseeding can be used in lieu of drilling at double the recommended seeding rates. Where seed is broadcast, firm the seedbed with a cultipacker or roller after seeding. In rocky soils or where site conditions may limit the effectiveness of this equipment, other alternatives may be appropriate (e.g., use of a chain drag) to lightly cover seed after application, as approved by the Environmental Inspector.

VI. OFF-ROAD VEHICLE CONTROL

To each owner or manager of forested lands, offer to install and maintain measures to control unauthorized vehicle access to the right-of-way. These measures may include:

- A. signs;
- B. fences with locking gates;
- C. slash and timber barriers, pipe barriers, or a line of boulders across the right-of-way; and
- D. conifers or other appropriate trees or shrubs across the right-of-way.

VII. POST-CONSTRUCTION ACTIVITIES AND REPORTING

A. MONITORING AND MAINTENANCE

1. Conduct follow-up inspections of all disturbed areas, as necessary, to determine the success of revegetation and address landowner concerns. At a minimum, conduct inspections after the first and second growing seasons.
2. Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise.

Continue revegetation efforts until revegetation is successful.

3. Monitor and correct problems with drainage and irrigation systems resulting from pipeline construction in agricultural areas until restoration is successful.
4. Restoration shall be considered successful if the right-of-way surface condition is similar to adjacent undisturbed lands, construction debris is removed (unless otherwise approved by the landowner or land managing agency per section V.A.6), revegetation is successful, and proper drainage has been restored.
5. Routine vegetation mowing or clearing over the full width of the permanent right-of-way in uplands shall not be done more frequently than every 3 years. However, to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In no case shall routine vegetation mowing or clearing occur during the migratory bird nesting season between April 15 and August 1 of any year unless specifically approved in writing by the responsible land management agency or the U.S. Fish and Wildlife Service.
6. Efforts to control unauthorized off-road vehicle use, in cooperation with the landowner, shall continue throughout the life of the project. Maintain signs, gates, and permanent access roads as necessary.

B. REPORTING

1. The project sponsor shall maintain records that identify by milepost:
 - a. method of application, application rate, and type of fertilizer, pH modifying agent, seed, and mulch used;
 - b. acreage treated;
 - c. dates of backfilling and seeding;
 - d. names of landowners requesting special seeding treatment and a description of the follow-up actions;
 - e. the location of any subsurface drainage repairs or improvements made during restoration; and
 - f. any problem areas and how they were addressed.
2. The project sponsor shall file with the Secretary quarterly activity reports documenting the results of follow-up inspections required by section VII.A.1; any problem areas, including those identified by the landowner; and corrective actions taken for at least 2 years following construction.

The requirement to file quarterly activity reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advanced notice provisions in the FERC's regulations.

ATTACHMENT B

FERC Waterbody and Wetland Construction and Mitigation Procedures

**WETLAND AND WATERBODY CONSTRUCTION AND
MITIGATION PROCEDURES**

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

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WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES (PROCEDURES)

I. APPLICABILITY

- A. The intent of these Procedures is to assist project sponsors by identifying baseline mitigation measures for minimizing the extent and duration of project-related disturbance on wetlands and waterbodies. Project sponsors shall specify in their applications for a new FERC authorization, and in prior notice and advance notice filings, any individual measures in these Procedures they consider unnecessary, technically infeasible, or unsuitable due to local conditions and fully describe any alternative measures they would use. Project sponsors shall also explain how those alternative measures would achieve a comparable level of mitigation.

Once a project is authorized, project sponsors can request further changes as variances to the measures in these Procedures (or the applicant's approved procedures). The Director of the Office of Energy Projects (Director) will consider approval of variances upon the project sponsor's written request, if the Director agrees that a variance:

1. provides equal or better environmental protection;
2. is necessary because a portion of these Procedures is infeasible or unworkable based on project-specific conditions; or
3. is specifically required in writing by another federal, state, or Native American land management agency for the portion of the project on its land or under its jurisdiction.

Sponsors of projects planned for construction under the automatic authorization provisions in the FERC's regulations must receive written approval for any variances in advance of construction.

Project-related impacts on non-wetland areas are addressed in the staff's Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

B. DEFINITIONS

1. “Waterbody” includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes:
 - a. “minor waterbody” includes all waterbodies less than or equal to 10 feet wide at the water’s edge at the time of crossing;
 - b. “intermediate waterbody” includes all waterbodies greater than 10 feet wide but less than or equal to 100 feet wide at the water’s edge at the time of crossing; and
 - c. “major waterbody” includes all waterbodies greater than 100 feet wide at the water’s edge at the time of crossing.
2. “Wetland” includes any area that is not in actively cultivated or rotated cropland and that satisfies the requirements of the current federal methodology for identifying and delineating wetlands.

II. PRECONSTRUCTION FILING

- A. The following information must be filed with the Secretary of the FERC (Secretary) prior to the beginning of construction, for the review and written approval by the Director:
 1. site-specific justifications for extra work areas that would be closer than 50 feet from a waterbody or wetland; and
 2. site-specific justifications for the use of a construction right-of-way greater than 75-feet-wide in wetlands.
- B. The following information must be filed with the Secretary prior to the beginning of construction. These filing requirements do not apply to projects constructed under the automatic authorization provisions in the FERC’s regulations:
 1. Spill Prevention and Response Procedures specified in section IV.A;
 2. a schedule identifying when trenching or blasting will occur within each waterbody greater than 10 feet wide, within any designated coldwater fishery, and within any waterbody identified as habitat for federally-listed threatened or endangered species. The project sponsor will revise the schedule as necessary to provide FERC staff at least 14 days advance notice. Changes within this last 14-day period must provide for at least 48 hours advance notice;

3. plans for horizontal directional drills (HDD) under wetlands or waterbodies, specified in section V.B.6.d;
4. site-specific plans for major waterbody crossings, described in section V.B.9;
5. a wetland delineation report as described in section VI.A.1, if applicable; and
6. the hydrostatic testing information specified in section VII.B.3.

III. ENVIRONMENTAL INSPECTORS

- A. At least one Environmental Inspector having knowledge of the wetland and waterbody conditions in the project area is required for each construction spread. The number and experience of Environmental Inspectors assigned to each construction spread shall be appropriate for the length of the construction spread and the number/significance of resources affected.
- B. The Environmental Inspector's responsibilities are outlined in the Upland Erosion Control, Revegetation, and Maintenance Plan (Plan).

IV. PRECONSTRUCTION PLANNING

- A. The project sponsor shall develop project-specific Spill Prevention and Response Procedures that meet applicable requirements of state and federal agencies. A copy must be filed with the Secretary prior to construction and made available in the field on each construction spread. This filing requirement does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.
 1. It shall be the responsibility of the project sponsor and its contractors to structure their operations in a manner that reduces the risk of spills or the accidental exposure of fuels or hazardous materials to waterbodies or wetlands. The project sponsor and its contractors must, at a minimum, ensure that:
 - a. all employees handling fuels and other hazardous materials are properly trained;
 - b. all equipment is in good operating order and inspected on a regular basis;
 - c. fuel trucks transporting fuel to on-site equipment travel only on approved access roads;
 - d. all equipment is parked overnight and/or fueled at least 100 feet from a waterbody or in an upland area at least 100 feet from a wetland boundary. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the

project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;

- e. hazardous materials, including chemicals, fuels, and lubricating oils, are not stored within 100 feet of a wetland, waterbody, or designated municipal watershed area, unless the location is designated for such use by an appropriate governmental authority. This applies to storage of these materials and does not apply to normal operation or use of equipment in these areas;
 - f. concrete coating activities are not performed within 100 feet of a wetland or waterbody boundary, unless the location is an existing industrial site designated for such use. These activities can occur closer only if the Environmental Inspector determines that there is no reasonable alternative, and the project sponsor and its contractors have taken appropriate steps (including secondary containment structures) to prevent spills and provide for prompt cleanup in the event of a spill;
 - g. pumps operating within 100 feet of a waterbody or wetland boundary utilize appropriate secondary containment systems to prevent spills; and
 - h. bulk storage of hazardous materials, including chemicals, fuels, and lubricating oils have appropriate secondary containment systems to prevent spills.
2. The project sponsor and its contractors must structure their operations in a manner that provides for the prompt and effective cleanup of spills of fuel and other hazardous materials. At a minimum, the project sponsor and its contractors must:
- a. ensure that each construction crew (including cleanup crews) has on hand sufficient supplies of absorbent and barrier materials to allow the rapid containment and recovery of spilled materials and knows the procedure for reporting spills and unanticipated discoveries of contamination;
 - b. ensure that each construction crew has on hand sufficient tools and material to stop leaks;
 - c. know the contact names and telephone numbers for all local, state, and federal agencies (including, if necessary, the U. S. Coast Guard and the National Response Center) that must be notified of a spill; and

- d. follow the requirements of those agencies in cleaning up the spill, in excavating and disposing of soils or other materials contaminated by a spill, and in collecting and disposing of waste generated during spill cleanup.

B. AGENCY COORDINATION

The project sponsor must coordinate with the appropriate local, state, and federal agencies as outlined in these Procedures and in the FERC's Orders.

V. WATERBODY CROSSINGS

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply to the U.S. Army Corps of Engineers (COE), or its delegated agency, for the appropriate wetland and waterbody crossing permits.
2. Provide written notification to authorities responsible for potable surface water supply intakes located within 3 miles downstream of the crossing at least 1 week before beginning work in the waterbody, or as otherwise specified by that authority.
3. Apply for state-issued waterbody crossing permits and obtain individual or generic section 401 water quality certification or waiver.
4. Notify appropriate federal and state authorities at least 48 hours before beginning trenching or blasting within the waterbody, or as specified in applicable permits.

B. INSTALLATION

1. Time Window for Construction

Unless expressly permitted or further restricted by the appropriate federal or state agency in writing on a site-specific basis, instream work, except that required to install or remove equipment bridges, must occur during the following time windows:

- a. coldwater fisheries - June 1 through September 30; and
- b. coolwater and warmwater fisheries - June 1 through November 30.

2. Extra Work Areas

- a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from water's edge, except where

the adjacent upland consists of cultivated or rotated cropland or other disturbed land.

- b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from the water's edge, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the conditions that will not permit a 50-foot setback and measures to ensure the waterbody is adequately protected.
- c. Limit the size of extra work areas to the minimum needed to construct the waterbody crossing.

3. General Crossing Procedures

- a. Comply with the COE, or its delegated agency, permit terms and conditions.
- b. Construct crossings as close to perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.
- c. Where pipelines parallel a waterbody, maintain at least 15 feet of undisturbed vegetation between the waterbody (and any adjacent wetland) and the construction right-of-way, except where maintaining this offset will result in greater environmental impact.
- d. Where waterbodies meander or have multiple channels, route the pipeline to minimize the number of waterbody crossings.
- e. Maintain adequate waterbody flow rates to protect aquatic life, and prevent the interruption of existing downstream uses.
- f. Waterbody buffers (e.g., extra work area setbacks, refueling restrictions) must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.
- g. Crossing of waterbodies when they are dry or frozen and not flowing may proceed using standard upland construction techniques in accordance with the Plan, provided that the Environmental Inspector verifies that water is unlikely to flow between initial disturbance and final stabilization of the feature. In the event of perceptible flow, the project sponsor must comply with all applicable Procedure requirements for "waterbodies" as defined in section I.B.1.

4. Spoil Pile Placement and Control

- a. All spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction right-of-way at least 10 feet from the water's edge or in additional extra work areas as described in section V.B.2.
- b. Use sediment barriers to prevent the flow of spoil or silt-laden water into any waterbody.

5. Equipment Bridges

- a. Only clearing equipment and equipment necessary for installation of equipment bridges may cross waterbodies prior to bridge installation. Limit the number of such crossings of each waterbody to one per piece of clearing equipment.
- b. Construct and maintain equipment bridges to allow unrestricted flow and to prevent soil from entering the waterbody. Examples of such bridges include:
 - (1) equipment pads and culvert(s);
 - (2) equipment pads or railroad car bridges without culverts;
 - (3) clean rock fill and culvert(s); and
 - (4) flexi-float or portable bridges.

Additional options for equipment bridges may be utilized that achieve the performance objectives noted above. Do not use soil to construct or stabilize equipment bridges.

- c. Design and maintain each equipment bridge to withstand and pass the highest flow expected to occur while the bridge is in place. Align culverts to prevent bank erosion or streambed scour. If necessary, install energy dissipating devices downstream of the culverts.
- d. Design and maintain equipment bridges to prevent soil from entering the waterbody.
- e. Remove temporary equipment bridges as soon as practicable after permanent seeding.
- f. If there will be more than 1 month between final cleanup and the beginning of permanent seeding and reasonable alternative access to the right-of-way is available, remove temporary equipment bridges as soon as practicable after final cleanup.

- g. Obtain any necessary approval from the COE, or the appropriate state agency for permanent bridges.

6. Dry-Ditch Crossing Methods

- a. Unless approved otherwise by the appropriate federal or state agency, install the pipeline using one of the dry-ditch methods outlined below for crossings of waterbodies up to 30 feet wide (at the water's edge at the time of construction) that are state-designated as either coldwater or significant coolwater or warmwater fisheries, or federally-designated as critical habitat.

- b. Dam and Pump

- (1) The dam-and-pump method may be used without prior approval for crossings of waterbodies where pumps can adequately transfer streamflow volumes around the work area, and there are no concerns about sensitive species passage.
- (2) Implementation of the dam-and-pump crossing method must meet the following performance criteria:
 - (i) use sufficient pumps, including on-site backup pumps, to maintain downstream flows;
 - (ii) construct dams with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner);
 - (iii) screen pump intakes to minimize entrainment of fish;
 - (iv) prevent streambed scour at pump discharge; and
 - (v) continuously monitor the dam and pumps to ensure proper operation throughout the waterbody crossing.

- c. Flume Crossing

The flume crossing method requires implementation of the following steps:

- (1) install flume pipe after blasting (if necessary), but before any trenching;
- (2) use sand bag or sand bag and plastic sheeting diversion structure or equivalent to develop an effective seal and to divert stream flow through the flume pipe (some modifications to the stream bottom may be required to achieve an effective seal);

- (3) properly align flume pipe(s) to prevent bank erosion and streambed scour;
- (4) do not remove flume pipe during trenching, pipelaying, or backfilling activities, or initial streambed restoration efforts; and
- (5) remove all flume pipes and dams that are not also part of the equipment bridge as soon as final cleanup of the stream bed and bank is complete.

d. Horizontal Directional Drill

For each waterbody or wetland that would be crossed using the HDD method, file with the Secretary for the review and written approval by the Director, a plan that includes:

- (1) site-specific construction diagrams that show the location of mud pits, pipe assembly areas, and all areas to be disturbed or cleared for construction;
- (2) justification that disturbed areas are limited to the minimum needed to construct the crossing;
- (3) identification of any aboveground disturbance or clearing between the HDD entry and exit workspaces during construction;
- (4) a description of how an inadvertent release of drilling mud would be contained and cleaned up; and
- (5) a contingency plan for crossing the waterbody or wetland in the event the HDD is unsuccessful and how the abandoned drill hole would be sealed, if necessary.

The requirement to file HDD plans does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

7. Crossings of Minor Waterbodies

Where a dry-ditch crossing is not required, minor waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

- a. except for blasting and other rock breaking measures, complete instream construction activities (including trenching, pipe installation, backfill, and restoration of the streambed contours) within 24 hours.

Streambanks and unconsolidated streambeds may require additional restoration after this period;

- b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and
- c. equipment bridges are not required at minor waterbodies that do not have a state-designated fishery classification or protected status (e.g., agricultural or intermittent drainage ditches). However, if an equipment bridge is used it must be constructed as described in section V.B.5.

8. Crossings of Intermediate Waterbodies

Where a dry-ditch crossing is not required, intermediate waterbodies may be crossed using the open-cut crossing method, with the following restrictions:

- a. complete instream construction activities (not including blasting and other rock breaking measures) within 48 hours, unless site-specific conditions make completion within 48 hours infeasible;
- b. limit use of equipment operating in the waterbody to that needed to construct the crossing; and
- c. all other construction equipment must cross on an equipment bridge as specified in section V.B.5.

9. Crossings of Major Waterbodies

Before construction, the project sponsor shall file with the Secretary for the review and written approval by the Director a detailed, site-specific construction plan and scaled drawings identifying all areas to be disturbed by construction for each major waterbody crossing (the scaled drawings are not required for any offshore portions of pipeline projects). This plan must be developed in consultation with the appropriate state and federal agencies and shall include extra work areas, spoil storage areas, sediment control structures, etc., as well as mitigation for navigational issues. The requirement to file major waterbody crossing plans does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

The Environmental Inspector may adjust the final placement of the erosion and sediment control structures in the field to maximize effectiveness.

10. Temporary Erosion and Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the waterbody or adjacent upland.

Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan; however, the following specific measures must be implemented at stream crossings:

- a. install sediment barriers across the entire construction right-of-way at all waterbody crossings, where necessary to prevent the flow of sediments into the waterbody. Removable sediment barriers (or driveable berms) must be installed across the travel lane. These removable sediment barriers can be removed during the construction day, but must be re-installed after construction has stopped for the day and/or when heavy precipitation is imminent;
- b. where waterbodies are adjacent to the construction right-of-way and the right-of-way slopes toward the waterbody, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the waterbody; and
- c. use temporary trench plugs at all waterbody crossings, as necessary, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody.

11. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any waterbody. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Use clean gravel or native cobbles for the upper 1 foot of trench backfill in all waterbodies that contain coldwater fisheries.
2. For open-cut crossings, stabilize waterbody banks and install temporary sediment barriers within 24 hours of completing instream construction activities. For dry-ditch crossings, complete streambed and bank stabilization before returning flow to the waterbody channel.
3. Return all waterbody banks to preconstruction contours or to a stable angle of repose as approved by the Environmental Inspector.
4. Install erosion control fabric or a functional equivalent on waterbody banks at the time of final bank recontouring. Do not use synthetic monofilament

mesh/netted erosion control materials in areas designated as sensitive wildlife habitat unless the product is specifically designed to minimize harm to wildlife. Anchor erosion control fabric with staples or other appropriate devices.

5. Application of riprap for bank stabilization must comply with COE, or its delegated agency, permit terms and conditions.
6. Unless otherwise specified by state permit, limit the use of riprap to areas where flow conditions preclude effective vegetative stabilization techniques such as seeding and erosion control fabric.
7. Revegetate disturbed riparian areas with native species of conservation grasses, legumes, and woody species, similar in density to adjacent undisturbed lands.
8. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent that are less than 50 feet from the waterbody, or as needed to prevent sediment transport into the waterbody. In addition, install sediment barriers as outlined in the Plan.

In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the waterbody.

9. Sections V.C.3 through V.C.7 above also apply to those perennial or intermittent streams not flowing at the time of construction.

D. POST-CONSTRUCTION MAINTENANCE

1. Limit routine vegetation mowing or clearing 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 construction right-of-way. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees that are located within 15 feet of the pipeline that have roots that could compromise the integrity of the pipeline coating may be cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in riparian areas that are between HDD entry and exit points.
2. Do not use herbicides or pesticides in or within 100 feet of a waterbody except as allowed by the appropriate land management or state agency.
3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of riparian areas.

VI. WETLAND CROSSINGS

A. GENERAL

1. The project sponsor shall conduct a wetland delineation using the current federal methodology and file a wetland delineation report with the Secretary before construction. The requirement to file a wetland delineation report does not apply to projects constructed under the automatic authorization provisions in the FERC's regulations.

This report shall identify:

- a. by milepost all wetlands that would be affected;
- b. the National Wetlands Inventory (NWI) classification for each wetland;
- c. the crossing length of each wetland in feet; and
- d. the area of permanent and temporary disturbance that would occur in each wetland by NWI classification type.

The requirements outlined in this section do not apply to wetlands in actively cultivated or rotated cropland. Standard upland protective measures, including workspace and topsoiling requirements, apply to these agricultural wetlands.

2. Route the pipeline to avoid wetland areas to the maximum extent possible. If a wetland cannot be avoided or crossed by following an existing right-of-way, route the new pipeline in a manner that minimizes disturbance to wetlands. Where looping an existing pipeline, overlap the existing pipeline right-of-way with the new construction right-of-way. In addition, locate the loop line no more than 25 feet away from the existing pipeline unless site-specific constraints would adversely affect the stability of the existing pipeline.
3. Limit the width of the construction right-of-way to 75 feet or less. Prior written approval of the Director is required where topographic conditions or soil limitations require that the construction right-of-way width within the boundaries of a federally delineated wetland be expanded beyond 75 feet. Early in the planning process the project sponsor is encouraged to identify site-specific areas where excessively wide trenches could occur and/or where spoil piles could be difficult to maintain because existing soils lack adequate unconfined compressive strength.
4. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.

5. Implement the measures of sections V and VI in the event a waterbody crossing is located within or adjacent to a wetland crossing. If all measures of sections V and VI cannot be met, the project sponsor must file with the Secretary a site-specific crossing plan for review and written approval by the Director before construction. This crossing plan shall address at a minimum:
 - a. spoil control;
 - b. equipment bridges;
 - c. restoration of waterbody banks and wetland hydrology;
 - d. timing of the waterbody crossing;
 - e. method of crossing; and
 - f. size and location of all extra work areas.
6. Do not locate aboveground facilities in any wetland, except where the location of such facilities outside of wetlands would prohibit compliance with U.S. Department of Transportation regulations.

B. INSTALLATION

1. Extra Work Areas and Access Roads
 - a. Locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet away from wetland boundaries, except where the adjacent upland consists of cultivated or rotated cropland or other disturbed land.
 - b. The project sponsor shall file with the Secretary for review and written approval by the Director, site-specific justification for each extra work area with a less than 50-foot setback from wetland boundaries, except where adjacent upland consists of cultivated or rotated cropland or other disturbed land. The justification must specify the site-specific conditions that will not permit a 50-foot setback and measures to ensure the wetland is adequately protected.
 - c. 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, prefabricated equipment mats, or terra mats).

In wetlands that cannot be appropriately stabilized, all construction equipment other than that needed to install the wetland crossing shall

use access roads located in upland areas. Where access roads in upland areas do not provide reasonable access, limit all other construction equipment to one pass through the wetland using the construction right-of-way.

- d. The only access roads, other than the construction right-of-way, that can be used in wetlands are those existing roads that can be used with no modifications or improvements, other than routine repair, and no impact on the wetland.

2. Crossing Procedures

- a. Comply with COE, or its delegated agency, permit terms and conditions.
- b. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.
- c. Use “push-pull” or “float” techniques to place the pipe in the trench where water and other site conditions allow.
- d. Minimize the length of time that topsoil is segregated and the trench is open. Do not trench the wetland until the pipeline is assembled and ready for lowering in.
- e. Limit construction equipment operating in wetland areas to that needed to clear the construction right-of-way, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction right-of-way.
- f. Cut vegetation just above ground level, leaving existing root systems in place, and remove it from the wetland for disposal.

The project sponsor can burn woody debris in wetlands, if approved by the COE and in accordance with state and local regulations, ensuring that all remaining woody debris is removed for disposal.

- g. Limit pulling of tree stumps and grading activities to directly over the trenchline. Do not grade or remove stumps or root systems from the rest of the construction right-of-way in wetlands unless the Chief Inspector and Environmental Inspector determine that safety-related construction constraints require grading or the removal of tree stumps from under the working side of the construction right-of-way.
- h. Segregate the top 1 foot of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are

saturated. Immediately after backfilling is complete, restore the segregated topsoil to its original location.

- i. Do not use rock, soil imported from outside the wetland, tree stumps, or brush riprap to support equipment on the construction right-of-way.
- j. If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-ground-weight construction equipment, or operate normal equipment on timber riprap, prefabricated equipment mats, or terra mats.
- k. Remove all project-related material used to support equipment on the construction right-of-way upon completion of construction.

3. Temporary Sediment Control

Install sediment barriers (as defined in section IV.F.3.a of the Plan) immediately after initial disturbance of the wetland or adjacent upland. Sediment barriers must be properly maintained throughout construction and reinstalled as necessary (such as after backfilling of the trench). Except as noted below in section VI.B.3.c, maintain sediment barriers until replaced by permanent erosion controls or restoration of adjacent upland areas is complete. Temporary erosion and sediment control measures are addressed in more detail in the Plan.

- a. Install sediment barriers across the entire construction right-of-way immediately upslope of the wetland boundary at all wetland crossings where necessary to prevent sediment flow into the wetland.
- b. Where wetlands are adjacent to the construction right-of-way and the right-of-way slopes toward the wetland, install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil within the construction right-of-way and prevent sediment flow into the wetland.
- c. Install sediment barriers along the edge of the construction right-of-way as necessary to contain spoil and sediment within the construction right-of-way through wetlands. Remove these sediment barriers during right-of-way cleanup.

4. Trench Dewatering

Dewater the trench (either on or off the construction right-of-way) in a manner that does not cause erosion and does not result in silt-laden water flowing into any wetland. Remove the dewatering structures as soon as practicable after the completion of dewatering activities.

C. RESTORATION

1. Where the pipeline trench may drain a wetland, construct trench breakers at the wetland boundaries and/or seal the trench bottom as necessary to maintain the original wetland hydrology.
2. Restore pre-construction wetland contours to maintain the original wetland hydrology.
3. For each wetland crossed, install a trench breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. Install a permanent slope breaker across the construction right-of-way at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from the wetland, or as needed to prevent sediment transport into the wetland. In addition, install sediment barriers as outlined in the Plan. In some areas, with the approval of the Environmental Inspector, an earthen berm may be suitable as a sediment barrier adjacent to the wetland.
4. Do not use fertilizer, lime, or mulch unless required in writing by the appropriate federal or state agency.
5. Consult with the appropriate federal or state agencies to develop a project-specific wetland restoration plan. The restoration plan shall include measures for re-establishing herbaceous and/or woody species, controlling the invasion and spread of invasive species and noxious weeds (e.g., purple loosestrife and phragmites), and monitoring the success of the revegetation and weed control efforts. Provide this plan to the FERC staff upon request.
6. Until a project-specific wetland restoration plan is developed and/or implemented, temporarily revegetate the construction right-of-way with annual ryegrass at a rate of 40 pounds/acre (unless standing water is present).
7. Ensure that all disturbed areas successfully revegetate with wetland herbaceous and/or woody plant species.
8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after revegetation and stabilization of adjacent upland areas are judged to be successful as specified in section VII.A.4 of the Plan.

D. POST-CONSTRUCTION MAINTENANCE AND REPORTING

1. Do not conduct routine vegetation mowing or clearing over the full width of the permanent right-of-way in wetlands. However, to facilitate periodic corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state. In addition, trees within 15 feet of the pipeline with roots that could compromise the integrity of pipeline coating may be selectively cut and removed from the permanent right-of-way. Do not conduct any routine vegetation mowing or clearing in wetlands that are between HDD entry and exit points.
2. Do not use herbicides or pesticides in or within 100 feet of a wetland, except as allowed by the appropriate federal or state agency.
3. Time of year restrictions specified in section VII.A.5 of the Plan (April 15 – August 1 of any year) apply to routine mowing and clearing of wetland areas.
4. Monitor and record the success of wetland revegetation annually until wetland revegetation is successful.
5. Wetland revegetation shall be considered successful if all of the following criteria are satisfied:
 - a. the affected wetland satisfies the current federal definition for a wetland (i.e., soils, hydrology, and vegetation);
 - b. vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;
 - c. if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and
 - d. invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.
6. Within 3 years after construction, file a report with the Secretary identifying the status of the wetland revegetation efforts and documenting success as defined in section VI.D.5, above. The requirement to file wetland restoration reports with the Secretary does not apply to projects constructed under the automatic authorization, prior notice, or advance notice provisions in the FERC's regulations.

For any wetland where revegetation is not successful at the end of 3 years after construction, develop and implement (in consultation with a

professional wetland ecologist) a remedial revegetation plan to actively revegetate wetlands. Continue revegetation efforts and file a report annually documenting progress in these wetlands until wetland revegetation is successful.

VII. HYDROSTATIC TESTING

A. NOTIFICATION PROCEDURES AND PERMITS

1. Apply for state-issued water withdrawal permits, as required.
2. Apply for National Pollutant Discharge Elimination System (NPDES) or state-issued discharge permits, as required.
3. Notify appropriate state agencies of intent to use specific sources at least 48 hours before testing activities unless they waive this requirement in writing.

B. GENERAL

1. Perform 100 percent radiographic inspection of all pipeline section welds or hydrotest the pipeline sections, before installation under waterbodies or wetlands.
2. If pumps used for hydrostatic testing are within 100 feet of any waterbody or wetland, address secondary containment and refueling of these pumps in the project's Spill Prevention and Response Procedures.
3. The project sponsor shall file with the Secretary before construction a list identifying the location of all waterbodies proposed for use as a hydrostatic test water source or discharge location. This filing requirement does not apply to projects constructed under the automatic authorization provisions of the FERC's regulations.

C. INTAKE SOURCE AND RATE

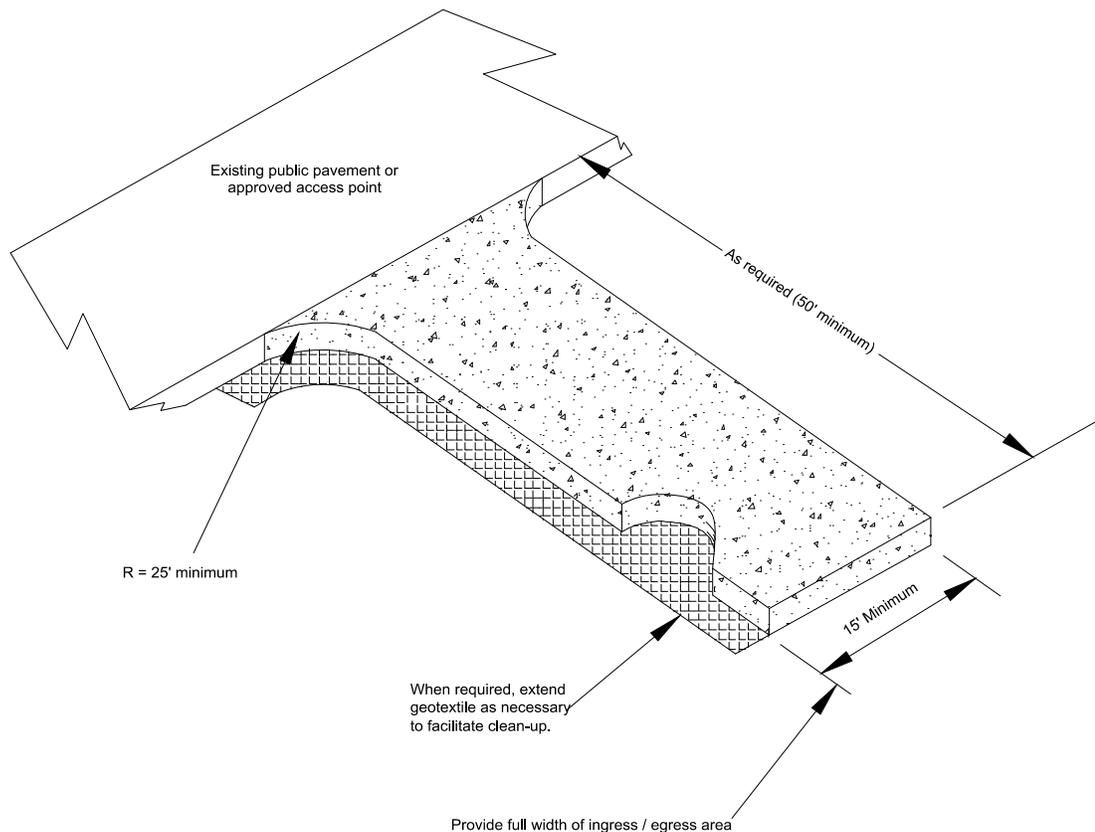
1. Screen the intake hose to minimize the potential for entrainment of fish.
2. Do not use state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and/or local permitting agencies grant written permission.
3. Maintain adequate flow rates to protect aquatic life, provide for all waterbody uses, and provide for downstream withdrawals of water by existing users.
4. Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.

D. DISCHARGE LOCATION, METHOD, AND RATE

1. Regulate discharge rate, use energy dissipation device(s), and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive streamflow.
2. Do not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission.

ATTACHMENT C

Typical BMP Drawings



Notes:

Equipment mats or their equivalent may be used as a substitute for the graveled apron if approved by the Company.

Install construction entrances at right-of-way access points that intersect paved roads to reduce sediment transport onto roadway.

Install culverts in road ditches as necessary.

Crushed stone access pads shall be placed on synthetic fabric in residential or active agricultural areas to facilitate stone removal. Use Synthetic Industries style 22TEX, Light Stabilization Fabric, or equivalent (3 oz/yd woven geotextile).

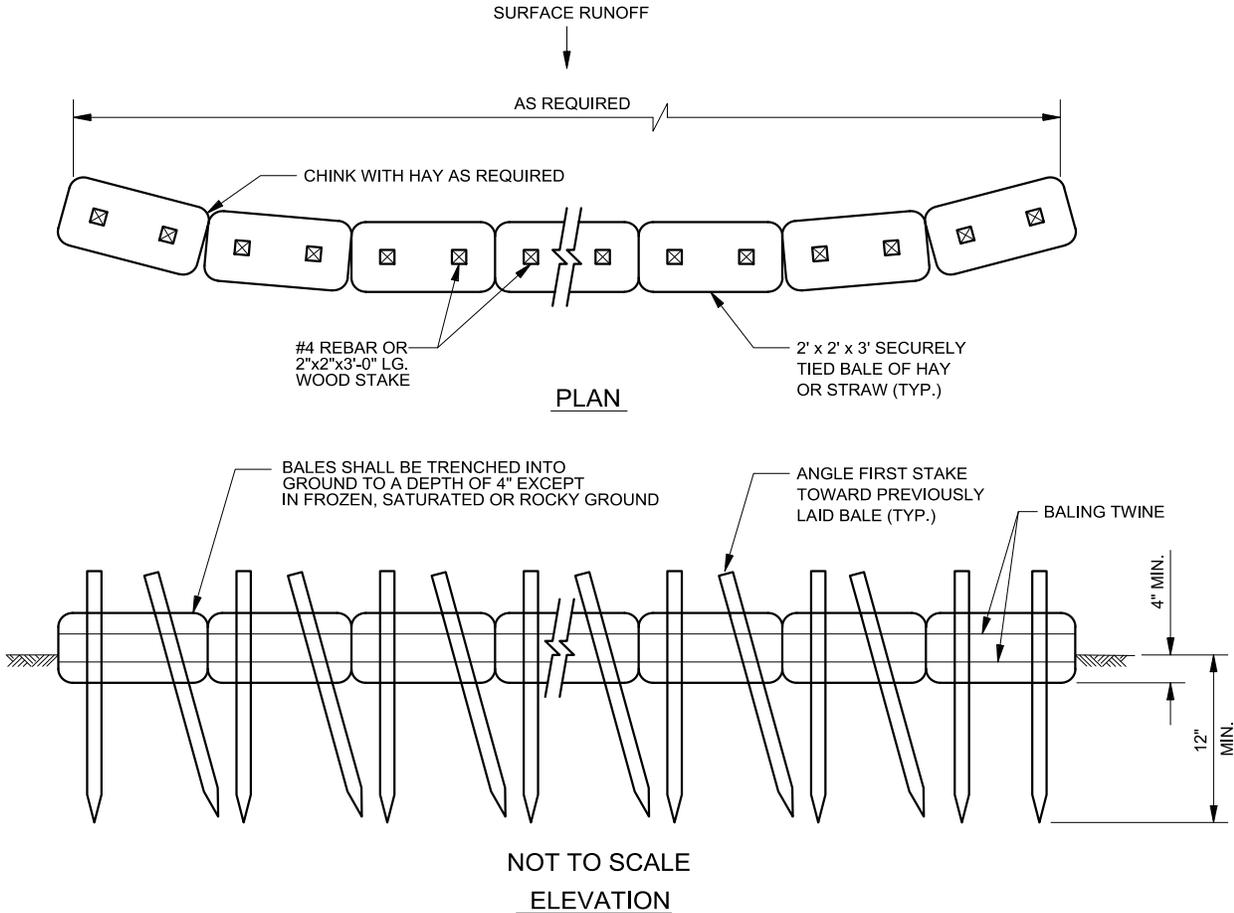
INSTALLATION: The area of the entrance should be cleared of all vegetation, roots and other objectionable material. The gravel shall be placed to the specified dimensions. Any drainage facilities required because of washing should be constructed according to specifications in the plan. If wash racks are used, they should be installed according to manufacturer's specifications.

AGGREGATE: 2" to 6" crushed Ballast Rock.

ENTRANCE DIMENSIONS: The aggregate layer must be at least 6 inches thick. It must extend the full width of the vehicular ingress and egress area. The length of the entrance must be at least 50 feet.

MAINTENANCE: The entrance shall be maintained in a condition which will prevent tracking or flow of mud onto public rights-of-way. This may require periodic top dressing with 2-inch stone, as conditions demand, and repair and/or clean out any structures used to trap sediment. All materials spilled, dropped, washed or tracked from vehicles onto roadway or into storm drains must be removed immediately.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL CONSTRUCTION ENTRANCE ACCESS PAD (CE)				 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: JST	DATE: JUNE 2007	ISSUED FOR BID:	SCALE: NONE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0001	SHEET OF
									%TIME% %PATH%	



NOTES:

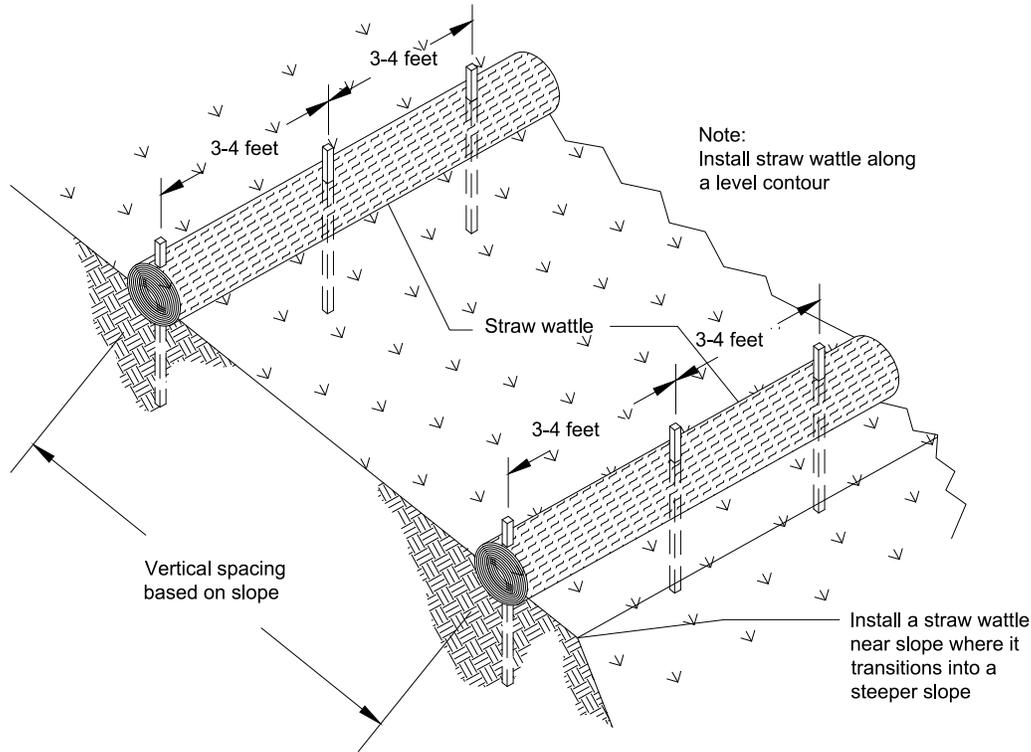
Straw bales will not be used as a primary sediment barrier. They may be used at road crossings and waterbodies where equipment will be moved up and down the right-of-way or at the end of the work day to allow traffic to leave the right-of-way. They may be used to reinforce other sediment barriers (i.e., silt fence).

1. BALE BARRIERS SHALL BE PLACED TO FOLLOW (RUN PARALLEL TO) THE CONTOURS AND SHALL NOT BE LOCATED IN AREAS OF CONCENTRATED FLOW.
2. INSTALLATIONS SHALL BE CHECKED AFTER EACH 0.5 INCHES OF RAINFALL AND IF FLOW IS OBSTRUCTED, THE SEDIMENT SHALL BE REMOVED.
3. BALE BARRIERS SHALL BE LEFT IN PLACE UNTIL PERMANENT VEGETATION COVER IS ESTABLISHED. MATERIAL FROM BALE BARRIERS MAY THEN BE USED AS MULCH AND SCATTERED OVER THE SURROUNDING AREA AS DIRECTED BY COMPANY REPRESENTATIVE.
4. ON UPSLOPE INSTALLATIONS, BOTH ENDS OF THE BALE BARRIER SHALL BE TURNED AND EXTENDED UPSLOPE.
5. AREA DISTURBED AS A RESULT OF REMOVING THE BALE BARRIER SHALL BE RESTABILIZED BY SEEDING ACCORDING TO THE REVEGETATION SPECIFICATIONS.
6. CONTRACTOR SHALL USE CERTIFIED NOXIOUS WEED FREE HAY OR STRAW.
7. BALES SHALL BE PLACED SUCH THAT TIES OR BALING TWINE IS NOT IN CONTACT WITH THE GROUND.

SEDIMENT BARRIER - STRAW BALE

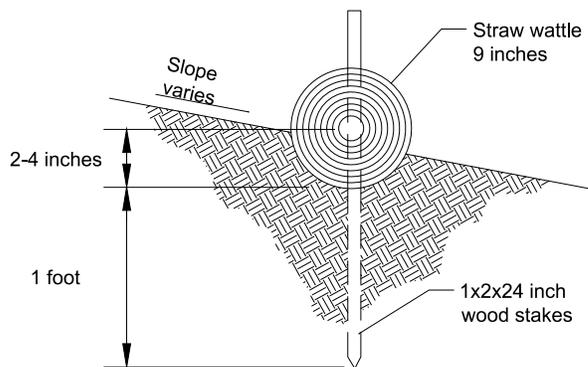
TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL SEDIMENT BARRIER - STRAW BALE OPTION (SB)					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0002	SHEET 2
									%TIME%	OF 2
									%PATH%	



TYPICAL STRAW WATTLE INSTALLATION

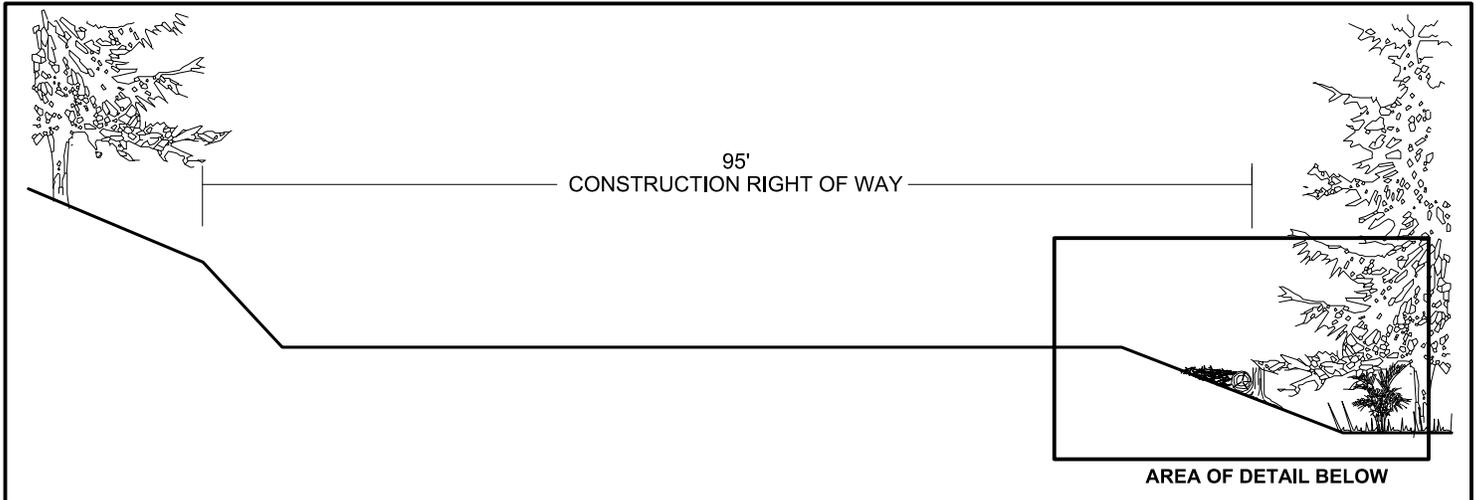
N.T.S.



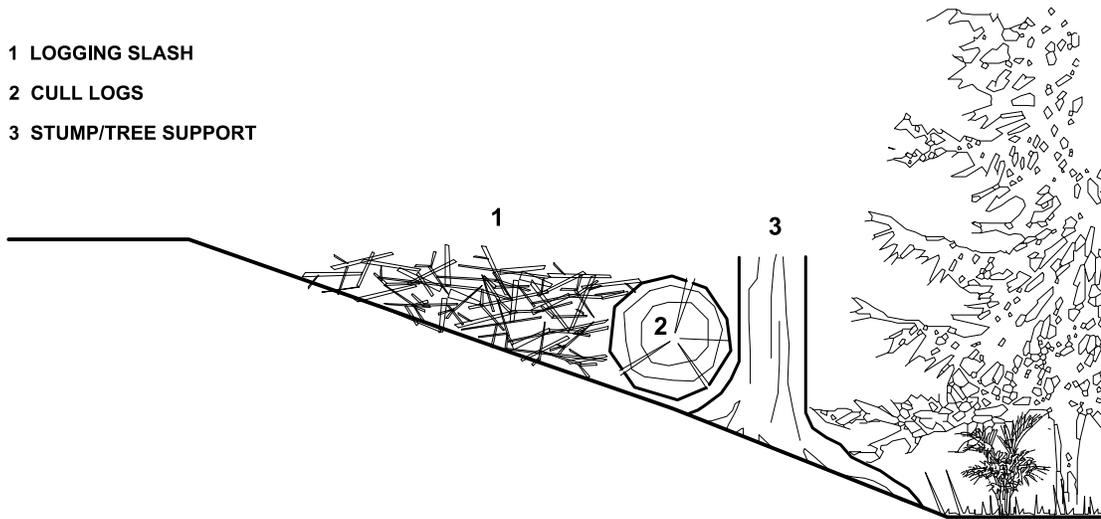
ENTRENCHMENT DETAIL

N.T.S.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL SEDIMENT BARRIER - STRAW WATTLE OPTION (SW)				 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
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									%TIME% %PATH%	OF 4



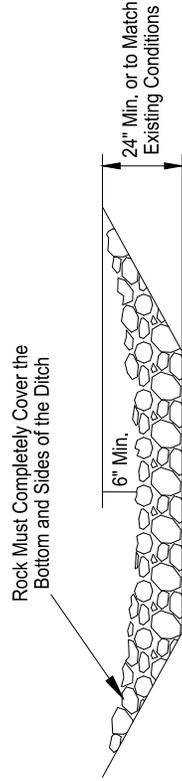
- 1 LOGGING SLASH
- 2 CULL LOGS
- 3 STUMP/TREE SUPPORT



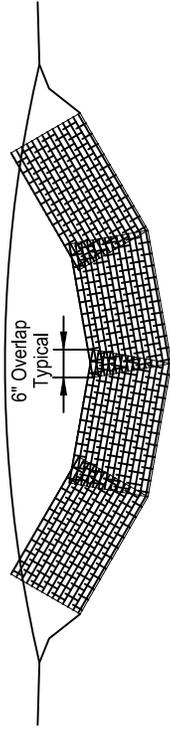
Slash-Filter Windrows

1. In forested areas during timber clearing/right-of-way grading operations slash-filter windrows will be constructed on the downhill edge of the Construction Right-of-Way and Temporary Extra Work Areas (TEWAs), as directed by the Environmental Inspector.
2. Slash-filter windrows will be constructed of logging slash including cull logs, tree tops, limbs and branches. The windrow may be supported at the base by cull logs or rocks, which may be supported by stumps, rocks or trees parallel to the right-of-way.
- 3 Material in the windrow would be constructed (packed/tamped) to form a compact windrow that will be effective in filtering sediment, reducing water velocities and preventing stream sedimentation.
4. Windrows shall be placed so that they do not interfere with functioning drainage structures or stream channels.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP SLASH-FILTER WINDROW					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0002	SHEET 4 OF 4



PROFILE (ROCK)



PROFILE (BIO BAG)

Notes:

Use wood stakes whenever possible. Steel rebar may be used when soil is frozen or rocky.

Biobags, straw wattles, or other approved materials may be used.

Sediment control structures can be placed off the construction right-of-way by hand if the location has been approved by the Environmental Inspector.

Contractor shall use certified noxious weed free hay or straw.

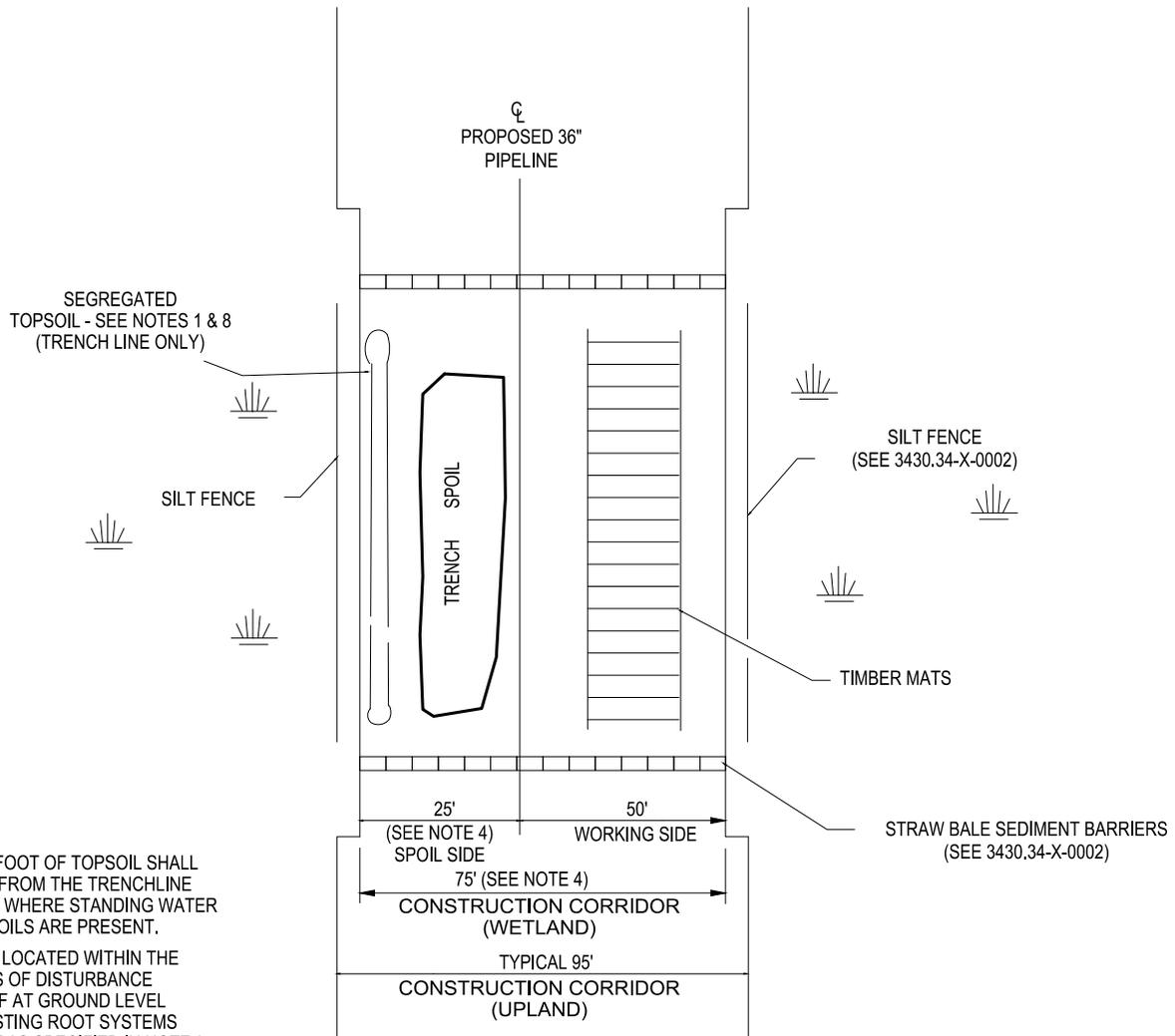
DRAWING NO.		REFERENCE TITLE				
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		APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0004		SHEET OF
				%TIME: %		OF
				%PATH: %		



**PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
SEDIMENT CONTROL IN DITCHES AND SWALES**

SC

WETLAND CROSSING DETAIL

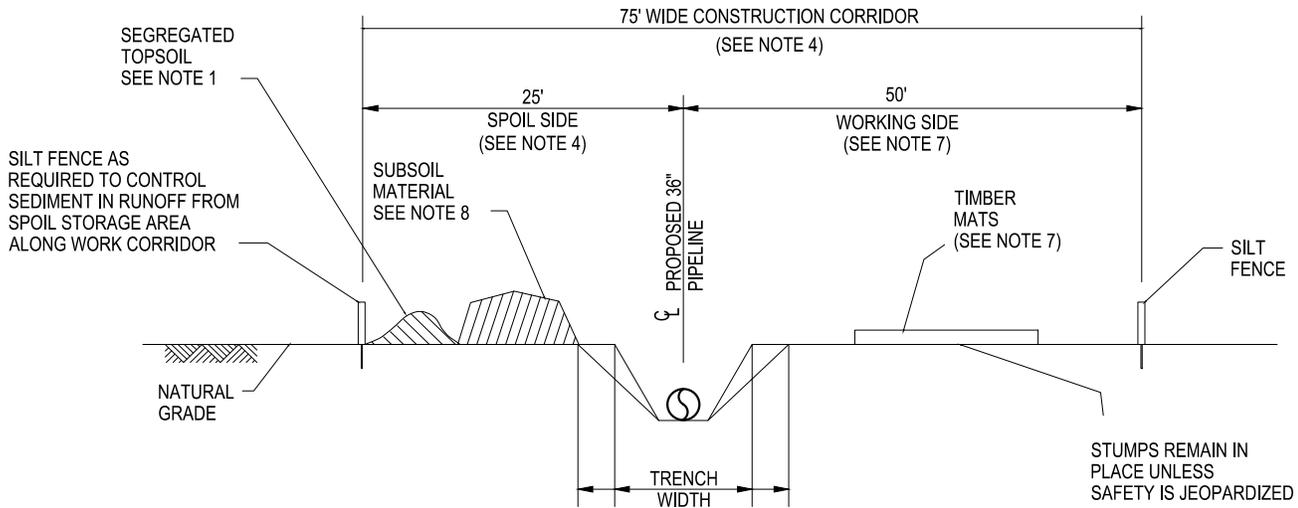


PLAN VIEW

NOTES:

1. THE TOP ONE (1) FOOT OF TOPSOIL SHALL BE SEGREGATED FROM THE TRENCHLINE EXCEPT IN AREAS WHERE STANDING WATER OR SATURATED SOILS ARE PRESENT.
2. THE VEGETATION LOCATED WITHIN THE PROPOSED LIMITS OF DISTURBANCE SHALL BE CUT OFF AT GROUND LEVEL LEAVING THE EXISTING ROOT SYSTEMS IN PLACE, EXCEPT AS SPECIFIED IN NOTE 3.
3. PULLING OF TREE STUMPS AND GRADING ACTIVITIES SHALL BE LIMITED TO THE AREA DIRECTLY OVER THE TRENCHLINE UNLESS SAFETY CONDITIONS REQUIRE THE REMOVAL OF TREE STUMPS FROM UNDER THE WORKING SIDE OF THE WORK CORRIDOR.
4. CONSTRUCTION CORRIDOR THROUGH WETLANDS WILL BE 75 FEET WIDE UNLESS A MODIFICATION IS GRANTED. CONFIGURATION OF RIGHT-OF-WAY MAY VARY.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP CROSSING DETAIL FOR WETLANDS <div style="text-align: center; border: 1px solid black; border-radius: 50%; width: 30px; margin: 0 auto;">WC</div>					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001		
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							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0005	
									SHEET 1	
									OF 2	

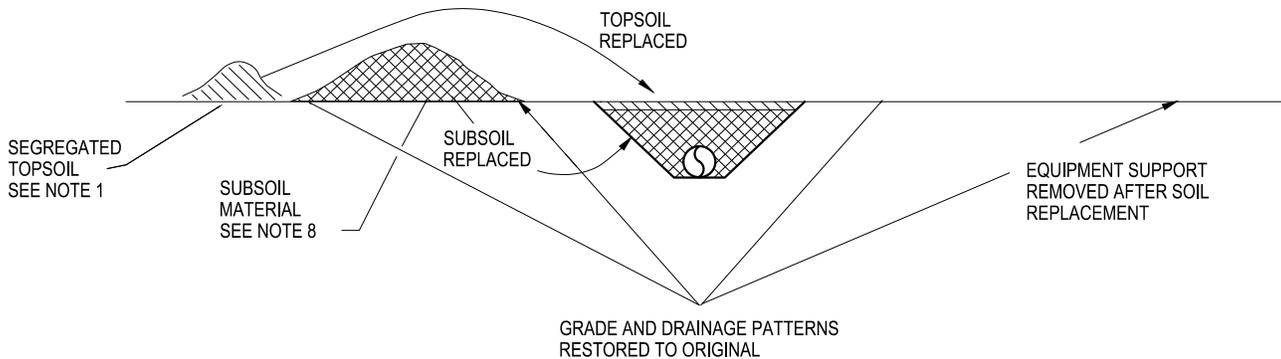


TRENCH WIDTH VARIES DEPENDING ON SOILS ENCOUNTERED DURING CONSTRUCTION

NOTES CONTINUED:

5. SILT FENCE OR STRAW BALES WILL BE USED WHERE APPROPRIATE TO PREVENT SILTATION INTO WATER BODIES OR WETLANDS.
6. SILT FENCES OR STRAW BALES WILL ALSO BE USED TO PREVENT STOCKPILED SOIL OR SPOIL FROM LEAVING THE CONSTRUCTION RIGHT-OF-WAY OR WORKSPACES.
7. TIMBER MATS MAY BE USED OVER SPOIL STORAGE WHERE STANDING WATER OR SATURATED SOILS ARE PRESENT.
8. IF STANDING WATER OR SATURATED SOILS ARE PRESENT, OR IF CONSTRUCTION EQUIPMENT CAUSES RUTS OR MIXING OF TOPSOIL AND SUBSOIL IN WETLANDS, USE LOW-GROUND WEIGHT EQUIPMENT, OR OPERATE NORMAL EQUIPMENT ON TIMBER RIPRAP, PREFABRICATED EQUIPMENT MATS OR TERRA MATS.

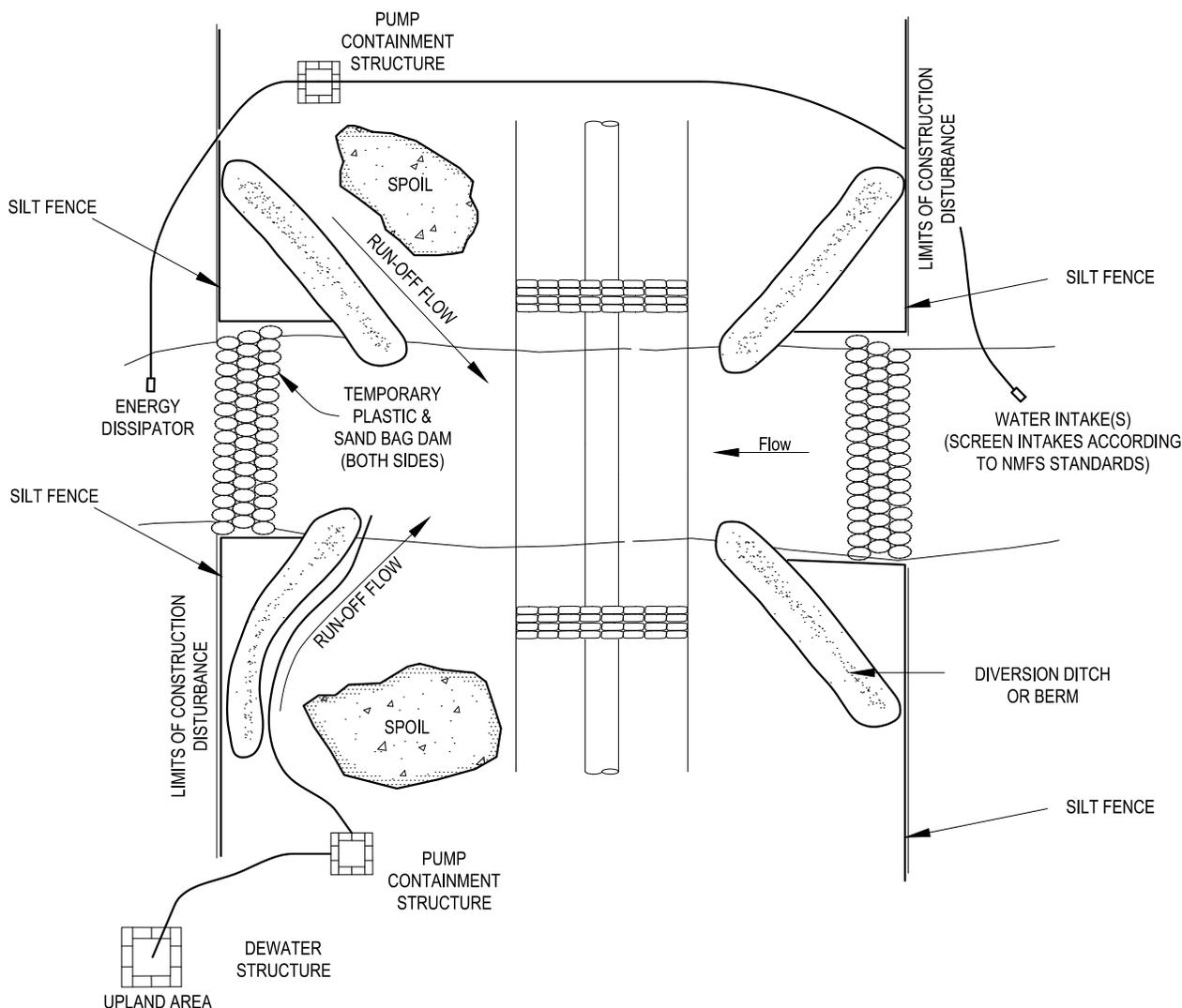
CROSS SECTION



WETLAND RESTORATION

DRAWING NO.		REFERENCE TITLE		PACIFIC CONNECTOR GAS OPERATOR, LP PACIFIC CONNECTOR GAS PIPELINE PROJECT CROSSING DETAIL FOR WETLANDS						
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	DRAWING NUMBER: 3430.34-X-0005	SHEET 2 OF 2
							CHECKED BY:	DATE:		
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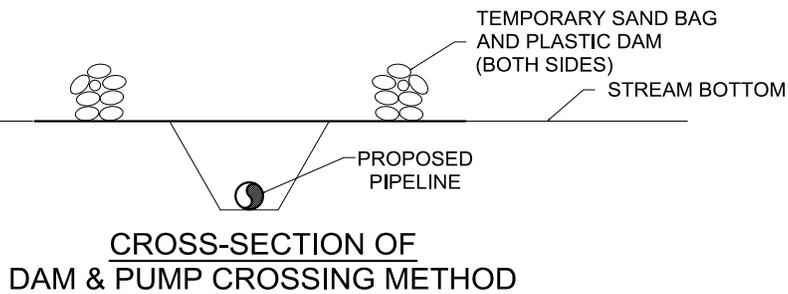
CONFIGURATION THROUGH WATERBODIES WITH ASSOCIATED WETLANDS IS VARIABLE BUT WILL NOT EXCEED 75 FEET IN WIDTH UNLESS A VARIANCE IS GRANTED



PLAN VIEW OF DAM & PUMP CROSSING METHOD

NOTES:

- TRENCH WIDTH WILL VARY DUE TO SOIL CONDITIONS WHICH ARE NOT KNOWN UNTIL ACTUAL CONSTRUCTION TAKES PLACE.
- 1. EXTRA WORKSPACE WILL BE LOCATED 50 FEET FROM EDGE OF WATERBODY UNLESS A MODIFICATION IS GRANTED.
- 2. FOR EXTRAWORKSPACE LOCATIONS AND DIMENSIONS SEE ENVIRONMENTAL ALIGNMENT SHEETS.
- 3. TEMPORARY EROSION CONTROL MEASURES MUST BE REPLACED AT THE END OF EACH WORKING DAY.



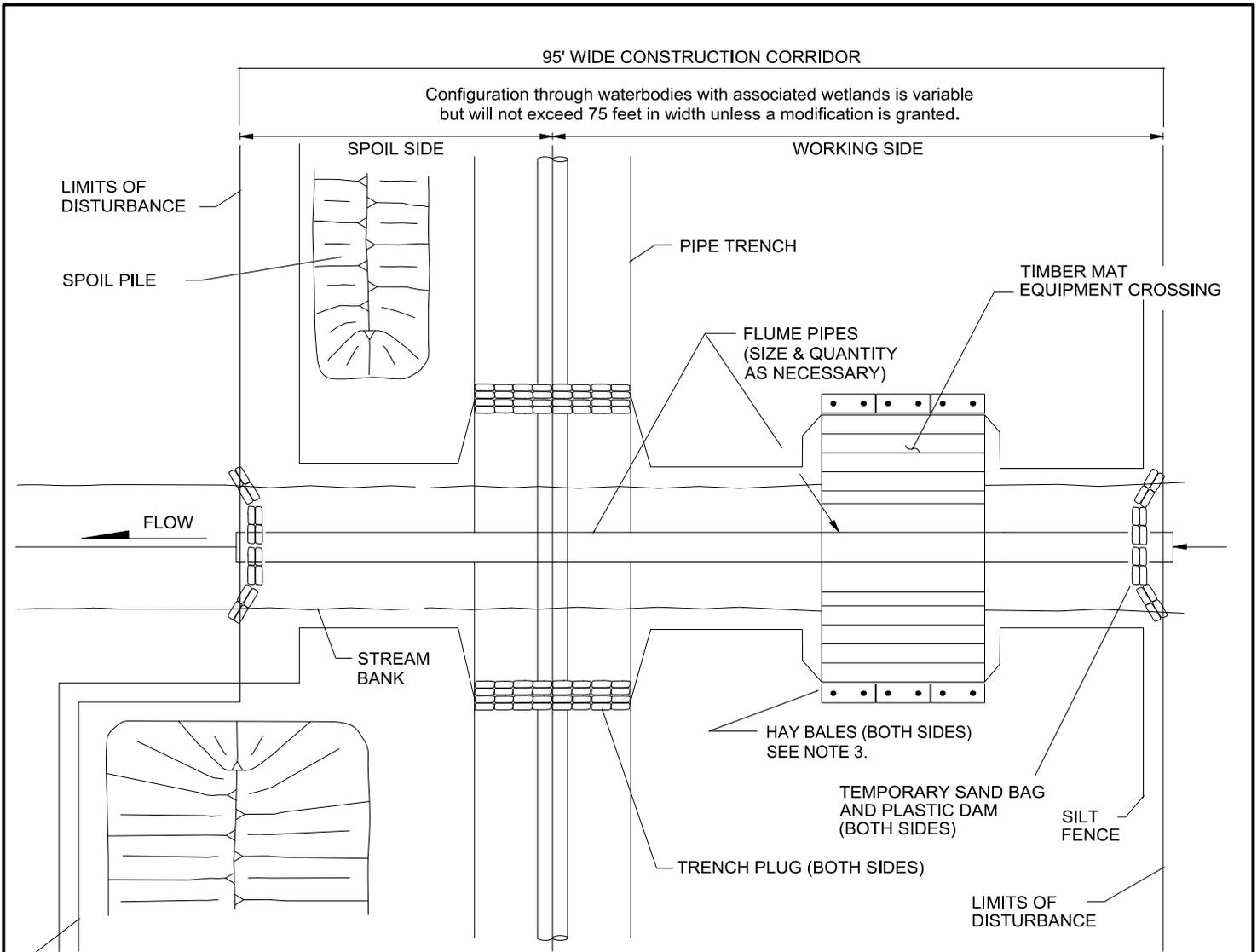
CROSS-SECTION OF DAM & PUMP CROSSING METHOD

3.	DRAWING NO.	REFERENCE TITLE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
 PACIFIC CONNECTOR GAS PIPELINE, LP
 WATERBODY CROSSING DETAIL
 DAM & PUMP CROSSING METHOD

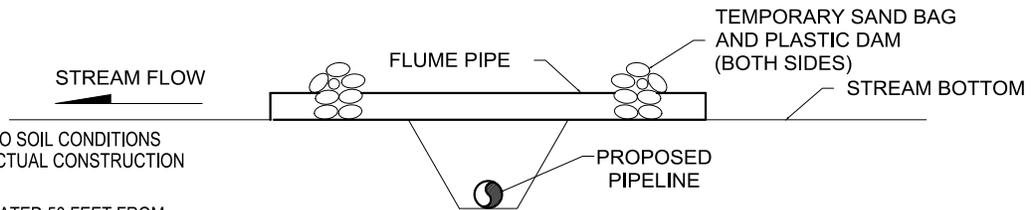


NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	DRAWING NUMBER: 3430.34-X-0006	SHEET 1 OF 1
							CHECKED BY:	DATE:		
							APPROVED BY:	DATE:		



PLAN VIEW OF FLUMED CROSSING METHOD

EXTRA WORKSPACE. SEE NOTE 2.

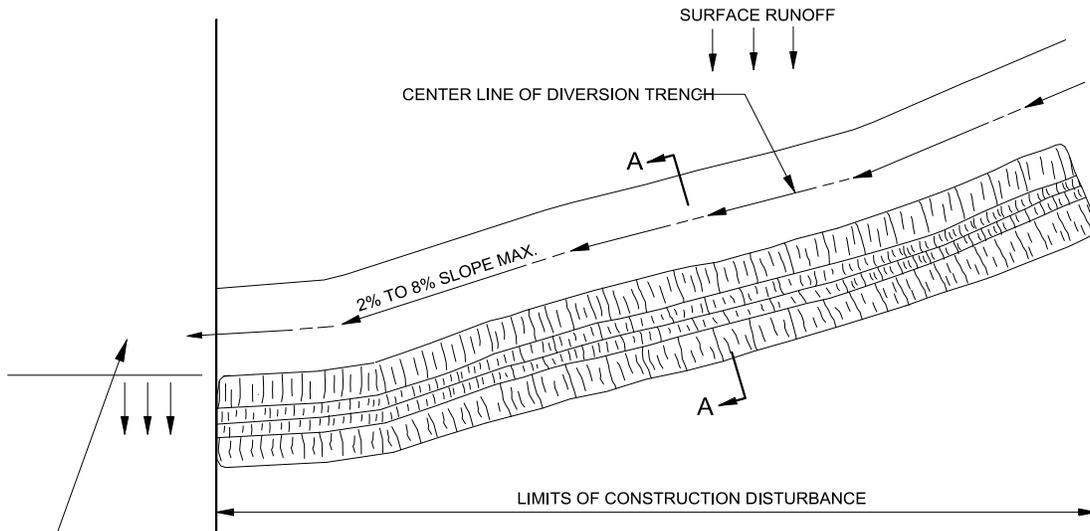


CROSS-SECTION OF FLUMED CROSSING METHOD

NOTES:

1. TRENCH WIDTH WILL VARY DUE TO SOIL CONDITIONS WHICH ARE NOT KNOWN UNTIL ACTUAL CONSTRUCTION TAKES PLACE.
2. EXTRA WORKSPACE WILL BE LOCATED 50 FEET FROM EDGE OF WATERBODY UNLESS A MODIFICATION IS GRANTED. FOR EXTRA WORKSPACE LOCATIONS AND DIMENSIONS SEE ENVIRONMENTAL ALIGNMENT SHEETS.
3. TEMPORARY EROSION CONTROL MEASURES MUST BE REPLACED AT THE END OF EACH WORKING DAY.

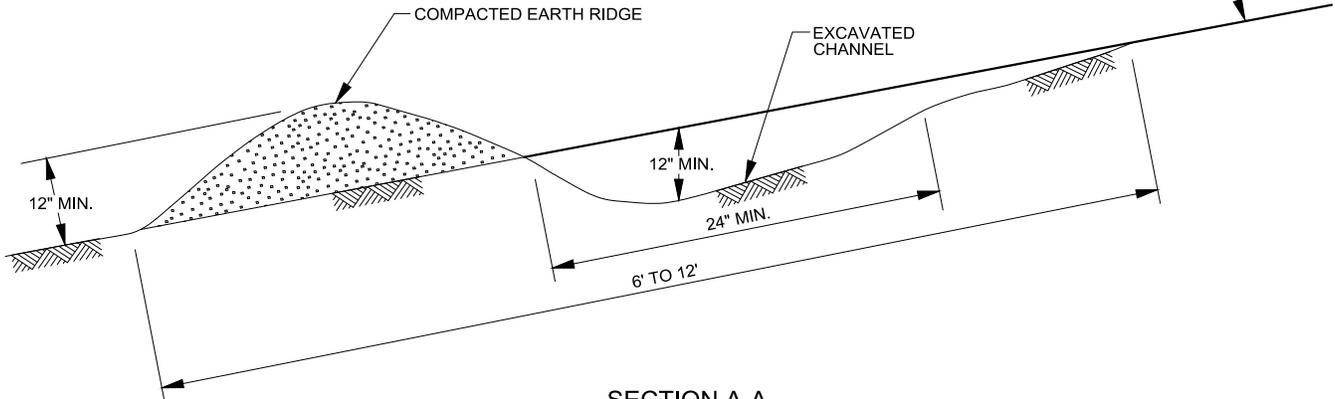
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-05-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0007	SHEET OF



DIVERSION TRENCH OUTLET SHALL BE PLACED WHERE RUNOFF WILL BE RELEASED ONTO STABLE WELL-VEGETATED GROUND. INSTALL GEO-JUTE AT OUTLET AS AN ENERGY-DISSIPATOR AT THE END OF THE BREAKER IF NEEDED.

PLAN

NOTE:
SLOPE BREAKER SPACING WILL BE DETERMINED ACCORDING TO TABLE 6.2-1.



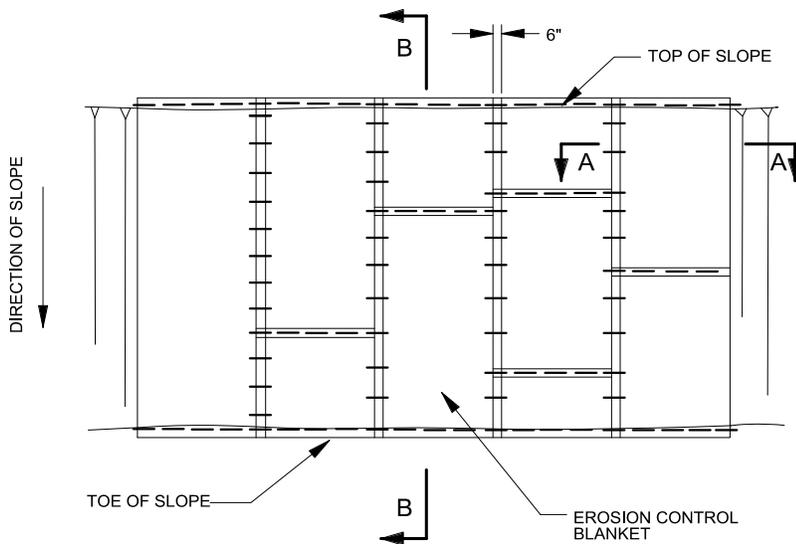
SECTION A-A

NOTE:
SLOPE BREAKERS MAY EXTEND SLIGHTLY (ABOUT 4 FEET) BEYOND THE EDGE OF THE CONSTRUCTION RIGHT-OF-WAY TO EFFECTIVELY DRAIN WATER OFF THE DISTURBED AREA.

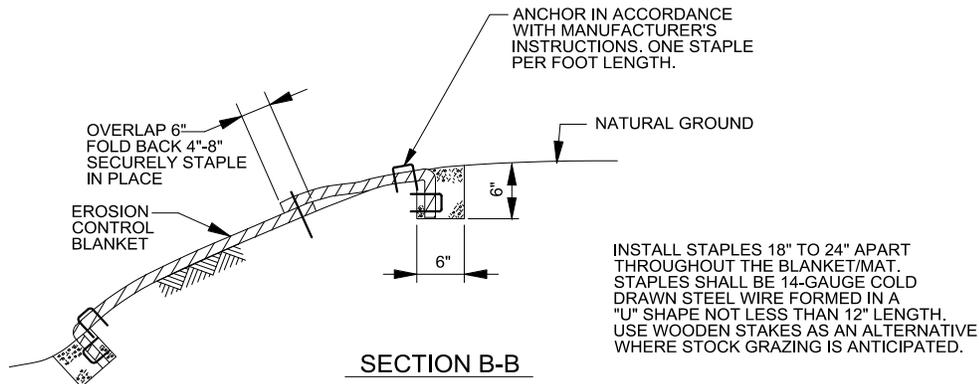
TEMPORARY AND PERMANENT SLOPE BREAKERS

TEMPORARY & PERMANENT EROSION CONTROL MEASURE

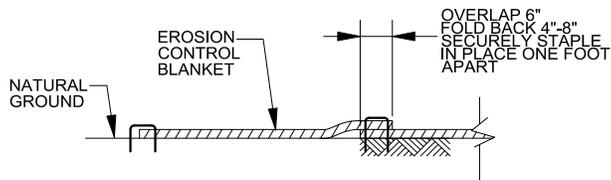
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-05-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0008	SHEET OF



PLAN



SECTION B-B

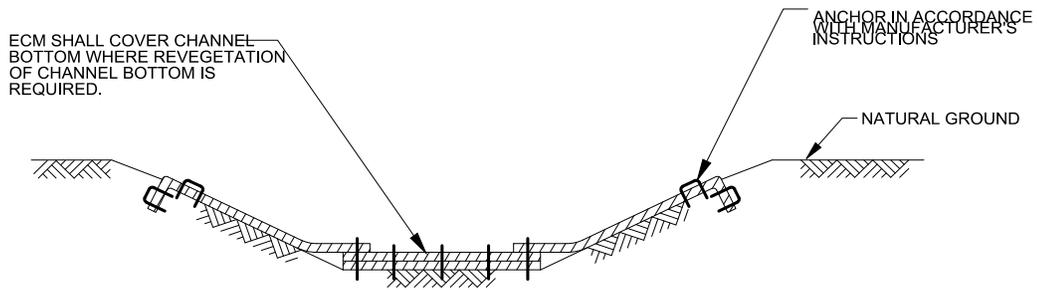
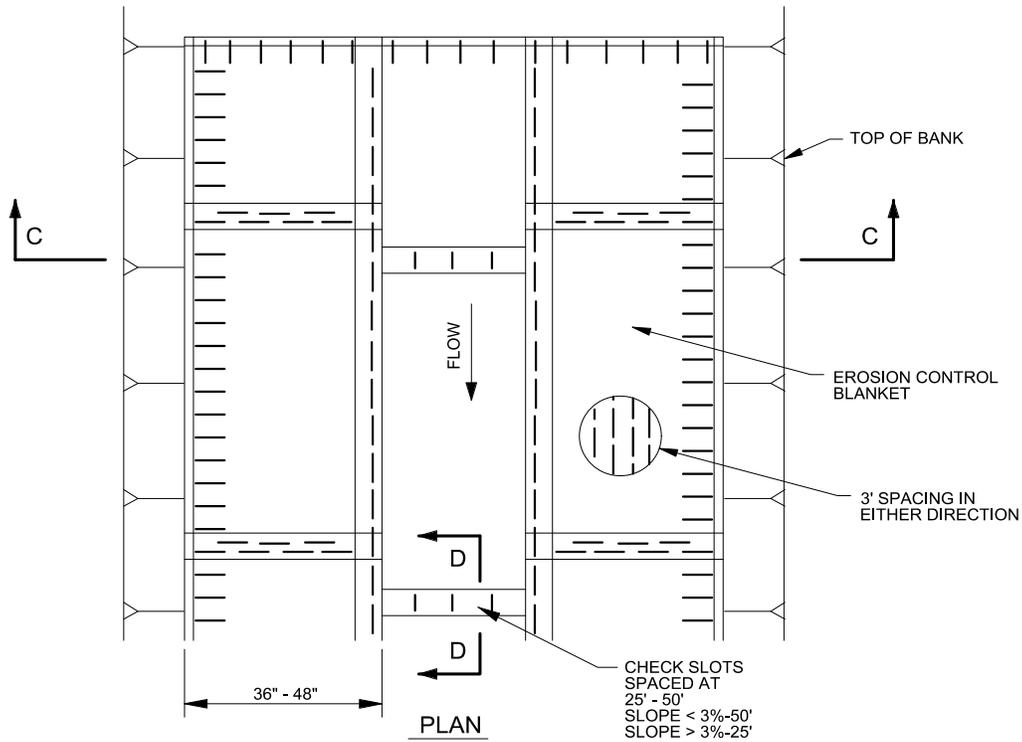


SECTION A-A

EMBANKMENT INSTALLATION

EROSION CONTROL MATTING
PERMANENT EROSION CONTROL MEASURE

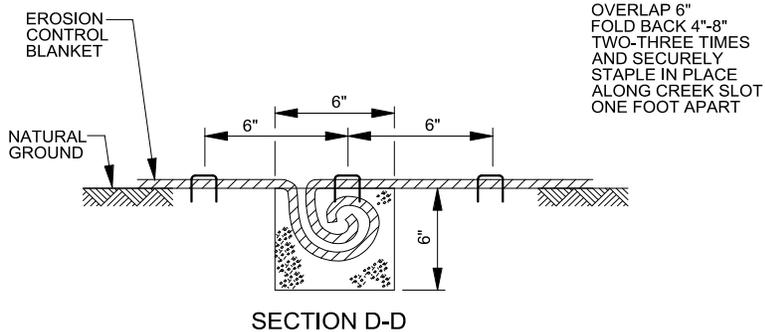
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0009	SHEET 1 OF 4



SECTION C-C
CHANNEL INSTALLATION

EROSION CONTROL MATTING
PERMANENT EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE		PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL EROSION CONTROL MATTING (ECM)				 Pacific Connector GAS PIPELINE		
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0009	SHEET 2 OF 4



MATERIAL
NORTH AMERICAN GREEN SC150 (OR EQUIVALENT)

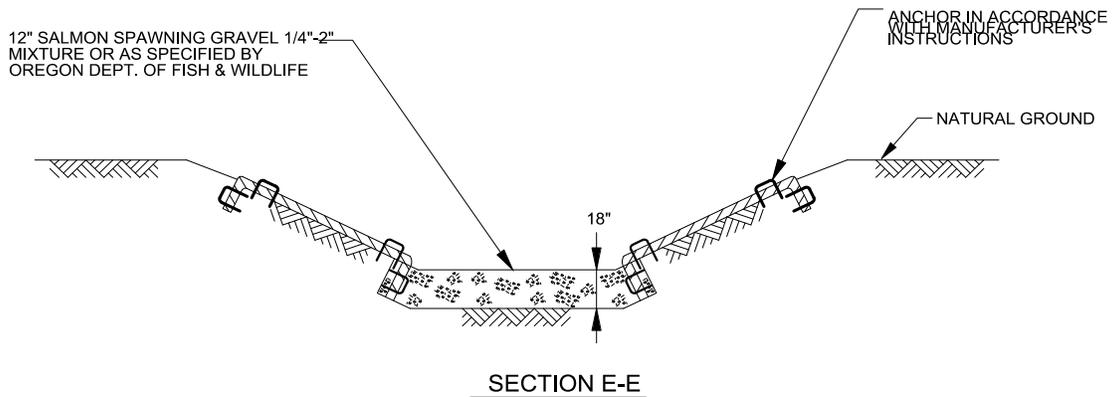
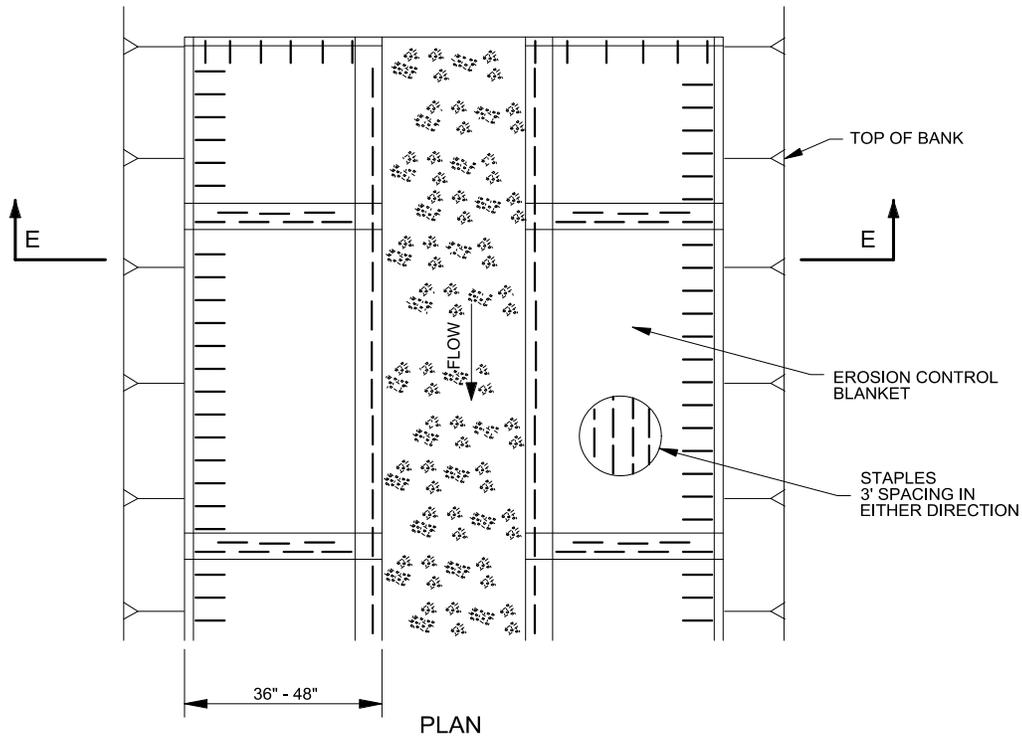
NOTES:

1. EROSION CONTROL BLANKETS SHALL EXTEND COMPLETELY ACROSS DISTURBED AREA TO PROTECT ERODIBLE SURFACES. THE SOIL SHALL BE PROPERLY PREPARED, SEEDED AND MULCHED PRIOR TO INSTALLATION.
2. INSTALL EROSION CONTROL BLANKETS ON FRESHLY GRADED EMBANKMENTS ON SLOPES IN EXCESS OF 3:1 (H:V) TO SUPPORT VEGETATION OR AS DIRECTED TO DO SO BY A COMPANY REPRESENTATIVE.
3. INSTALL BLANKETS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
4. BLANKET SHALL BE LOOSELY INSTALLED AND TAMPED OR ROLLED IN PLACE AFTER INSTALLATION. STAPLES SHALL BE DRIVEN FLUSH WITH THE GROUND.

EROSION CONTROL MATTING

PERMANENT EROSION CONTROL MEASURE

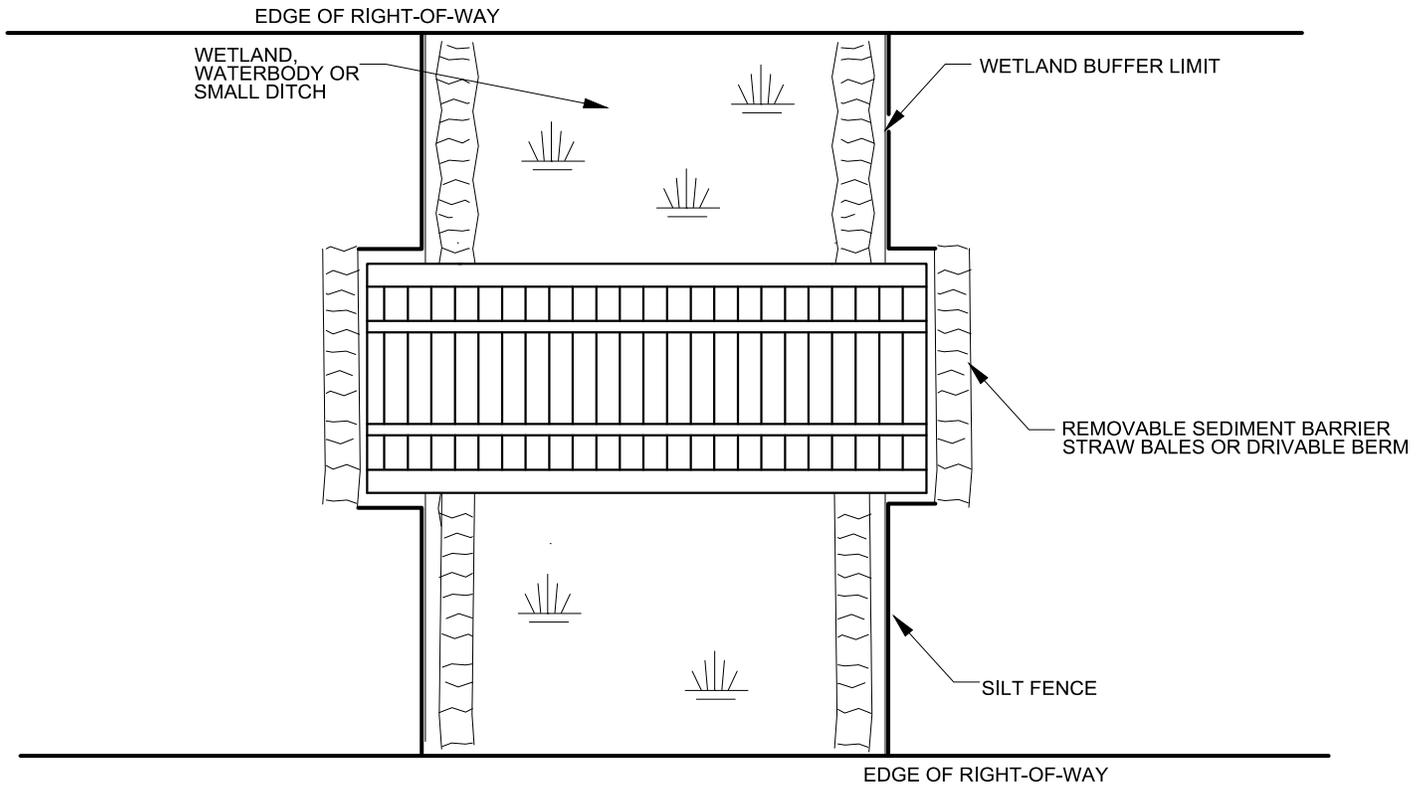
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NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
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SHEET 3										
OF 4										



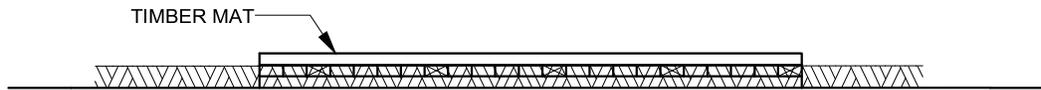
SALMON STREAM RESTORATION ALTERNATIVE

EROSION CONTROL MATTING
PERMANENT EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE		PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL EROSION CONTROL MATTING (ECM)						
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0009	SHEET 4 OF 4



PLAN



PROFILE

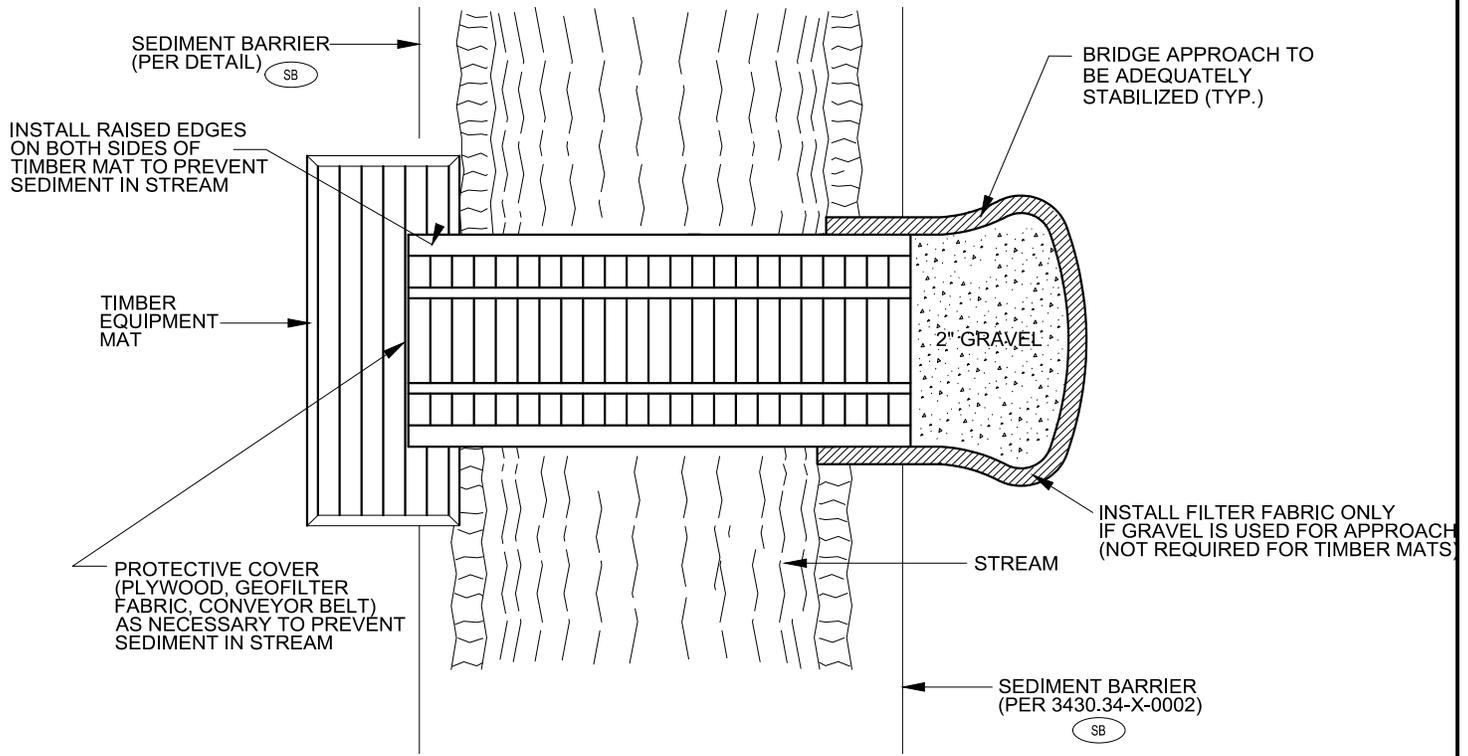
NOTES:

1. PERIODICALLY CHECK INSTALLATION AND REMOVE BUILD-UP OF SEDIMENT OR DEBRIS.
2. MATERIALS PLACED IN WETLANDS SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL OF THIS STRUCTURE IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
3. EXTEND TIMBER MATS TO EQUIPMENT CROSSING AT WATERBODY. CONTINUE EQUIPMENT MATS THROUGH THE WETLAND AND WATERBODY AREA.
4. USE ADDITIONAL TIMBER MAT LAYERS TO RAISE CROSSING ABOVE GRADE WHERE POOR SOIL CONDITIONS EXIST.

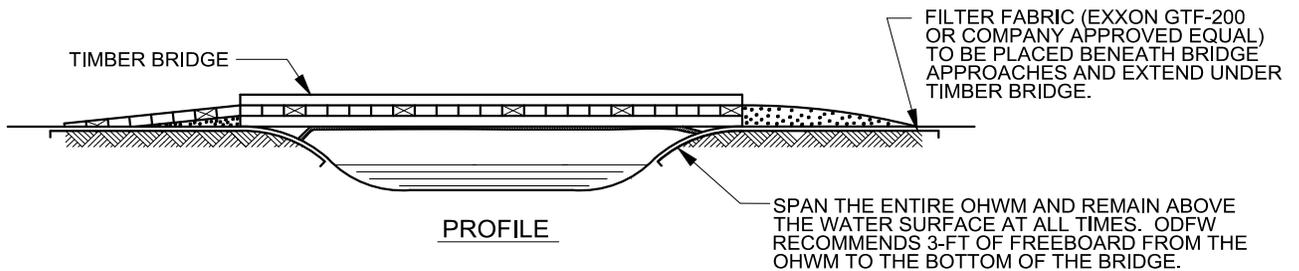
PORTABLE BRIDGE CROSSING

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.			REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL PORTABLE BRIDGE CROSSING (PB)			 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
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							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0010	SHEET 1 OF 2



PLAN

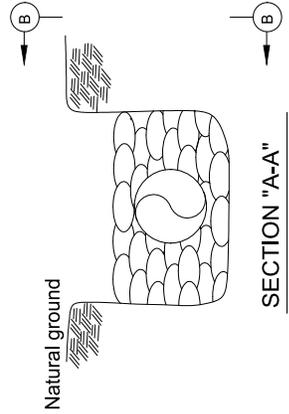
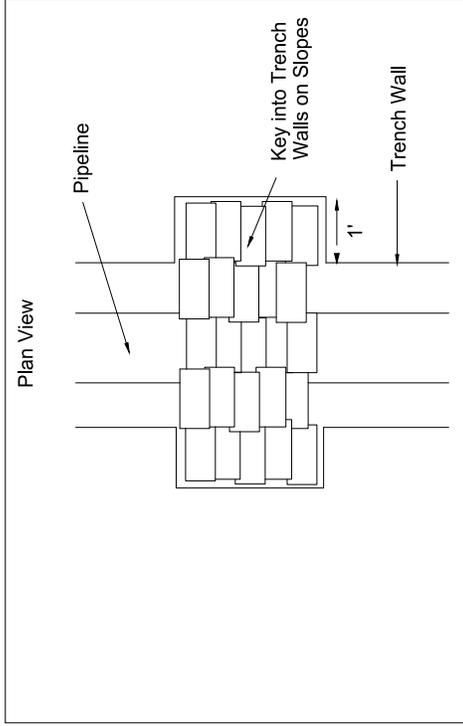
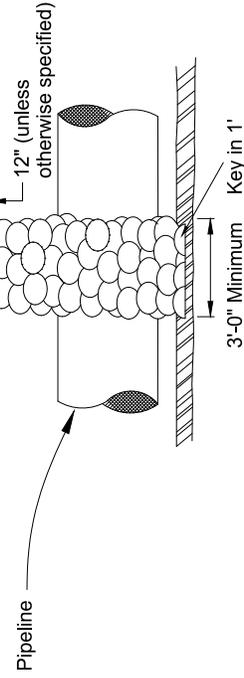
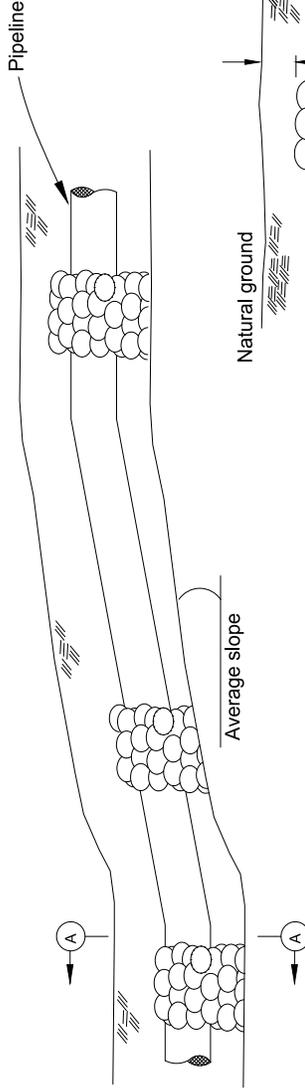


PROFILE

MINIMUM PERFORMANCE/DESIGN STANDARDS:

1. TIMBER BRIDGES SHALL BE ADEQUATELY ANCHORED AT ONE END.
2. BRIDGE APPROACHES SHALL BE EITHER COARSE AGGREGATE OR TIMBER EQUIPMENT MATS.
3. SEDIMENT AND DEBRIS SHALL NOT ENTER WATERBODY. PROVIDE RAISED EDGES ON BOTH BRIDGE EDGES AND PROTECTIVE COVER (PLYWOOD, GEOFILTER FABRIC, CONVEYOR BELT), AS NECESSARY, TO PREVENT SEDIMENT IN STREAM.
4. PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE BUILD-UP OF SEDIMENT OR DEBRIS ON BRIDGE.
5. MATERIALS PLACED ALONG STREAM CHANNEL SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL OF THIS STRUCTURE IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
6. THE TIMBER BRIDGE SHALL BE DESIGNED TO SPAN THE ENTIRE OHWM OF THE WATERBODIES AND REMAIN ABOVE THE WATER SURFACE ELEVATION AT ALL TIMES. ODFW RECOMMENDS 3-FT OF FREEBOARD FROM THE OHWM/ACTIVE CHANNEL TO THE BOTTOM OF THE BRIDGE.
7. CONTRACTOR MAY USE MANUFACTURED PORTABLE BRIDGES OR RAIL CAR BRIDGES AS SUBSTITUTES FOR THE MEASURES SHOWN, IF APPROVED BY COMPANY REPRESENTATIVE.
8. MID-STREAM BRIDGE SUPPORTS PIERS OR CULVERTS SHALL BE USED TO PREVENT SETTLEMENT OF THE BRIDGE, IF NECESSARY. WHERE PIERS/CULVERTS ARE USED TO SUPPORT BRIDGES THEY SHALL NOT RESTRICT FLOW AND SHALL BE DESIGNED TO WITHSTAND AND PASS THE HIGHEST FLOW THAT WOULD OCCUR WHILE THE BRIDGE IS IN PLACE.
9. USE OF MID-STREAM BRIDGE SUPPORTS PIERS/CULVERTS WILL TRIGGER ODFW FISH PASSAGE PERMIT REQUIREMENTS AND APPROVALS BEFORE INSTALATION.

DRAWING NO.		REFERENCE TITLE		PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL PORTABLE BRIDGE CROSSING (PB)						
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0010	SHEET 2 OF 2



Notes:

Topsoil shall not be used in trench breakers.

Spacing of trench breakers shall be installed base on slope or as directed by Pacific Connector Gas Pipeline, LP authorized representative. Soft plugs (unexcavated sections along the pipeline trench line) may be left in place to perform function of permanent breakers prior to pipe placement.

SLOPE PERCENT	SPACING (feet)
10-15	500
15-20	300
20-30	150
>30	100

DRAWING NO. REFERENCE TITLE

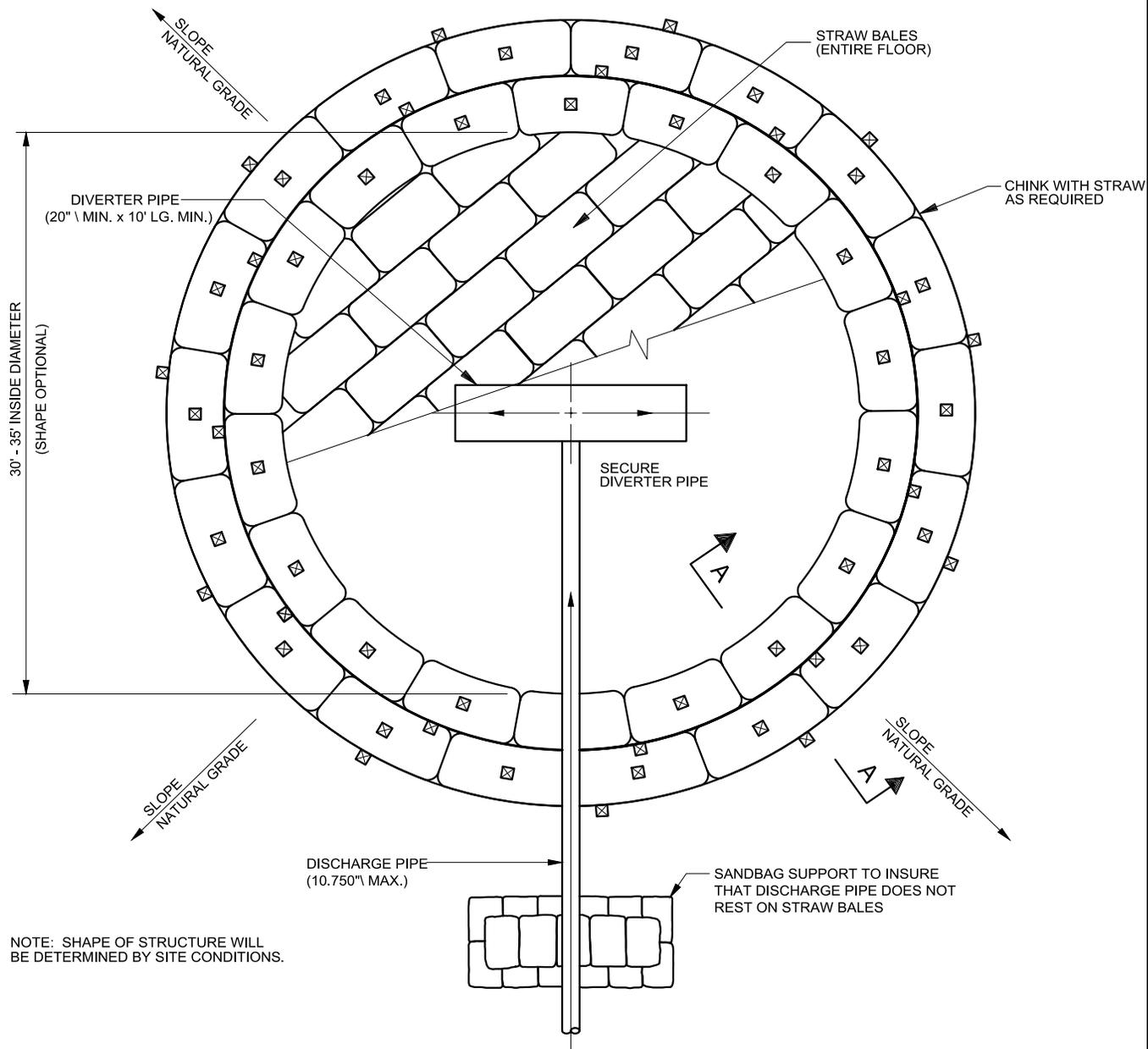


Pacific Connector
GAS PIPELINE

PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP
TRENCH BREAKER INSTALLATION

TB

NO.	DATE	BY	REVISION DESCRIPTION	W.C. NO.	CHK.	APP.	DRAWN BY: JUST	DATE: 1-08-2004	ISSUED FOR BID:	SCALE: NONE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0011	SHEET OF

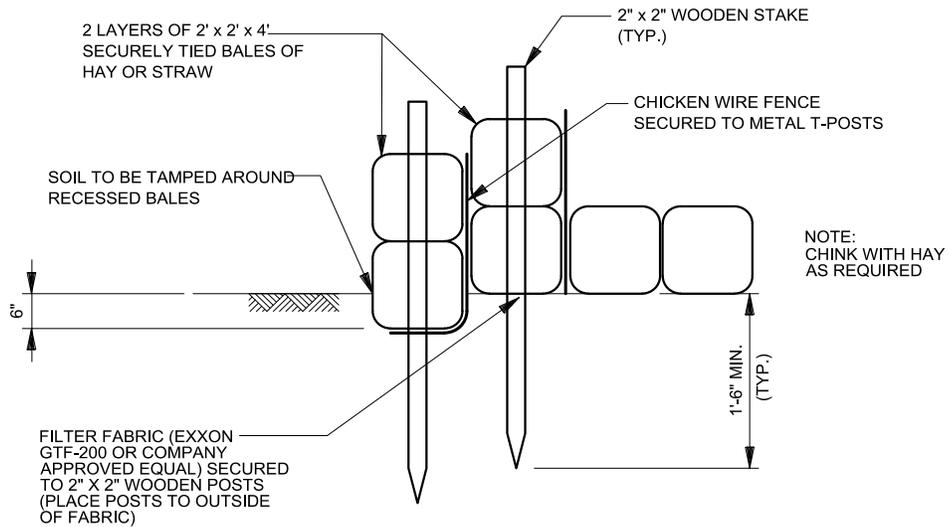


NOTE: SHAPE OF STRUCTURE WILL BE DETERMINED BY SITE CONDITIONS.

HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL HYDROSTATIC TEST DEWATERING STRUCTURE (HDW)					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0012	SHEET 1 OF 4



SECTION A-A

NOTE:
STAKES SECURING FILTER FABRIC AND CHICKEN WIRE FENCE ARE NOT SHOWN FOR CLARITY

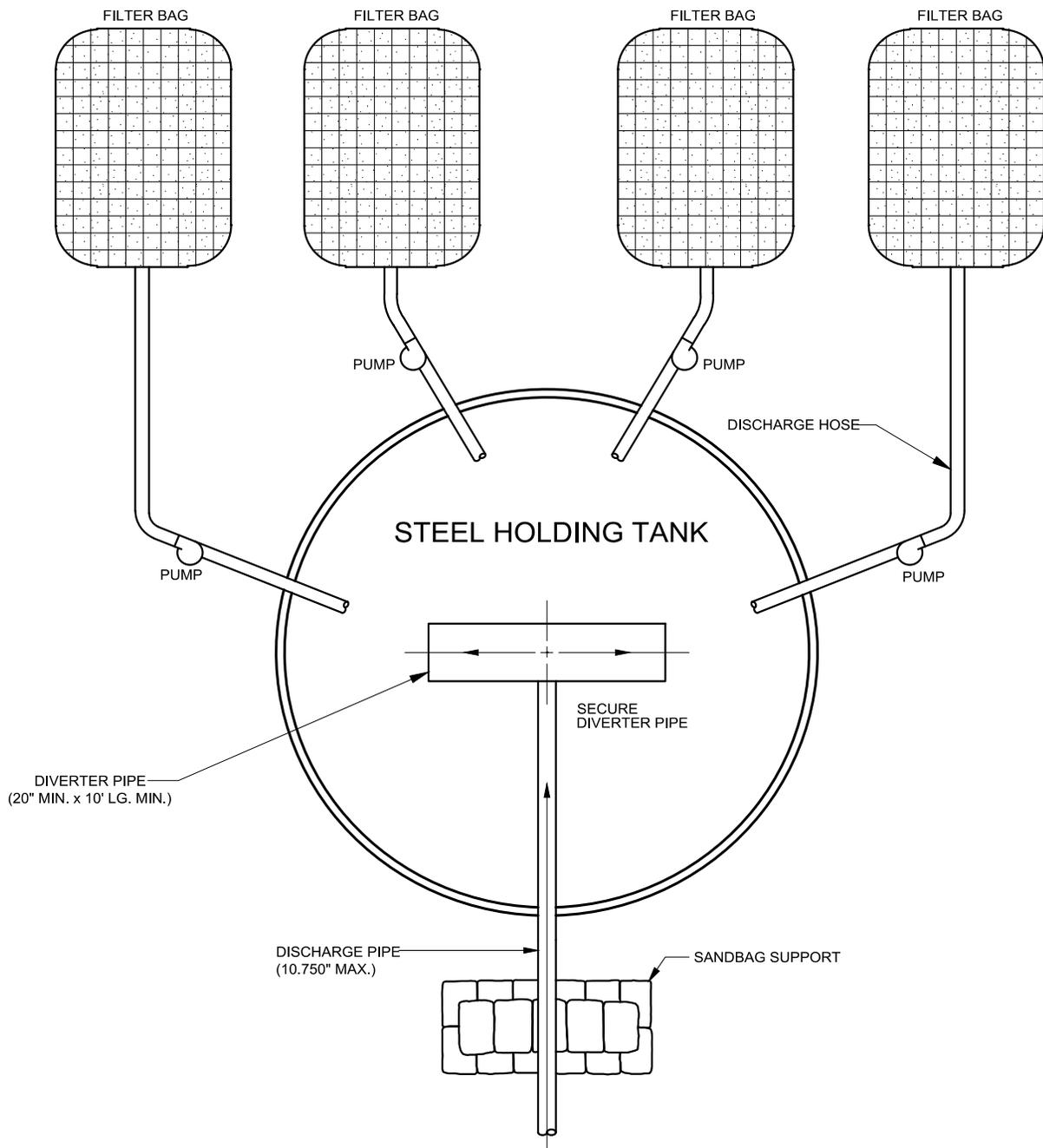
NOTES:

1. STRUCTURE SHALL BE PLACED ON A LEVEL WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS.
2. FLOW RATES THROUGH DISCHARGE AND DIVERTER PIPES SHALL BE SUCH THAT STRUCTURE WILL NOT OVERFLOW.
3. WHERE CONDITIONS WARRANT A 30' x 30' RECTANGULAR STRUCTURE MAY BE SUBSTITUTED FOR THE CIRCULAR CONFIGURATION SHOWN.
4. DIMENSIONS SHOWN ARE THE MINIMUM ACCEPTABLE VALUES AND MAY BE VARIED DEPENDING UPON SPECIFIC LOCATION.
5. CONTRACTOR SHALL USE CERTIFIED NOXIOUS WEED FREE HAY OR STRAW FOR STRUCTURE.

HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

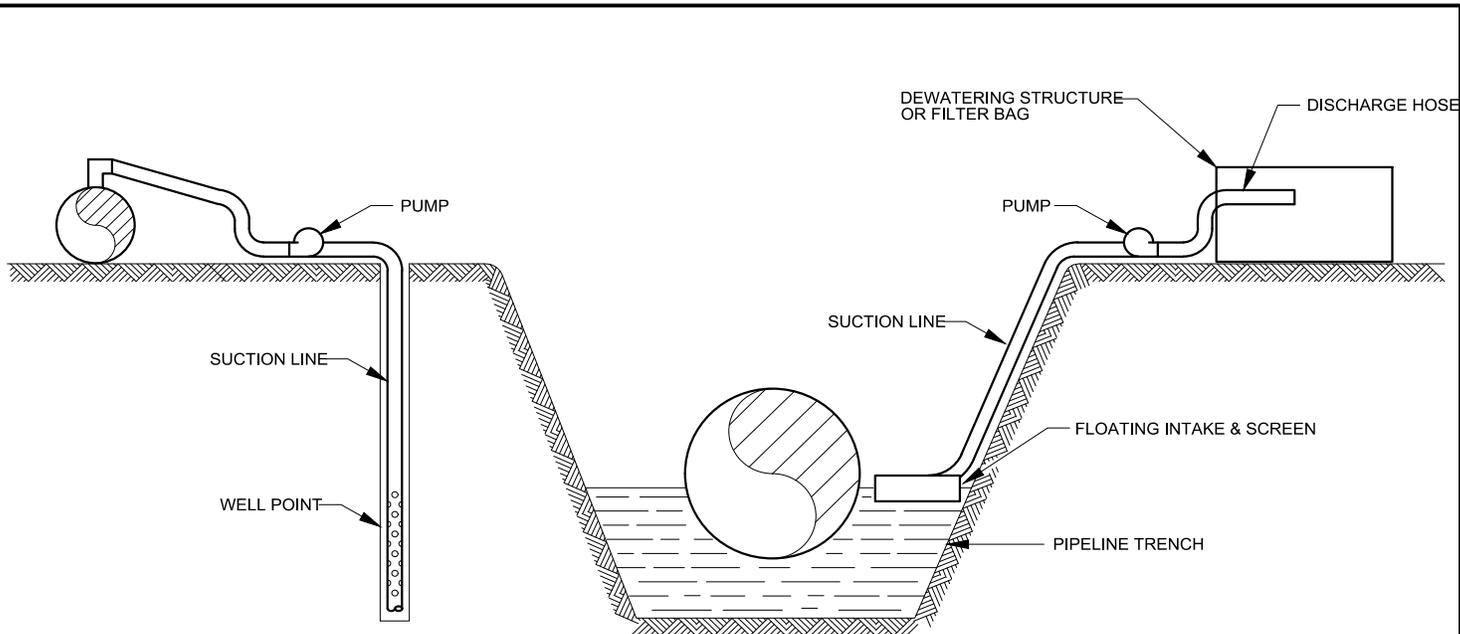
DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL HYDROSTATIC TEST DEWATERING STRUCTURE (HDW)				 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0012	SHEET 2 OF 4



HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL HYDROSTATIC TEST DEWATERING STRUCTURE (HDW)					
DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE	
						CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:		
						APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0012	SHEET 3 OF 3	



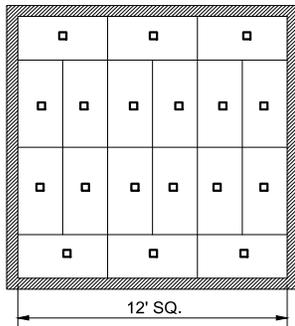
NOTES:

1. DEWATERING MEASURE/METHODS
 - A. PUMP WATER TO A FILTERING STRUCTURE TYPICALLY CONSTRUCTED WITH HAY BALES OR GEOTEXTILE AND DISCHARGE AS "SHEET FLOW" OUT OF STRUCTURE. (SEE SHT. 3)
 - B. PUMP WATER INTO A FILTER BAG. (SEE SHT. 1)
 - C. PUMP WATER TO A SETTLING TANK AND HAUL TO A DISPOSAL SITE.
 - D. PUMP WATER TO A SETTLING TANK AND DISCHARGE OVERLAND.
 - E. TRANSFER WATER TO NEXT SECTION OF TRENCH.
 - F. INSTALL WELL POINTS AND PUMP TO FILTERING STRUCTURE AND DISCHARGE TO DRAINAGE, CHANNEL OR SHEET FLOW IF WATER IS SEDIMENT FREE.
 - G. INSTALL WELL POINTS AND DISCHARGE SHEET FLOW.
 - H. DISPOSE OF WATER COLLECTED IN TANK OR FILTRATION STRUCTURE BY AERATION THROUGH A SPRINKLER SYSTEM.
2. WATER PUMPED OUT OF TRENCH SHALL NOT BE DISCHARGED INTO WATERBODIES OR WETLANDS.
3. PUMP SHALL BE CONTROLLED SO THAT DISCHARGE DOES NOT OVERFLOW DEWATERING STRUCTURE.
4. PUMP SUCTION HOSE MUST NOT BE ALLOWED TO SETTLE THE TRENCH BOTTOM. PROVISIONS MUST BE MADE TO ELEVATE THE SUCTION HOSE TO AT LEAST ONE FOOT ABOVE THE BOTTOM UNTIL BOTTOM DEWATERING IS NECESSARY.

TRENCH DEWATERING

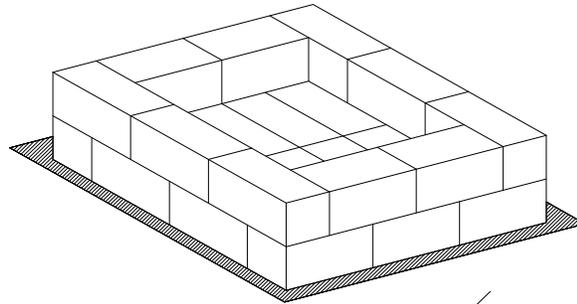
TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.	REFERENCE TITLE	PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL TRENCH DEWATERING (TDW)								
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0013	SHEET 1 OF 3



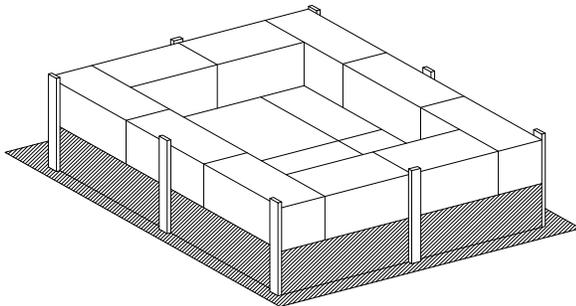
STEP 1

ARRANGE HAY BALES OVER FILTER FABRIC ON LEVEL LAND TIGHTLY PACKED AS SHOWN TO COVER AN AREA APPROXIMATELY 12' x 12'. SECURE EACH HAYBALE IN PLACE BY DRIVING REBAR OR A WOODEN STAKE THROUGH EACH OF THE HAY BALES



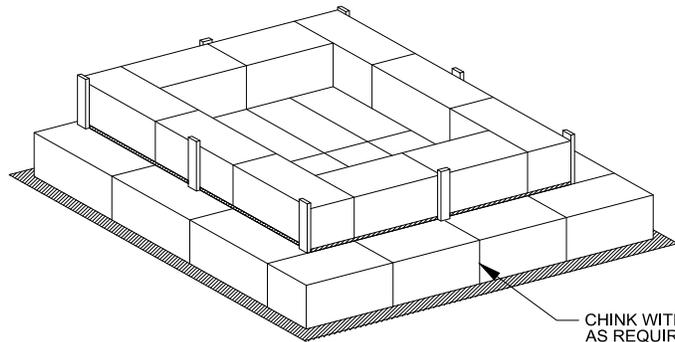
STEP 2

INSTALL ANOTHER LAYER OF HAY BALES ON THE OUTER EDGE AS SHOWN



STEP 3

INSTALL FILTER FABRIC ALL AROUND HAY BALE STRUCTURE AS SHOWN



STEP 4

INSTALL ANOTHER LAYER OF HAY BALES ON THE OUTSIDE OF THE FILTER FABRIC AND SECURE IN PLACE BY DRIVING REBAR OR A WOODEN STAKE THROUGH EACH OF THE OUTER HAY BALES

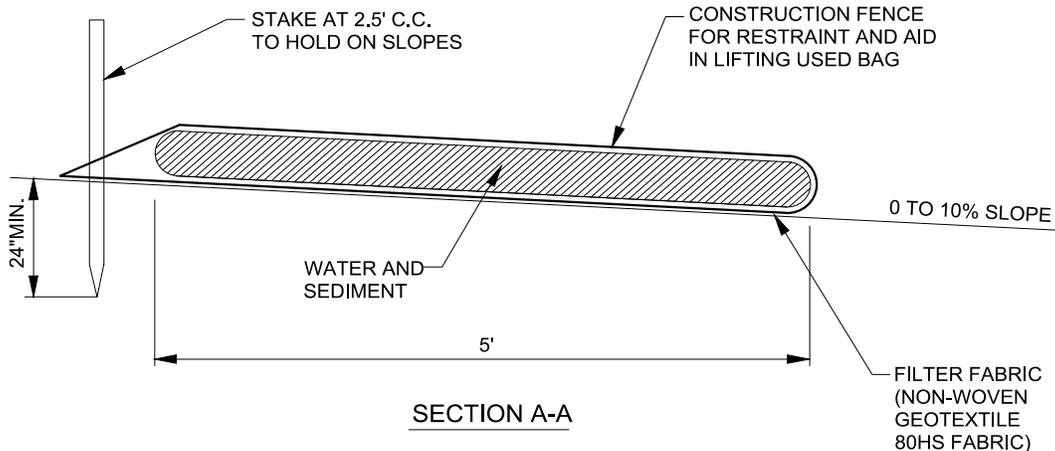
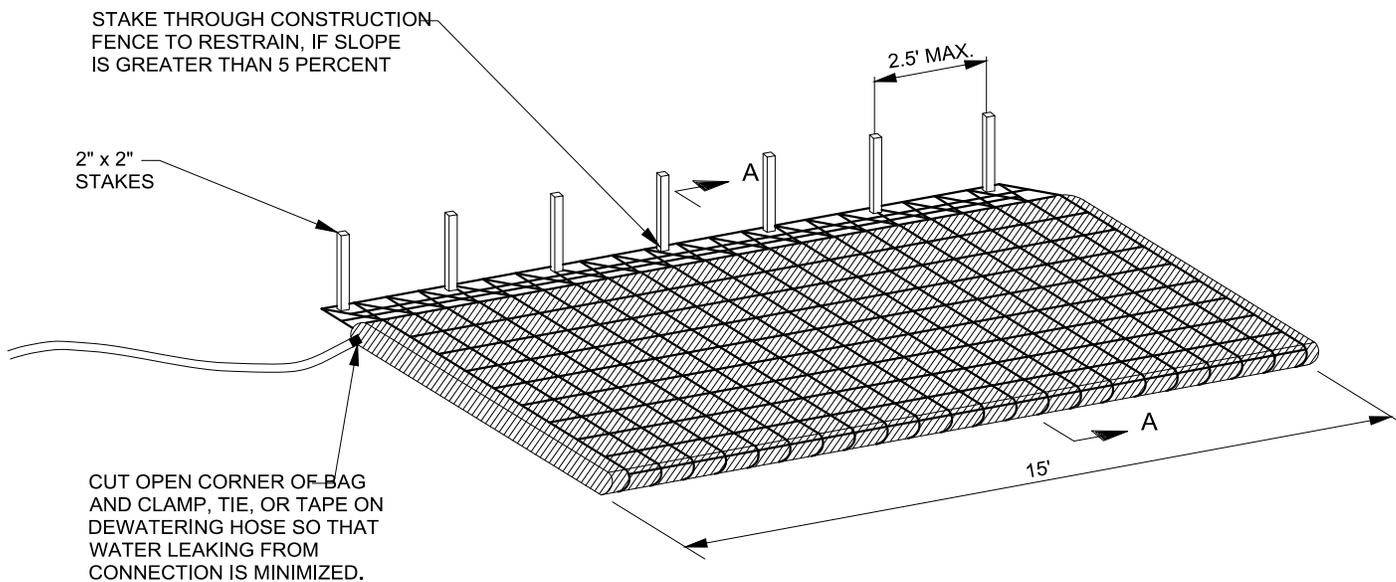
NOTES:

1. WHERE POSSIBLE STRUCTURE SHALL BE PLACED ON A LEVEL, WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND ANY WORK AREAS, WATERBODIES OR WETLANDS.
2. THIS MEASURE SHALL BE REMOVED UPON COMPLETION OF THE PROJECT. REMOVAL IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION. MATERIAL FROM BALES MAY BE SCATTERED ON RIGHT-OF-WAY.
3. CONTRACTOR SHALL USE CERTIFIED NOXIOUS WEED FREE HAY OR STRAW FOR STRUCTURE.

TRENCH DEWATERING

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL TRENCH DEWATERING (TDW)					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0013	SHEET 2 OF 3



NOTES:

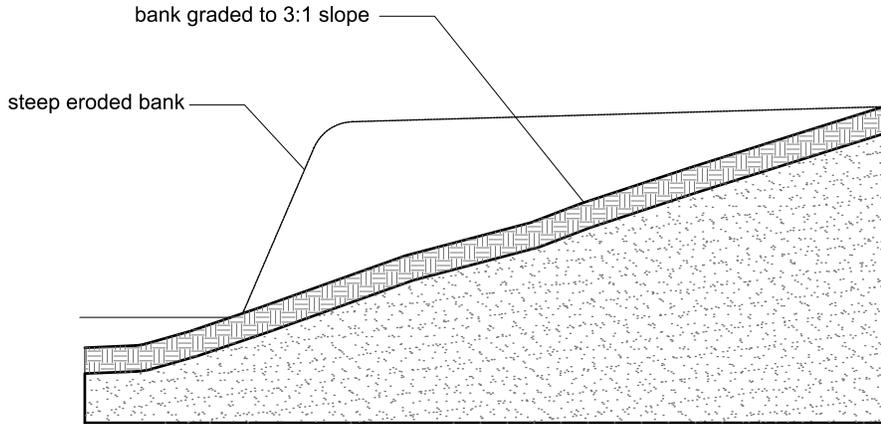
1. FILTER BAG SHALL BE PLACED ON A GENTLY SLOPING OR LEVEL, WELL GRADED VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM DEVICE, ANY WORK AREAS, WATERBODIES OR WETLANDS.
2. THE FILTER BAG MUST BE STAKED IN PLACE AND SECURED TO THE PUMP DISCHARGE LINE.
3. FILTER BAG SHALL NOT BE USED FOR DISCHARGE FLOWS GREATER THAN 300 GPM.
4. DEVICE SHALL BE REMOVED AND DISPOSED OF AFTER BAG IS FILLED WITH SEDIMENT. SEDIMENT FROM BAG SHALL BE SPREAD IN AN UPLAND AREA.

TRENCH DEWATERING - FILTER BAG

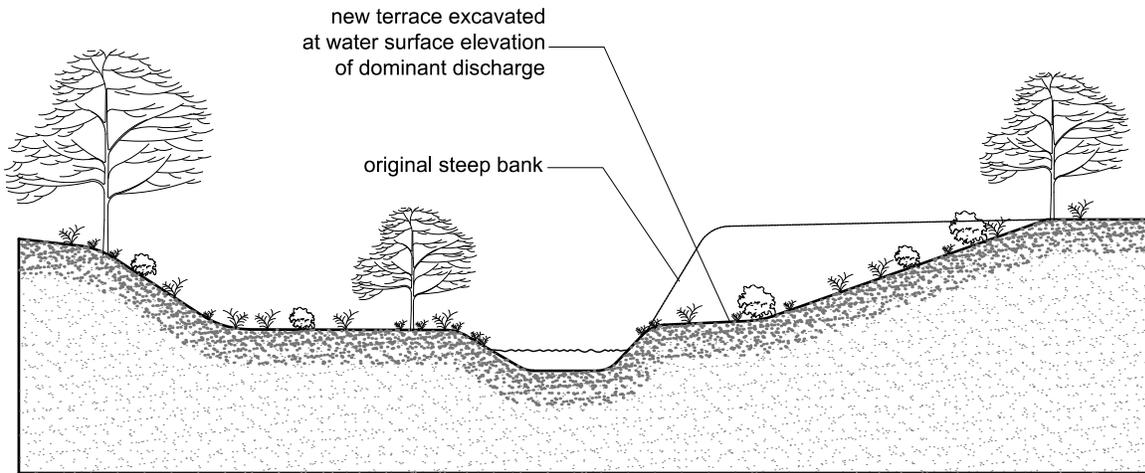
TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL TRENCH DEWATERING (TDW)					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
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							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0013	SHEET 3 OF 3

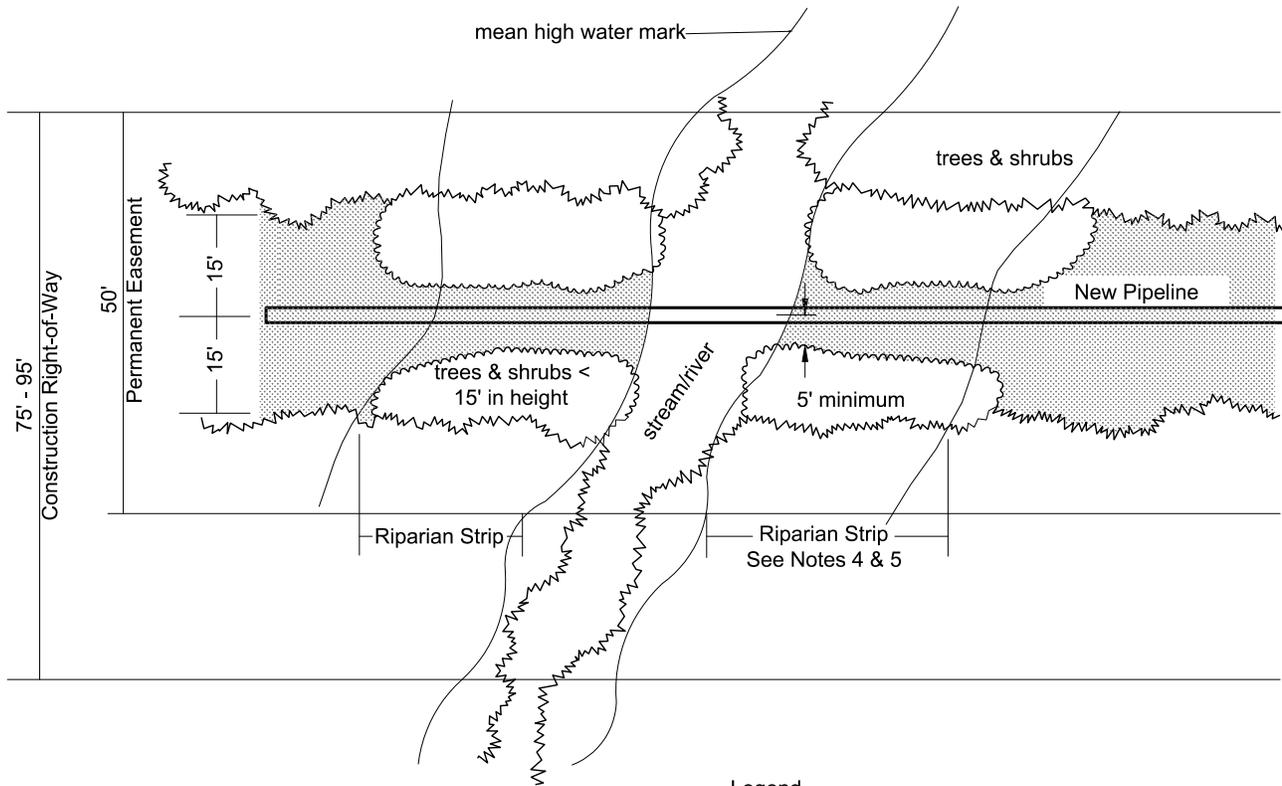
Stable Gradient



Terraced Bank



DRAWING NO.			REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP STREAMBANK RESTORATION / RECONTOURING			 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0014	SHEET 1 OF 2



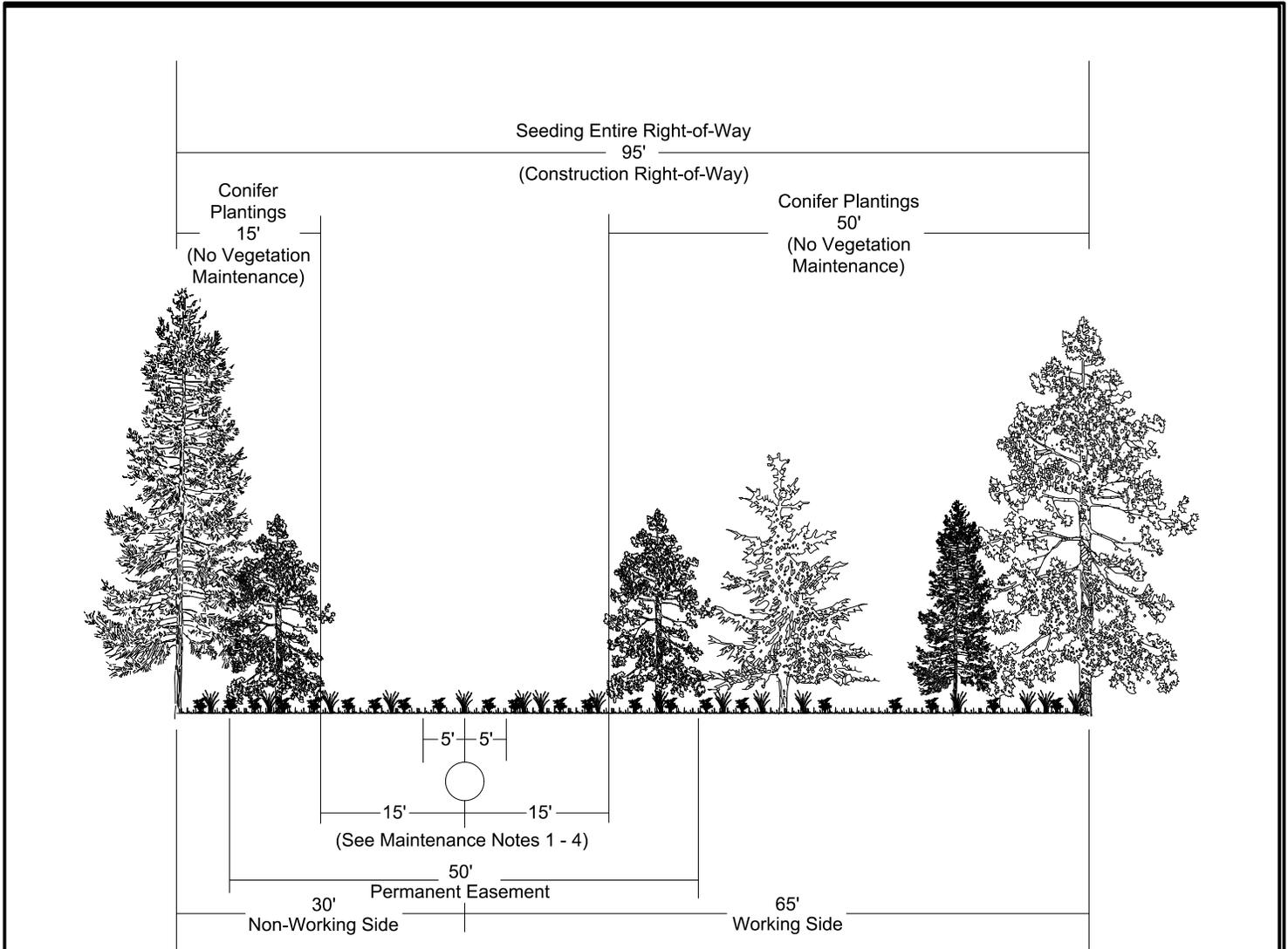
Legend

-  Herbaceous seeding & periodic maintenance
-  Shrub planting & selective cutting
(trees <15' in height permitted within 15' of pipeline)
-  No vegetative maintenance

Notes:

1. Maintenance of right-of-way in herbaceous state permitted in a 10' corridor centered on the pipeline.
2. Selective hand cutting of trees within 15' of the pipeline.
3. No vegetation maintenance permitted beyond 15' of the pipeline centerline.
4. On private lands riparian planting will occur across the ROW based on ODF RMA buffer widths (see ECRP), subject to the 15-foot (trees) restriction on either side of centerline. The riparian planting area will occur to the RMA buffer width, or to the limit of existing riparian vegetation where the riparian vegetation does not exceed the RMA buffer width.
5. On federal lands extend riparian strip planting along all perennial & intermittent streams within federally-designated riparian reserves to 100' or to limit of existing riparian vegetation.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP WATERBODY / RIPARIAN REVEGETATION & MAINTENANCE PLAN					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0016	SHEET 1 OF 1



Planting Notes:

1. Entire right-of-way to be seeded with appropriate seed mixture (see Section 10.9).
2. Trees will be planted in all disturbed forested areas beyond 15' of pipeline centerline.
3. On National Forest System lands, shrubs to be planted from 15' each side of pipeline centerline to the outer edge of the construction limits (see Table 10.13-11).



Volunteer Shrubs

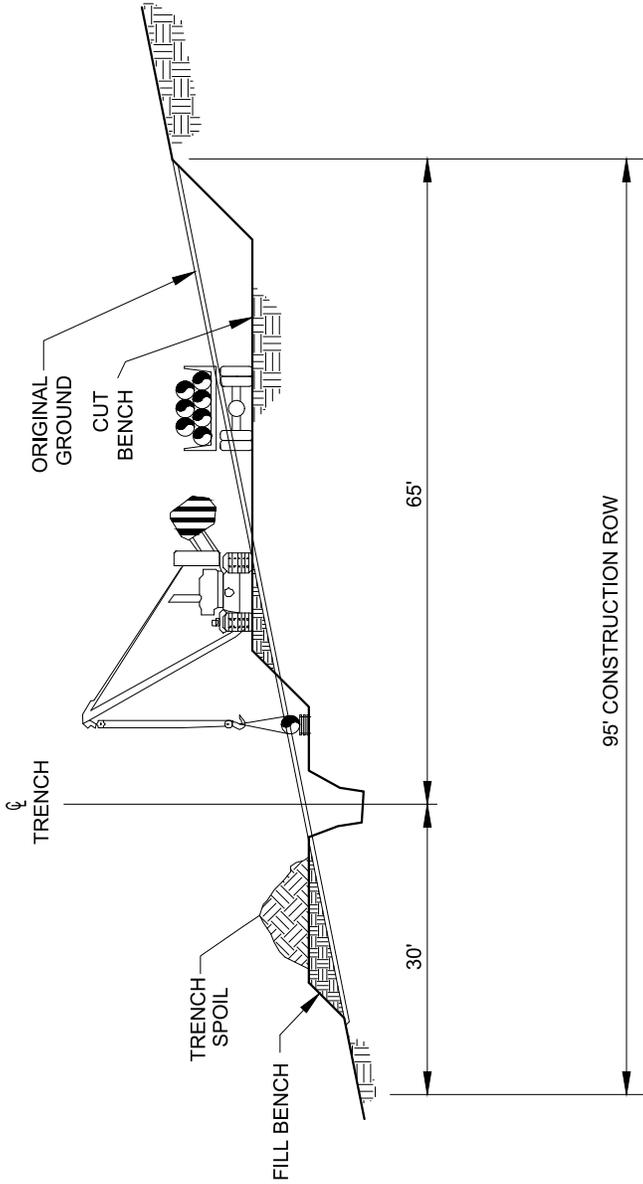


Herbaceous vegetation/
seed mixture

Maintenance Notes:

1. Selective cutting of trees within 15' of the pipeline
2. No vegetation maintenance proposed beyond 15' of the pipeline centerline.
3. Routine vegetation mowing or clearing shall not be done more frequently than every 3 years. However to facilitate periodic corrosion/leak surveys, a corridor not exceeding 10 feet in width centered on the pipeline may be cleared at a frequency necessary to maintain the 10-foot corridor in an herbaceous state.
4. In no case shall routine vegetation mowing or clearing occur during the migratory bird nesting season between April 15 and August 1 of any year unless approved in writing by responsible land management agency or the U.S. Fish and Wildlife Service.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP FOREST REVEGETATION & MAINTENANCE PLAN					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
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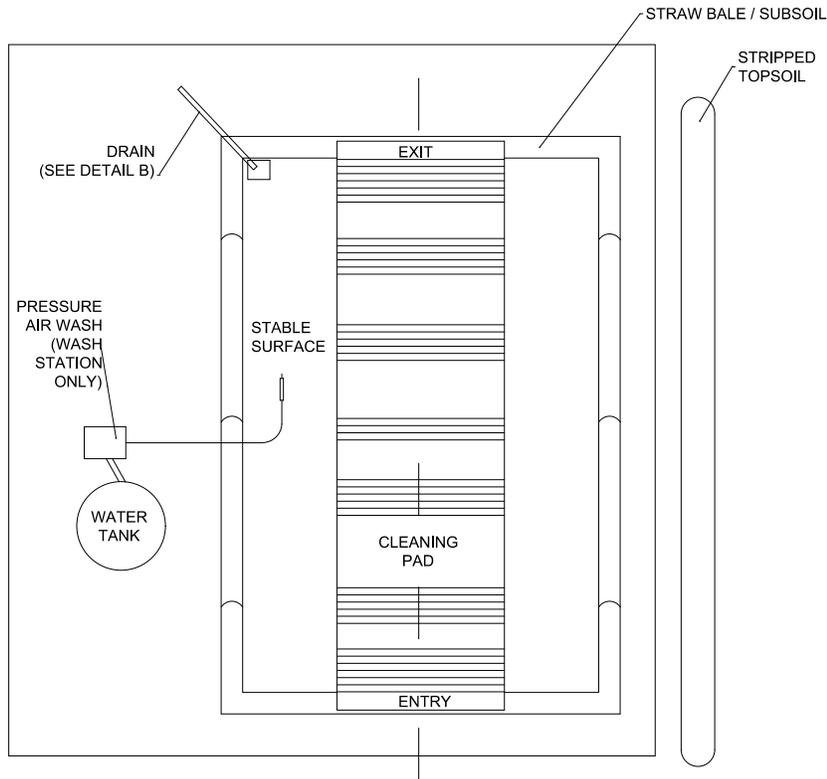


SIDE HILL R.O.W.
NOT TO SCALE

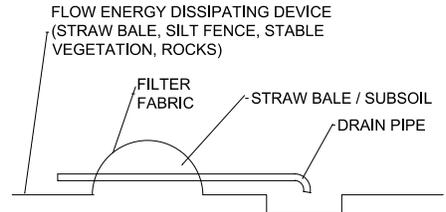
NOTES:

1. LEAVE GAPS IN SPOIL PILES AT OBVIOUS DRAINAGES AND EMPLOY BMP'S WHERE NECESSARY. DO NOT PUSH SPOIL INTO CREEKS OR WETLANDS.
2. WHERE SIDE HILL SECTION IS OF SEVERE GRADE, ONLY A SINGLE COMBINED WORKING AND TRAVEL LANE MAY BE CONSTRUCTED. WHERE REQUIRED, PIPE LINE-UP, WELDING AND JOINT COATING MAY BE PERFORMED AT AN ADJACENT AREA AND THE LINE INSTALLED AS A "DRAG SECTION."
3. SURFACE MAY BE RESTORED TO NEAR ORIGINAL LINE, GRADE AND CROSS SLOPE UPON COMPLETION OF CONSTRUCTION. THE FINISHED SURFACE SHALL HAVE WATER BARS INSTALLED, SLOPE MATTING PLACED, RESEEDING AND RE-VEGETATION WORK DONE AS STATED IN THE EROSION CONTROL & RE-VEGETATION PLAN, OR WHEN ORDERED BY THE ENVIRONMENTAL INSPECTOR.
4. UCUSA'S (UNCLEARED STORAGE AREAS) AND TEWA'S ARE SITE SPECIFIC AND ARE SHOWN ON ENVIRONMENTAL CONSTRUCTION ALIGNMENTS.

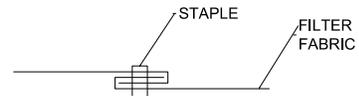
DRAWING NO.		REFERENCE TITLE		 PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP RIGHT-OF-WAY SECTION WITH TWO-TONE GRADING	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NOCHK.	APP.
DRAWN BY: KLL			DATE: 1-15-2007	ISSUED FOR BID:	
CHECKED BY:			DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:			DATE:	DRAWING NUMBER: 3430.34-X-0019	
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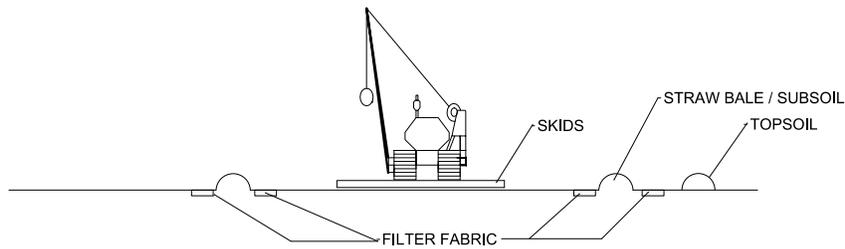
PLAN



DETAIL "B"
(NOT TO SCALE)



DETAIL "A"
(NOT TO SCALE)



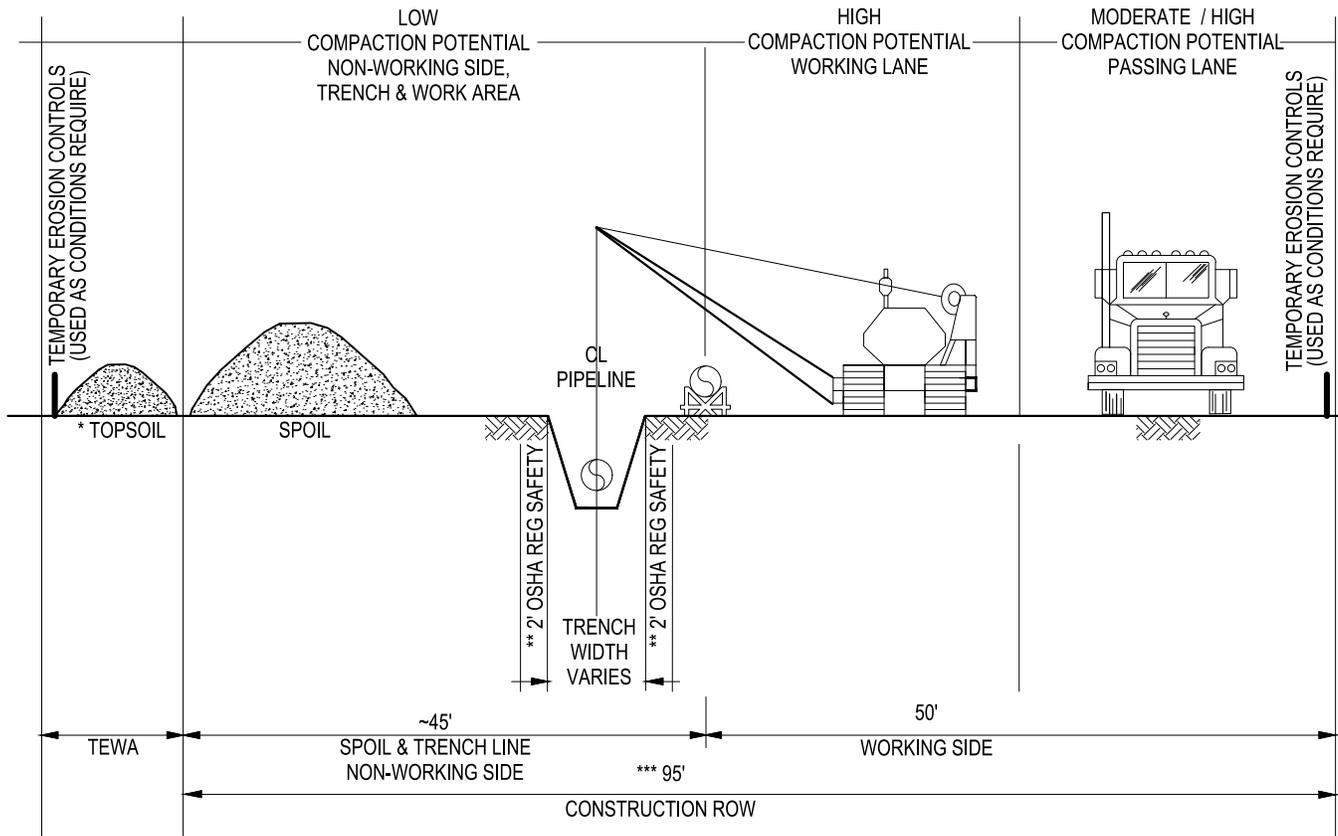
ELEVATION

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP EQUIPMENT CLEANING STATION					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0020	SHEET 1 OF 2

Equipment Cleaning Station Notes:

1. Equipment moved from a weed infested area as determined by weed inventory must be washed or otherwise cleaned prior to mobilization.
2. During non -frozen soil conditions, construct cleaning stations for high pressure water cleaning at approved locations by stripping topsoil and construction containment berms out of subsoil.
3. Containment berms will not be required when cleaning will be done using compressed air and shovels instead of high pressure water.
4. Cleaning shall be carried out under the supervision and to satisfaction of the environmental inspector.
5. Station to be equipped with timber mats, skid pads, or racks to elevate equipment tracks / tires so that soil and weeds will be contained in the station basin.
5. Filter fabric to be installed as a continuous piece and placed over the top and to the outside edge of the berm and firmly fastened in place. the edges of parallel pieces shall be overlapped a minimum of 12 inches (shingle style), and folded over (see detail A). Staple through the overlapped area every 12 inches.
7. Filter fabric shall be non-woven polypropylene, with an apparent opening size of 70 to 100 (U.S. sieve), 200-pound grab strength, and 8 ounces per yard unit weight, or better in areas that are not rocky. Contractor may choose to use non-woven polypropylene, 160-pound grab strength, and 6 ounces per yard unit weight.
8. Water used for cleaning shall not be allowed to flow into any waterbody, wetland or irrigation canal/ditch.
9. Size of station shall be adequate to accommodate the maximum size of equipment expected.
10. Equipment is to consistently enter at one end and exit at another.
11. Skids are to be cleaned between washing independent pieces of equipment.
12. Filter fabric will be removed to an acceptable landfill when the wash station is dismantled.
13. The depression will be backfilled with bermed material and soils contaminated by petroleum based or other undesirable materials from clean off stations shall be removed in accordance with applicable requirements. Topsoil will be returned and the area reclaimed.
14. Cleaning sites will be monitored during the post construction monitoring program and weeds controlled as required.

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP EQUIPMENT CLEANING STATION				 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0020	
									SHEET 2 OF 2	



* Topsoil and subsoil segregated within unsaturated wetlands, residential, agricultural, pasture lands, hayfields and areas of landowner requests

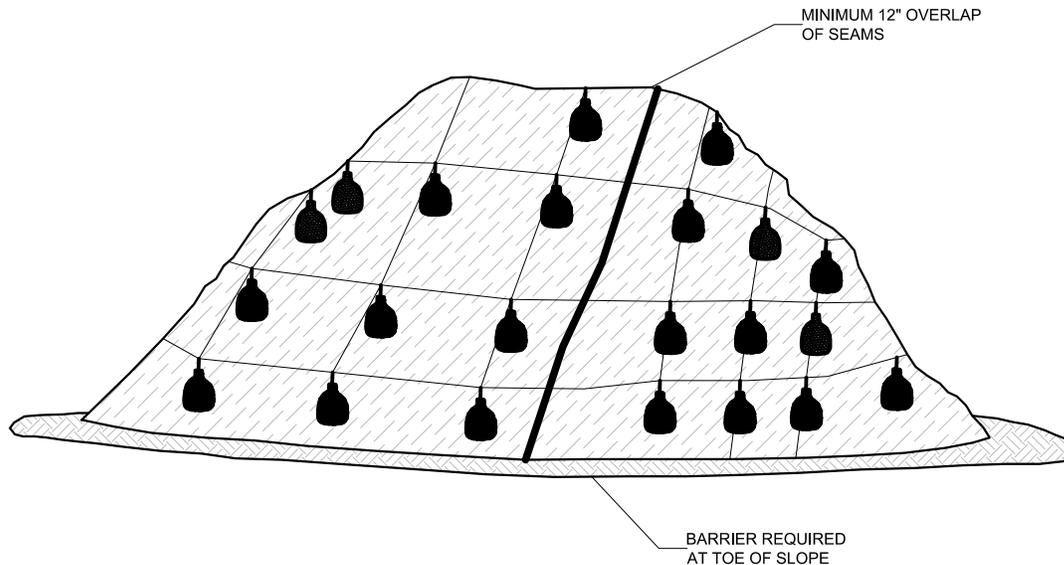
** Rev 29 CFR CH.XVII Part 1926, subpart WSEC 1926 550 (A) (15) (iii)

*** Where topsoil and subsoil segregation occur, a minimum of an additional 10 feet of temporary extra work area will be added to the construction right-of-way

Notes:

The dimensions shown on this figure are typical; however, some variations exist due to site-specific terrain features and alignment location. The maximum width of the construction right-of-way will be 95 feet; where topsoil and subsoil segregation occur, the construction right-of-way and TEWAs will be a minimum of 105 feet (see Environmental Alignment Sheets).

DRAWING NO.		REFERENCE TITLE		PACIFIC CONNECTOR GAS PIPELINE PROJECT POTENTIAL FOR SOIL COMPACTION ON CONSTRUCTION RIGHT-OF-WAY						
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY:	DATE:	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0022	SHEET 1
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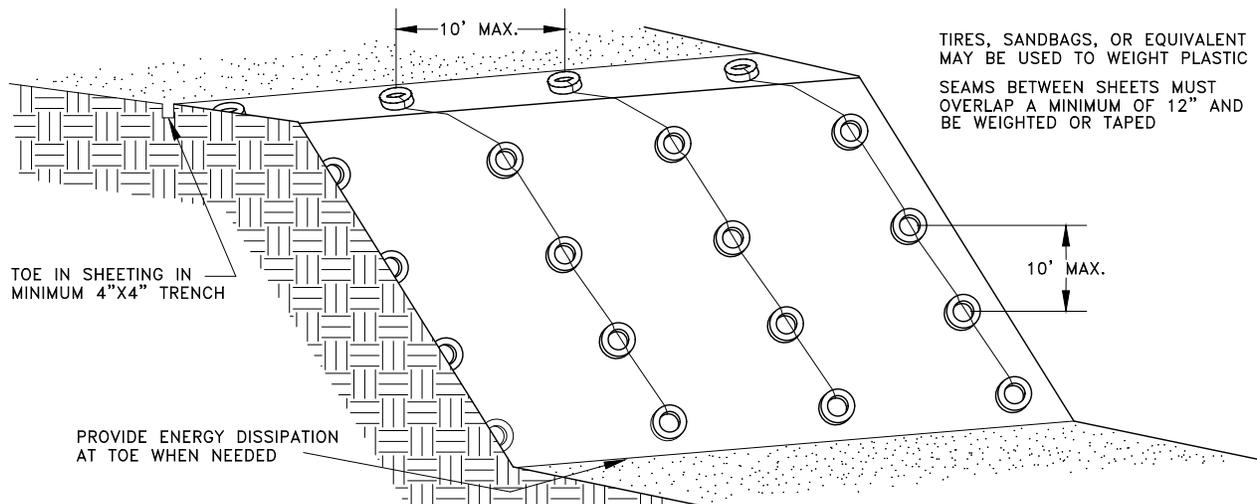
NOTES

1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. BARRIER REQUIRED AT TOE OF SLOPE.
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS OR TIRES ON ROPES WITH A MAXIMUM 10' GRID SPACING IN ALL DIRECTIONS.
4. PLASTIC (VISQUEEN) SHEETING CAN BE USED TO COVER SOIL STOCKPILES WHERE EROSION PROBLEMS OCCUR IN THE WET SEASON AND ARE UNABLE, DUE TO THE SOFT SOIL CONDITIONS, TO BE ACCESSED BY EQUIPMENT TO MAKE A PERMANENT REPAIR OR PLACEMENT OF OTHER APPROPRIATE BMPs. UNDER THESE CONDITIONS NORTHWEST WILL CONSIDER A TEMPORARY PLACEMENT OF PLASTIC SHEETING TO PROTECT THE AREA AND DIVERT RUNOFF AWAY FROM THE AREA OF CONCERN UNTIL A MORE PERMANENT SOLUTION CAN BE APPLIED.

SOIL STOCKPILE COVER

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL SOIL STOCKPILE COVER					
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0023	SHEET 1
									%TIME% %PATH%	OF 2



SOIL STOCKPILE COVER

TEMPORARY EROSION CONTROL MEASURE

DRAWING NO.		REFERENCE TITLE			PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL SOIL STOCKPILE COVER				 Pacific Connector GAS PIPELINE	
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0023	SHEET 2
									%TIME%	OF 2
									%PATH%	

ATTACHMENT D

Equipment Cleaning Inspection Checklist

EQUIPMENT CLEANING CHECKLIST

The purpose of this checklist is to provide guidance to appropriate District staff in the cleaning of equipment, as stipulated in contract provisions, to control or prevent the spread of invasive plants, noxious weeds and *Phytophthora lateralis* (PL). This is a guide to direct attention to specific areas on equipment that are likely to accumulate soil and organic material. On-site judgments still need to be made about overall equipment cleanliness.

- 1) Does the equipment appear to have been cleaned?
- 2) Is the equipment clean of clumps of soil and organic matter?

Rubber-Tired Vehicles:

- Tires
- Wheel Rims (underside and outside)
- Axles
- Fenders/wheel wells/trim
- Bumpers

Track-Laying Vehicles:

- Tracks
- Road Wheels
- Drive Gears
- Sprockets
- Roller Frame
- Track Rollers/Idlers

All Vehicles as Appropriate:

- Frame
- Belly Pan (inside)
- Stabilizers (jack pads)
- Grapple and Arms
- Dozer Blade or Bucket and Arms
- Ripper
- Brush Rake
- Winch
- Shear Head
- Log Loader
- Water Tenders (empty or with treated water)
- Trailers (Low-boys)
- Radiator/grill
- Air filter/pre-cleaner
- Struts/Spring/Shocks
- Body seams

Other Materials

- Equipment Mats / Temporary Bridge Materials

ATTACHMENT E

Winterization Plan

Winterization Plan

1.0 Introduction

As outlined in Section 3.2 of the ECRP, the Pipeline's mainline and facility construction is planned for the spring of Year Two and continuing through fall of Year Two with the in-service date scheduled for the fourth quarter of Year Two. Restoration of construction disturbance is expected to begin in the fall of Year Two and be completed by the end of the winter season the following year when forest, wetland, and riparian plantings would be completed. Depending on site-specific conditions, it may be necessary to continue restoration through the spring of the next year. This Plan provides the winterization measures that PCGP would implement in areas where final restoration has not been completed and which would occur in the spring to ensure disturbed areas are stabilized and erosion and potential sedimentation is minimized over the winter. This Plan would also be implemented in areas where construction has been initiated in Year One but has not been completed prior to the onset of the wet season when ground conditions become wet/saturated and no longer practical to complete. During the time this Plan is being implemented, PCGP's contractor will be available to address erosion issues and landowner concerns that may arise.

During the winterization period PCGP will have a minimum of one EI assigned to each Construction Spread to monitor the right-of-way for erosion, the effectiveness of erosion and sediment control measures, and compliance with permit conditions and plans. PCGP will have additional personnel to support the EI as conditions required. The EI or PCGP's authorized representative will coordinate with the agencies, as necessary, regarding spring cleanup and/or restoration activities.

2.0 Notification

In areas where final restoration has not been completed and winterization measures will be implemented, PCGP will notify affected landowners, as necessary according to landowner agreements, to inform them of the measures that will be implemented to stabilize the right-of-way and when restoration activities will most likely resume. During these notifications, PCGP will determine if any day-to-day activities/travel on the properties will be necessary so that potential effects can be mitigated. The landowners will be provided with contact information in the event of a problem or questions arise. PCGP will coordinate with affected landowners, as necessary, regarding spring cleanup and/restoration activities.

3.0 Grading Practices

During the wet season PCGP will implement the following the construction practices during earthmoving activities:

- In areas where PCGP's Chief Inspector and EI determine that soil conditions are favorable, the contractor may continue with final cleanup and/or restoration activities.
- In areas where PCGP's Chief Inspector and EI determine that soil conditions are unfavorable for achieving final grade contours, final grading will be limited. At a minimum, the contractor will provide positive drainage across the right-of-way and implement effective long-term soil stabilization measures, such as erosion control devices, mulch, and temporary seeding, as outlined in Section 4.0.

- Where topsoil or spoil stockpiles remain in place during the winter, openings in the topsoil or spoil pile at drainage crossings will be present to allow runoff to be diverted off the work area and minimize interference with runoff.
- No open trench or bell-holes will be left over winter.
- The work area will be left in a significantly roughened condition to reduce potential for erosion during snowmelt until final cleanup and restoration efforts are completed.

4.0 Erosion Control Measures

Temporary and permanent erosion control measures will be installed and maintained as outlined in PCGP's ECRP (see Appendix I to the POD), to the extent possible, in all areas where final clean-up and reclamation efforts have not been completed. Temporary erosion and sediment control measures may include installation of sediment barriers (such as silt fence, straw bale barriers, or straw wattles), temporary slope breakers (waterbars), interceptor dikes or swales, application of mulch or installation of erosion control matting, temporary seeding, and/or installation of other sediment control measures where necessary and where identified by PCGP. The following erosion control measures/practices will be implemented as soon as practical prior to onset of the wet season when ground conditions become wet/saturated and no longer practical to attempt final cleanup and/or restoration activities.

- All temporary erosion controls will be properly maintained during construction and reinstalled as necessary until permanent erosion controls are constructed, unless the control measures are buried under snowpack or inaccessible. Temporary erosion control measures will be inspected and installed with the intent to be operational for the duration of winter and to withstand periods of snowmelt and thawing conditions.
- Temporary slope breakers will be installed as described in the ECRP. In the event that soils are saturated and prevent construction of slope breakers, other temporary erosion control measures would be utilized (i.e., silt fence, straw bales, sandbags, straw wattles/coir rolls, mulched or erosion control fabric).
- Subsoil and topsoil piles will be stabilized, where necessary as determined by the EI, using appropriate erosion controls. Silt fences or staked straw bales will be installed where the disturbed right-of-way intersects wetlands and waterbodies, other sensitive areas, or steep slopes. Silt fences will be installed on the edges of the disturbed right-of-way, perpendicular to wetlands/waterbodies or sensitive areas. Water flow direction and volumes expected during spring melt and heavy spring rains will be taken into account when installing erosion control measures.
- Mulching will be used where necessary to stabilize soil surfaces where reclamation has not been completed. If site conditions require, soil tackifiers would be used to help stabilize soil surfaces. During mulching operations temporary seeding will also be considered using annual ryegrass and white clover, winter-active species, to help stabilize disturbed areas. Mulch will be applied using a minimum mulch application rate of two tons per acre. The mulch application rate will be increased to 3 tons per acre on all slopes within 100 feet of waterbodies and wetlands.

- Timber mats may be left in the wetlands to allow for travel during final restoration activities. Mats will be removed from areas prone to flooding.
- Depending on the schedule and field conditions, temporary bridges and mats may be removed before the contractor leaves the right-of-way for the winter. Temporary bridges may need to be reinstalled before construction resumes. Temporary bridges that are removed may be stored on the right-of-way or in a temporary extra work area (“TEWAs”) in a secure upland area near the crossing. Any equipment crossings remaining in place would be designed to allow passage of predicted high flows and would be approved by the U.S. Army Corps of Engineers, FERC, BLM, Forest Service, and private landowners, depending on jurisdiction. Immediately following the removal of equipment bridges, stream banks will be restored and stabilized in accordance with the ECRP.
- Construction access pads will be left in place and will be removed as part of final restoration activities.

5.0 Winter Inspection and Monitoring Procedures

During the wet season when the ground is wet/saturated and there are periods of snow melt and thawing conditions, there is a substantial increased potential for erosion and sedimentation. During these conditions the EIs will conduct inspections to determine if maintenance or erosion/sediment control measures are necessary.

Right-of-way and access road inspections will be prioritized based on weather conditions and precipitation amounts which could generate runoff. Inspection frequency will increase, as necessary, based on site conditions, weather patterns, and proximity to sensitive resources. In areas where the contractor has completed work and demobilized for the winter and after necessary erosion controls have been installed and approved by the EI, the right-of-way and associated access roads may only be inspected monthly, when the potential for erosion and sedimentation is low. In areas where the soil becomes frozen and snow-covered, the need for frequent inspection is reduced because the disturbed areas of the right-of-way would be stabilized in a frozen state. When inspections are conducted, they would consist primarily of ground inspections; however, periodic aerial surveys may also be utilized. Inspections will primarily focus on waterbody crossings, road crossings, wetlands, steep slopes, or other sensitive areas and would identify:

- Erosion control structures requiring maintenance and/or repair;
- Roads needing repair or maintenance;
- Areas where erosion and offsite sedimentation is occurring; and
- Areas of slope instability.

The EI and Chief Inspector would determine the most effective means of dealing with identified problems, taking into consideration the suitability of the construction right-of-way for access by equipment, potential damage that could occur by equipment accessing the construction work area, and the urgency/significance of the problem. Corrective actions may be deferred until spring where no sensitive resources would be impacted, where access is not feasible, or where damage from accessing the site would outweigh the benefits of correcting the issue during the winter.

ATTACHMENT F

Culvert Crossing BMP



Pacific Connector Gas Pipeline, LP

Culvert Crossing Best Management Practices

Pacific Connector Gas Pipeline Project

September 2017

Culvert Crossing Best Management Practices

Prior to construction, existing culverts will be investigated along all private roads and federally authorized roads (i.e., BLM and Forest Service) identified for access to the construction right-of-way. These investigations would occur on access roads where PCGP is authorized to be and/or where PCGP has negotiated an access use agreement or easement. The investigation will determine the condition and integrity of existing culverts and identify any location that may require mitigative measures to ensure construction activities do not damage or impair the existing function of the culverts. Mitigative measures may be required prior to access road use to allow safe construction equipment travel and prevent damage to the culverts. In select locations, replacement and/or modification of a culvert may be necessary. PCGP will not assume responsibility for repairing previously damaged, impaired, inadequately sized fish barriers or non-functioning culverts unless negotiated otherwise with the landowner who has responsibility/jurisdiction for such culverts.

Mitigative measures for protecting existing culverts may include placing thick metal plates, construction timber mats, additional fill/aggregate, or temporary bridges across culvert locations requiring protection during construction activities. A typical drawing of these mitigation measures is included as Attachment 1. Any mitigative measures implemented to protect existing culverts would be temporarily placed and maintained throughout timber and construction activities where access is needed.

A culvert replacement/reconstruction may be necessary only if the above mitigation measures cannot be applied to a specific culvert location or if determined to be required through landowner negotiations. Culvert replacements/reconstruction that may be required along existing access roads will be completed according to the exemptions specified under OAR 141-085-0530 (see Attachment 2). Where culvert replacement or reconstruction activities trigger Oregon fish passage rules and regulations (OAR 635-412-0005(9)), PCGP will follow the fish passage criteria as specified in OAR 635-412-0035. Attachment 3 provides a typical culvert replacement design which includes the design criteria according to OAR 635-412-0035. PCGP would submit a Fish Passage Plan with a Road-Stream Crossing application to ODFW and receive approval prior to conducting culvert replacement or installation activities.

PCGP will use the following BMPs to ensure potential resource impacts are minimized during any culvert replacement or removal allowed under the exemptions provided in OAR 141-085-0530 or Oregon fish passage rules and regulations found in OAR 635-412-0005(9). The BMPs will mitigate the potential impacts of proposed culvert maintenance, repair, replacement, or removal activities on protected, endangered, threatened, or sensitive species and habitats:

1. Any work, which must be performed in flowing water, will be completed during the ODFW in-water work period for that system, or as negotiated with ODFW if fish are present at the time of replacement. Some culvert locations may require temporary mitigative measures be installed (i.e., timber mats, steel plating, additional cover or a temporary bridge – see Attachment 1), to allow road use to occur prior to the ODFW in-water work window. Culvert replacement or repair activities would then be completed during the ODFW in-water work period.
2. Culvert installation/replacement or culvert extension on fish barrier streams are required to meet provisions for fish passage as required by OAR 635-412-0035.. Culvert replacement for culverts identified as requiring fish passage will occur in accordance with guidelines outlined in the ODFW Guidelines: Oregon Road/Stream Crossing Restoration Guide: Advanced Fish Passage Training Version. Oregon Department of

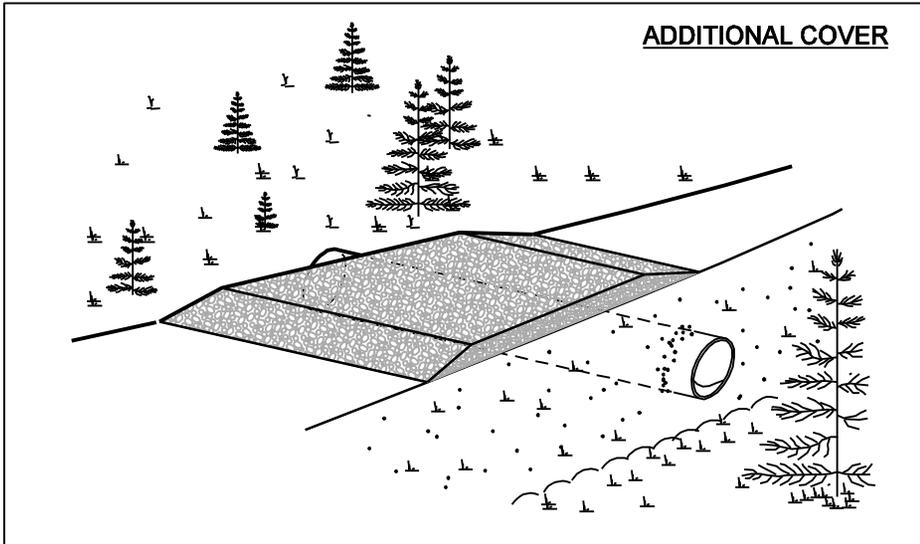
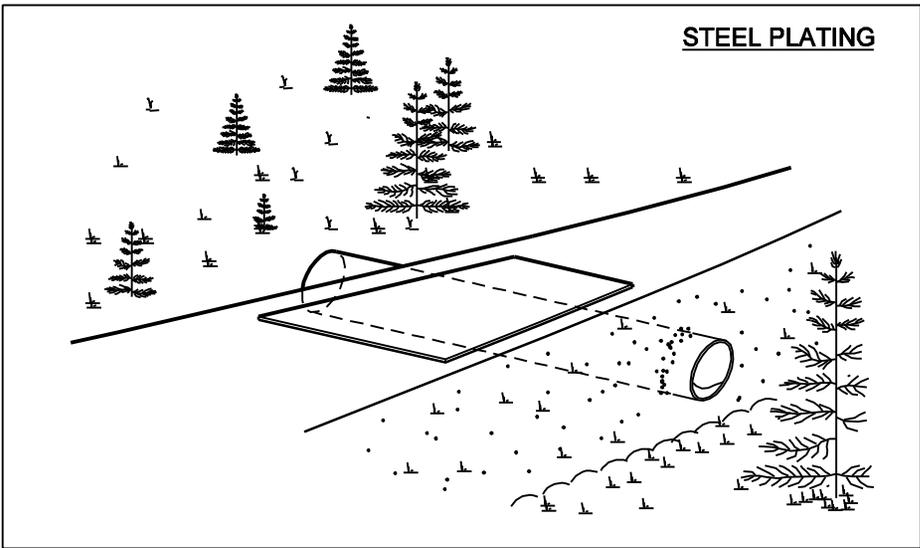
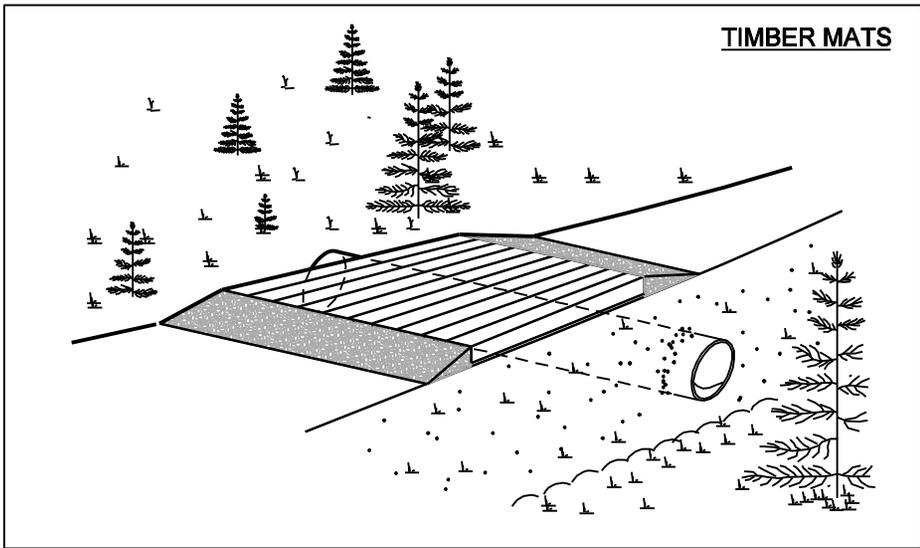
Forestry (1999)¹ and Fish Passage Guidelines for New and Replacement Stream Crossings Structures. Forest Practices Technical Note Number 4 (Version 1.0 May 2002)². Attachment 3 is a typical culvert replacement design which meets the ODFW Fish Passage Criteria specified in OAR 635-412-0035.

3. Disturbance and vegetation removal will be minimized to the greatest extent possible.
4. Excavated materials will be kept out of live streams unless designed to be placed there (i.e., riprap, etc.).
5. The culvert bed on streams must conform to the natural streambed and the bed should be either rock free or gravel. Clean gravel will be used where appropriate. Bedding should provide even distribution of the load over the length of the pipe.
6. Sediment producing materials will not be left within the 100-year floodplain any longer than necessary to replace the culvert. Once the construction is complete, fill material will be removed and properly disposed of in upland areas.
7. All disturbed areas will be restored as closely as possible to pre-disturbance contours upon construction completion of culvert replacements or where temporary mitigative measures (plates, mats, etc.) are implemented. In areas where additional cover (i.e., aggregate or approved fill as determined by the landowner and PCGP) is applied, PCGP will leave the additional cover in place as a permanent culvert protection, unless directed otherwise by the landowner.
8. Any vegetation removed as part of construction will be left on-site at disturbed areas to aid in sediment retention.
9. All equipment used during construction will be inspected and determined to be free of any fluid leakage prior to use.
10. All equipment refueling and maintenance will occur outside of the riparian habitat conservation areas.
11. The Spill Prevention, Containment, and Countermeasures (SPCC) Plan will be followed during any culvert replacement/reconstruction repair. The SPCC Plan describes measures to prevent and control any inadvertent spill of hazardous materials such as fuels, lubricants, and solvents that could contaminate soils and affect water quality.
12. All equipment will remain on the road's prism at all times or within the approved work space limits necessary for construction.
13. Construction activities will be conducted in a manner to ensure that turbidity levels do not exceed ten percent of the pre-activity levels on perennial streams or as specified in the Pipeline's 401 Water Quality Certification.

¹ http://arcweb.sos.state.or.us/pages/rules/oars_100/oar_141/141_085.html

² <http://www.oregon.gov/odf/privateforests/docs/fishpassguidelines.pdf>

Attachment 1
Typical Drawings



- NOTES**
1. Mitigation measures to protect existing culverts from project traffic would be installed as necessary, as determined by Pacific Connector and their construction contractors, and as negotiated with the landowner.
 2. All temporary culvert crossings will be removed at the completion of construction activities, unless negotiated otherwise with the landowner.
 3. Pacific Connector will ensure all temporary culvert crossings are designed to protect the buried culvert and handle the load requirements.
 4. All temporary culvert crossings will meet landowner requirements.
 5. Temporary protective matting, plating or cover will be appropriately designed to ensure protection of the existing culvert or drainage feature.
 6. Measures implemented to protect existing culverts would be temporary and maintained throughout timber and pipeline construction activities. Where additional cover (i.e., aggregate or approved fill) is required for culvert protection, Pacific Connector would leave the added material as a permanent protective measure, unless negotiated otherwise with the landowner.
 7. Sediment control measures (i.e., Silt fences, hay bales, etc.) will be used where appropriate, as determined necessary by Pacific Connectors Environmental Inspector, to prevent potential sedimentation of area waters, wetlands or other sensitive resources.

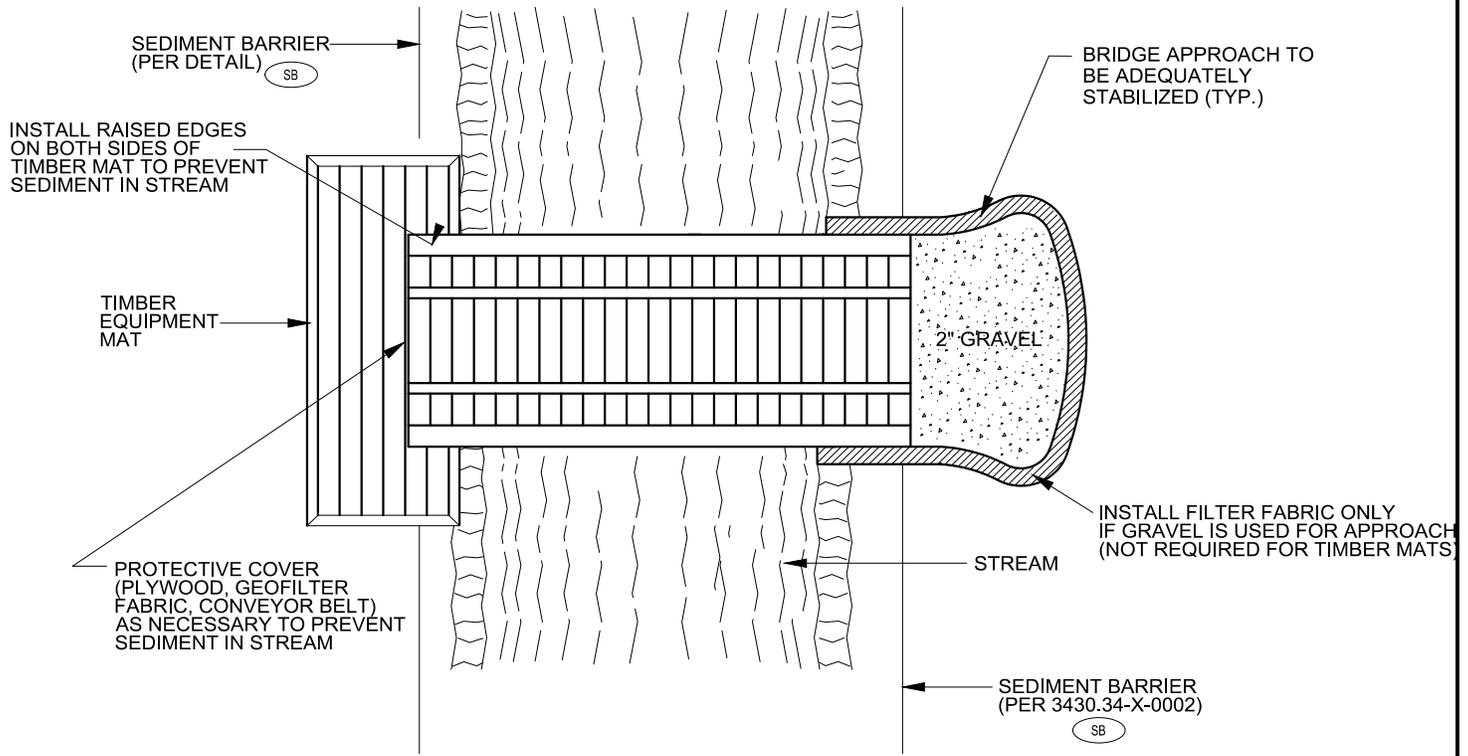
DRAWING NO.		REFERENCE TITLE	

**PACIFIC CONNECTOR GAS OPERATOR, LP
PACIFIC CONNECTOR GAS PIPELINE PROJECT**

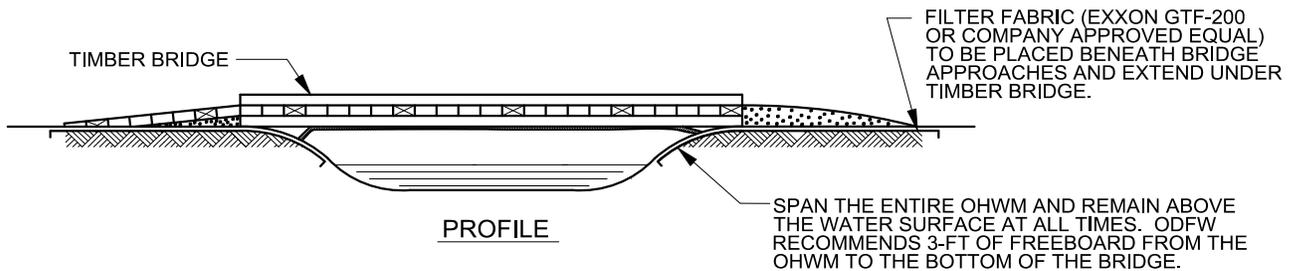
**TYPICAL MITIGATION MEASURE
TO PROTECT EXISTING CULVERTS**



NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY:	JST	DATE:	07-15-2008	ISSUED FOR BID:	SCALE:	NOT TO SCALE
							CHECKED BY:		DATE:		ISSUED FOR CONSTRUCTION:		
							APPROVED BY:		DATE:		DRAWING NUMBER:		SHEET 1
											7/21/2008		OF 1
											Q:\Oregon_gas\Mapping\Typicals\Culvert.dgn		



PLAN



PROFILE

MINIMUM PERFORMANCE/DESIGN STANDARDS:

1. TIMBER BRIDGES SHALL BE ADEQUATELY ANCHORED AT ONE END.
2. BRIDGE APPROACHES SHALL BE EITHER COARSE AGGREGATE OR TIMBER EQUIPMENT MATS.
3. SEDIMENT AND DEBRIS SHALL NOT ENTER WATERBODY. PROVIDE RAISED EDGES ON BOTH BRIDGE EDGES AND PROTECTIVE COVER (PLYWOOD, GEOFILTER FABRIC, CONVEYOR BELT), AS NECESSARY, TO PREVENT SEDIMENT IN STREAM.
4. PERIODICALLY CHECK BRIDGE INSTALLATION AND REMOVE BUILD-UP OF SEDIMENT OR DEBRIS ON BRIDGE.
5. MATERIALS PLACED ALONG STREAM CHANNEL SHALL BE COMPLETELY REMOVED DURING FINAL CLEAN-UP. REMOVAL OF THIS STRUCTURE IS NOT CONTINGENT UPON ESTABLISHMENT OF PERMANENT VEGETATION.
6. THE TIMBER BRIDGE SHALL BE DESIGNED TO SPAN THE ENTIRE OHWM OF THE WATERBODIES AND REMAIN ABOVE THE WATER SURFACE ELEVATION AT ALL TIMES. ODFW RECOMMENDS 3-FT OF FREEBOARD FROM THE OHWM/ACTIVE CHANNEL TO THE BOTTOM OF THE BRIDGE.
7. CONTRACTOR MAY USE MANUFACTURED PORTABLE BRIDGES OR RAIL CAR BRIDGES AS SUBSTITUTES FOR THE MEASURES SHOWN, IF APPROVED BY COMPANY REPRESENTATIVE.
8. MID-STREAM BRIDGE SUPPORTS PIERS OR CULVERTS SHALL BE USED TO PREVENT SETTLEMENT OF THE BRIDGE, IF NECESSARY. WHERE PIERS/CULVERTS ARE USED TO SUPPORT BRIDGES THEY SHALL NOT RESTRICT FLOW AND SHALL BE DESIGNED TO WITHSTAND AND PASS THE HIGHEST FLOW THAT WOULD OCCUR WHILE THE BRIDGE IS IN PLACE.
9. USE OF MID-STREAM BRIDGE SUPPORTS PIERS/CULVERTS WILL TRIGGER ODFW FISH PASSAGE PERMIT REQUIREMENTS AND APPROVALS BEFORE INSTALATION.

DRAWING NO.		REFERENCE TITLE		PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP TYPICAL PORTABLE BRIDGE CROSSING (PB)						
NO.	DATE	BY	REVISION DESCRIPTION	W.O. NO.	CHK.	APP.	DRAWN BY: KLL	DATE: 02-02-2001	ISSUED FOR BID:	SCALE: NOT TO SCALE
							CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
							APPROVED BY:	DATE:	DRAWING NUMBER: 3430.34-X-0010	SHEET 2 OF 2

Attachment 2

Excerpts from OAR 141-085

Excerpts from OAR 141-085-0530¹

Exemptions for Certain Activities and Structures

These exemptions apply in all waters of this state except State Scenic Waterways.

(4) Maintenance or Reconstruction of Water Control Structures. Fill or removal or both for maintenance or reconstruction of water control structures such as culverts, dikes, dams, levees, groins, riprap, tidegates, drainage ditches, irrigation ditches, and tile drain systems are exempt if:

(a) The project meets the definition of maintenance under OAR 141-085-0510; or

(b) The project meets the definition of reconstruction under OAR 141-085-0510;

(c) The structure was serviceable within the past five years; and

(d) The maintenance or reconstruction would not significantly adversely affect wetlands or other waters of this state to a greater extent than the wetlands or waters of this state were affected as a result of the original construction of those structures.

(7) Fish Passage and Fish Screening Structures in Essential Indigenous Anadromous Salmonid Habitat (ESH). Less than 50 cubic yards of removal-fill for construction or maintenance of fish passage and fish screening structures that are constructed, operated or maintained under ORS 498.306, 498.316, 498.326 or 509.600 to 509.645. This exemption includes removal of material that inhibits fish passage or prevents fish screens from functioning properly.

Excerpts from 141-085-0510

Definitions

(34) "Essential Indigenous Anadromous Salmonid Habitat (ESH)" means the streams designated pursuant to ORS 196.810 that are necessary to prevent the depletion of indigenous anadromous salmonid species during their life history stages of spawning and rearing, and any adjacent off-channel rearing or high-flow refugia habitat with a permanent or seasonal surface water connection to an ESH stream.

(52) "Maintenance" means the periodic repair or upkeep of a structure in order to maintain its original use. "Maintenance" includes a structure being widened by no more than twenty percent of its original footprint at any specific location in waters of this state if necessary to maintain its serviceability. "Maintenance" also includes removal of the minimum amount of sediment either within, on top of or immediately adjacent to a structure that is necessary to restore its serviceability, provided that the spoil is placed on upland.

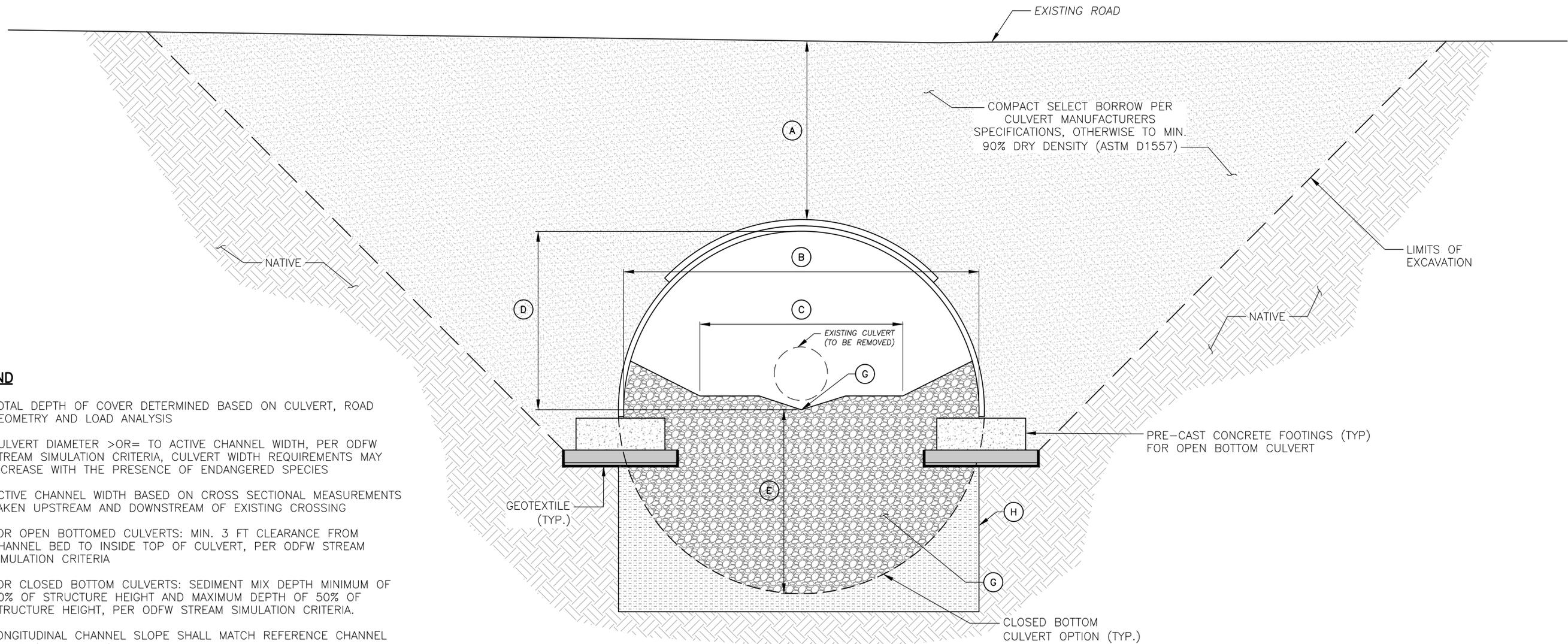
(80) "Reconstruction" means to rebuild or to replace the existing structure in-kind. "Reconstruction" includes a structure being widened by no more than twenty percent of its original footprint at any specific location in waters of this state.

(88) "State Scenic Waterway (SSW)" means a river or segment of river or lake that has been designated as such in accordance with Oregon Scenic Waterway Law (ORS 390.805 to 390.995).

¹ http://arcweb.sos.state.or.us/pages/rules/oars_100/oar_141/141_085.html

Attachment 3

Typical Culvert Replacement Design



LEGEND

- (A) TOTAL DEPTH OF COVER DETERMINED BASED ON CULVERT, ROAD GEOMETRY AND LOAD ANALYSIS
- (B) CULVERT DIAMETER \geq TO ACTIVE CHANNEL WIDTH, PER ODFW STREAM SIMULATION CRITERIA, CULVERT WIDTH REQUIREMENTS MAY INCREASE WITH THE PRESENCE OF ENDANGERED SPECIES
- (C) ACTIVE CHANNEL WIDTH BASED ON CROSS SECTIONAL MEASUREMENTS TAKEN UPSTREAM AND DOWNSTREAM OF EXISTING CROSSING
- (D) FOR OPEN BOTTOMED CULVERTS: MIN. 3 FT CLEARANCE FROM CHANNEL BED TO INSIDE TOP OF CULVERT, PER ODFW STREAM SIMULATION CRITERIA
- (E) FOR CLOSED BOTTOM CULVERTS: SEDIMENT MIX DEPTH MINIMUM OF 20% OF STRUCTURE HEIGHT AND MAXIMUM DEPTH OF 50% OF STRUCTURE HEIGHT, PER ODFW STREAM SIMULATION CRITERIA.
- (F) LONGITUDINAL CHANNEL SLOPE SHALL MATCH REFERENCE CHANNEL SLOPE (NOT SHOWN)
- (G) SEDIMENT MIX OF SIMILAR COMPOSITION TO SURROUNDING STREAM CHANNEL, OR SUPPLEMENTED, PER ODFW STREAM SIMULATION CRITERIA. FOR CULVERTS LONGER THAN 40- FEET, SEDIMENT MIX SHALL CONTAIN PARTIALLY-BURIED OVER-SIZED ROCK.
- (H) PIPE BEDDING PER MANUFACTURER'S RECOMMENDATIONS

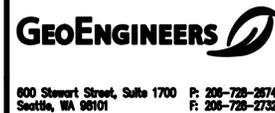
NOTES:

1. THE PURPOSE OF THE DRAWING IS TO PRESENT A GENERAL AND CONCEPTUAL CULVERT REPLACEMENT PLAN FOR DISCUSSION PURPOSES USING STREAM SIMULATION CRITERIA.
2. DRAWING NOT TO SCALE (NTS).
3. FISH PASSAGE CRITERIA TO BE MET AS DETERMINED BY OREGON ADMINISTRATIVE RULES (OAR) 635-412-0035, ODFW FISH PASSAGE CRITERIA (2006), NMFS ANADROMOUS SALMONID PASSAGE FACILITY DESIGN (2008).

TYPICAL-CULVERT CHANNEL SECTION

LOOKING DOWNSTREAM
NTS

2018 1/23/2018 2:12:09 PM



PACIFIC CONNECTOR GAS PIPELINE, LLC

SYM	DATE	REVISION DESCRIPTION	BY
APPROVED AND RELEASED FOR CONSTRUCTION			
CHIEF ENGINEER		DATE:	DATE:
PROGRAM		DATE:	DATE:

0 1" BAR MEASURES ONE INCH ON ORIGINAL DRAWINGS

CULVERT REPLACEMENT USING STREAM SIMULATION METHOD

TYPICAL SECTION

PROJECT NO.	
SHEET	OF

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Appendix J

Federally-Listed Plant Conservation Plan (forthcoming)



**Pacific
Connector**
GAS PIPELINE

Pacific Connector Gas Pipeline, LP

Appendix J

Federally-Listed Plant Conservation Plan

including
Botanical Mitigation Plans
(Applegate's Milk-vetch)
(Gentner's Fritillary)
(Kincaid's Lupine)
(Cox's mariposa-lily)

Pacific Connector Gas Pipeline Project

(Forthcoming)

Appendix K

Fire Prevention and Suppression Plan



Pacific Connector Gas Pipeline, LP

Fire Prevention and Suppression Plan

Pacific Connector Gas Pipeline Project

January 2018

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List of Acronyms and Abbreviations

AFMO	Assistant Fire Management Officer
ATV	All Terrain Vehicle
BLM	Bureau of Land Management
CFPA	Coos Forest Protection Association
DFPA	Douglas Forest Protection Association
FERC	Federal Energy Regulatory Commission
FMO	Fire Management Officer
IFPR	USDA-FS Industrial Fire Precaution Regulations
IFPL	BLMM-CFPA Industrial fire Precautions Levels
NFPA	National Fire Protection Association
OR OSHA	Oregon Occupational and Health Association
ODF	Oregon Department of Forestry
PCGP	Pacific Connector Gas Pipeline, LP
Plan	Fire Suppression Plan for Pacific Connector Gas Pipeline Project
Pipeline Project	Pacific Connector Gas Pipeline Project
POD	Plan of Development
R/W	Right-of-Way
SA	North Umpqua Hydroelectric Project Settlement Agreement
USDA-FS	United States Department of Agriculture-Forest Service
USDA-FS(4e) 4(e)	Conditioning Authority under the Federal Power Act

1.0 INTRODUCTION

Pacific Connector Gas Pipeline, LP (PCGP) proposes to construct and operate a 229-mile, 36-inch diameter pipeline (Pipeline or Pipeline Project) from an interconnection of the Ruby pipeline and the Gas Transmission Northwest pipeline to a liquefied natural gas terminal to be constructed and operated on the North Spit of Coos Bay by Jordan Cove Energy Project, LP.

This Fire Prevention and Suppression Plan (Plan), which is part of PCGP's (Plan of Development) POD, describes the measures to be used by PCGP and its contractors (Contractor) to ensure that fire prevention and suppression techniques are carried out in accordance with federal, state and local regulations.

1.1 Purpose and Intent

The primary purpose of this Plan is to provide a process for the following:

- 1) Reduce fire starts and spread; assess fire risk and hazards;
- 2) Establish a fire response notification process; and
- 3) Communicate existing PCGP procedures and programs and establish new guidelines to effectively manage fire suppression within the Pipeline Project area.

This Plan covers all lands and facilities associated with the Pipeline. This Plan meets the USDA-FS 4(e) conditions by presenting the following information as required by 4(e) Condition No. 12:

- 1) Describe the fire hazard associated with Licensee facilities. (Section 2.0)
- 2) Identify hazard abatement procedures. (Section 3.0)
- 3) Identify a notification process in the event of a fire involving Licensee Facilities. (Section 4.0)
- 4) Cooperate with the Forest Service for suppression of fire involving the Licensee facilities. (Section 5.0)

1.2 Goals

To meet the purpose and intent of this Plan, the following goals were developed to guide the operation of the Pipeline on federally-managed lands. These goals include:

- 1) Reduce risk of wildland and structural fires;
- 2) Ensure this Plan is consistent with National Forest Policies, Bureau of Land Management policies, Oregon Department of Forestry policies, current industry practices and procedures;
- 3) Address preparedness for wildland fires threatening the Pipeline, PCGP's employees and Contractors; and
- 4) Identify measures to minimize the chances of a fire starting on the right-of-way and spreading onto other lands.

1.2.1 Agency and PCGP Roles and Responsibilities

PCGP and its contractors are responsible for providing all required fire-fighting equipment as described by this Plan in Section 3.0 available to them during construction of the Pipeline. Prior to construction, PCGP will contact the appropriate authorities to establish communications,

obtain permits (if applicable), and/or fulfill other obligations as directed by fire control authorities. In addition, PCGP will:

- Designate a representative(s) authorized to act on all matters having to do with fire control, who shall be available at all times by direct means of communication with the Oregon Department of Forestry (ODF) and/or the Forest Service, Bureau of Land Management and the Bureau of Reclamation;
- Ensure prevention, detection, pre-suppression, and suppression activities are in accordance with this Plan and federal, state and county laws, ordinances, and regulations pertaining to fire; and
- Accompany agency representatives on fire tool and equipment inspections and take corrective action within agreed upon timeframes following notification of any fire protection requirements that are not in compliance with this Plan or federal or state regulations.

The fire prevention and suppression measures described in this Plan will be in effect during the entire construction period; required tools and equipment will be kept in serviceable condition and be immediately available for fire suppression at all times.

1.2.2 PCGP Roles and Responsibilities

PCGP shall be:

- Responsible for complying with all applicable federal, state and location regulations.
- Responsible for implementation of this Plan including funding and implementation of specific measures described within;
- Responsible for the coordination with other plans within the POD;
- Responsible for periodic, scheduled reporting to FERC;
- Responsible for annual meeting with ODF, Forest Service, Bureau of Land Management, and Bureau of Reclamation, and periodic (5-year) updates of the Plan;
- Liable for all fire suppression and resource damage costs caused by its actions to the extent required by applicable laws and regulations;
- Responsible for keeping informed of and ensuring compliance by itself and its contractors with current industrial fire precaution levels with respect to the right-of-way;
- Responsible for submitting all prescribed fire plans on BLM lands to the BLM for technical review; and
- Responsible for coordinating with the BLM or Forest Service, as applicable, to have a qualified federal burn boss oversee all prescribed fire operations on federal lands.

1.2.3 Forest Service Roles and Responsibilities

- Responsible for informing PCGP's designated representative of any Forest Service management activities involving fire or timber harvest within or near the right-of-way;
- Responsible for informing PCGP of any changes or proposed changes to Forest Service standards or policies regarding fire suppression in the National Forests that pertain to or may affect areas within the right-of-way;
- Attend annual Fire Suppression coordinator meetings with PCGP personnel;
- Assume command for suppression of any wildland fires occurring within lands managed by the Forest Service;
- Oversee all prescribed fire operations conducted by PCGP; and
- Investigate all fire ignitions within the PCGP boundary on NFS managed lands.

1.2.4 Bureau of Land Management (BLM), Coos Forest Protection Association (CFPA), Douglas Forest Protection Association (DFPA) and Oregon Department of Forestry (ODF) Roles and Responsibilities

- The BLM, CFPA, DFPA, ODF are responsible for informing PCGP of any Forest Management activities involving fire or timber harvest within or near the Pipeline Project boundary;
- The BLM, CFPA, DFPA, and ODF are responsible for informing PCGP of any changes or proposed changes to public lands standards or policies regarding fire suppression on the public lands that pertain to or may affect areas within the Pipeline Project boundary;
- The BLM, CFPA, DFPA and ODF will attend annual Fire Suppression coordinator meetings with PCGP personnel;
- CFPA will assume command for suppression of any wildland fires and investigate all fire ignitions within the Pipeline Project boundary within Coos County up to the Range 8 line except on NFS lands;
- DFPA will assume command for suppression of any wildland fires and investigate all fire ignitions within the Pipeline Project boundary from the Range 8 line through Douglas County except on NFS lands;
- ODF will assume command for suppression of any wildland fires and investigate all fire ignitions within the Pipeline Project boundary in Jackson and Klamath Counties except on NFS lands.

1.3 Plan Meetings and Reviews

PCGP will hold an annual meeting with the Forest Service, BLM, the CFPA, the DFPA, and ODF to discuss current fire suppression and preparedness issues, and to review and update this Plan as necessary to maintain consistency with applicable state, federal and local rules and regulations. The meetings will be held in _____, unless otherwise agreed to in advance by the parties, be organized by PCGP, and held at a time that does not conflict with the usual fire season. Should the parties agree as a result of this annual meeting that the Plan needs to be amended, such amendments will be made in writing and agreed to by all parties.

1.4 Coordination with other PCGP Project Management Plans

This Plan is one of a number of POD Management Plans that provide implementation and operations guidance for various activities associated with the Pipeline Project and addressed in the Right-of-Way Grant. Implementation of this Plan will be coordinated with other PCGP Project POD Management Plans. Generally, PCGP corporate-level plans and procedures will provide policy level guidance for updates and changes to this Plan.

1.5 Relevant Plans and Regulations

Listed in the Attachments are federal and state plans and regulations that are applicable to the actions required by this Plan:

Attachment 1: Industrial Fire Precaution Regulations

Attachment 4: Forest Service, Pacific Northwest Region

2.0 FIRE HISTORY, RISK ASSESSMENT MODEL, AND HAZARDS ASSOCIATED WITH PCGP'S PIPELINE

This section of the Plan sets out five distinct pieces of information: the first is a history of fire in the area of the Pipeline right-of-way; the second is the use of the Forest Service fire behavior ratings as they relate to the Pipeline; the third component is detailed descriptions of aboveground Pipeline facilities that will be located on federal lands; the fourth is the risk associated with service vehicles; and the fifth is the risk associated with maintenance activities.

2.1 Fire History – Wildland Fires in Proximity to PCGP Facilities

Figures 2.1, 2.2, 2.4, 2.5, 2.6, 2.7, and 2.8 in Attachment 6 depict the history of fires within the three National Forests and four BLM Districts crossed by the Pipeline.

2.2 Forest Service Fire Behavior Ratings

Figure 2.3 in Attachment 6 depicts the Umpqua National Forest fire behavior ratings in the vicinity of the Pipeline Project.

2.3 Pipeline Project Facilities

Three mainline block valves (MPs, 48.58, 80.03, and 150.70) will be located along the Pipeline on BLM land. For the mainline block valve at MP 48.58 a 40-foot communications tower, foundation, and generator and controls equipment will be installed. Each mainline block valve will occupy a site of approximately 0.06 acre and will be enclosed by a 7-foot high chain-link fence. The mainline block valve sites will be completely graveled within the fenced in area.

The risk of fire danger during pipeline construction can be related to smoking, refueling activities, operating vehicles and other equipment being used off of roadways, welding activities, and the use of flammable liquids. During pipeline operation, risk of fire can be from unauthorized entry onto the right-of-way. During maintenance operations, risk of fire can be from service vehicles or pipeline maintenance activities that require welding.

2.4 Service Vehicles

Employees and Contractors use service vehicles (including ATVs) to provide transportation to various portions of the Pipeline Project as well as perform various construction and maintenance functions. Much of the area that may be traveled by these service vehicles includes lands with high fire behavior predictions.

Service vehicles create a fire risk when driving through dry grass and other vegetation. The service activities associated with these vehicles, such as welding, grinding, and using chain saws, can create a risk as well.

All off-road travel on the BLM lands will be limited based on the "Regulated Use Closure" that is enacted by the fire protection district (CFPA, DFPA, or ODF's Southwest Oregon District).

2.5 Pipeline Maintenance Activities

Maintenance operations may include such activities as brush clearing, excavating the pipeline, and welding activities. On federal lands, these activities would occur in accordance with the

terms and conditions of the Right-of-Way Grant. As mentioned in Section 2.3.1 above, the use of flammable liquids for vehicle and equipment fueling along with welding and grinding activities can create a fire risk during these operations.

3.0 HAZARD ABATEMENT PROCEDURES

This section lists procedures to minimize fire risk for pre-construction, construction, and post-construction procedures and activities.

3.1 Pre-construction

Methods and procedures that will be implemented prior to and during the construction period to minimize the risk of fire are described below. PCGP will train all personnel on the measures to take in the event of a fire and will inform each construction crew member of fire dangers, locations of extinguishers and equipment, and individual responsibilities for fire prevention and suppression. Smoking and fire rules will also be discussed with all Contractors and all field personnel as part of the safety training program.

3.1.1 Training, Fire Regulations and Other Resources

In the event of a fire emergency, how personnel are trained is an important component of their ability to protect their personal safety and that of those around them. The following section outlines the training programs of PCGP and required training by the State of Oregon.

3.1.2 PCGP Training

Fire Training – As part of the training program, it is a PCGP goal to have:

- All employees participate in a fire training program which includes fire extinguisher training;
- Personnel that will be involved in daily construction activities participate in firefighting training that includes the use of all the fire equipment required to be on site for initial suppression of fires originating in their work areas; and
- All employees participate in training in the protocol for reporting fires per Section 4.1 of this Plan.

3.1.3 Oregon Occupational Safety and Health Administration (OSHA)

Fire Suppression and Safety Training – This training is designed to address initial fire response and safety issues for forest workers. Oregon OSHA requires this program for forest workers. All PCGP personnel who are performing forestry work (timber clearing) will need to have completed this course.

3.1.4 National Fire Protection Training Programs

PCGP personnel who wish to train on their own initiative may take the National Fire Protection Association (NFPA) Training Programs. PCGP agrees to make available those personnel who have completed the NFPA to assist in responding to local fires if they are not performing a critical function at the time.

3.2 Construction

3.2.1 Forest Service Industrial Fire Precaution Regulations (IFPR)

Prior to the start of each fire season, all PCGP personnel will have their fire equipment inspected by an authorized Forest Service representative prior to work on National Forest System lands (NFS lands). Inspections are available at the North Umpqua or Diamond Lake

Ranger Districts and other Ranger Districts as identified by the Forest Service across all three National Forests that will be crossed by the Pipeline. PCGP shall notify the Ranger District of the need for inspection and shall be responsible for scheduling such inspections.

All PCGP personnel will be required to follow these regulations and be aware of the current fire closure level when working in forested areas Attachment 3 details typical IFPRs. PCGP is responsible for ensuring that they operate under the current IFPRs in effect at the time work occurs.

PCGP will provide all water supply and fire tools on each active construction site as required by the IFPR. Crews that leave their vehicles and hike in to a work site are required to have appropriately stocked fire-boxes with their vehicles. The fire-boxes stay in the vehicles; they do not need to be with the crew. The required content of the fire-boxes is based on the crew size.

3.2.2 Coos Bay, Roseburg, Bureau of Land Management (BLM) and Oregon Department of Forestry (ODF) Industrial Fire Precaution Levels (IFPL)

The BLM contracts fire prevention, suppression and investigation to the Oregon Department of Forestry (ODF). In the vicinity of the Pipeline Project on BLM lands within Coos County and Douglas County, ODF has subcontracted to CFPA and DFPA respectively. ODF oversees fire protection in Jackson and Klamath Counties. CFPA and DFPA will do on-site inspections to ensure fire safety and to ensure the operator/contractor is meeting the Industrial Fire Precaution Levels (IFPL). If a citation is issued for any serious violation, the Coos Bay BLM or Roseburg BLM may issue a stop work order for that specific portion of the work. Once fire season is declared, all PCGP Contractors and employees will be required to notify CFPA and DFPA of the location of any work to be taken place in the field. PCGP and its contractors will conform with all current IFPL notification requirements. An example of IFPL requirements is included in Attachment 3.

3.2.3 Fire Season Work Waivers

The IFPL may prohibit different types of work during different fire closure levels during fire season. PCGP will apply for waivers in advance of specific types of work identified by the IFPL at the local office of the appropriate agency as detailed below.

If the work is on BLM-managed lands, PCGP will apply for a waiver through CFPA if within the Coos Bay BLM District, DFPA if within the Roseburg BLM District, or ODF if on the Medford BLM District, or on the Lakeview District. The local District Fire Management Officer reviews applications and determines if a waiver is appropriate. If authorized by ODF on BLM lands or the District Ranger on FS lands, additional precautions and equipment may be required. The Contractor is required to possess a copy of the waiver at the work site and adhere to all requirements of the waiver. PCGP is responsible to assure that their contractors are in compliance with waivers.

If a citation for PCGP is issued by ODF, on BLM managed lands, a future waiver request will be denied for a calendar year. Repeat warnings by the ODF unit can also result in denial of future waivers.

3.2.4 Prescribed Burning

For the POD, PCGP has submitted a separate Prescribed Burning Plan that contains the process for creating and submitting a burn plan, notification procedures, and how the Pipeline Project will meet the requirements as outlined in the Interagency Standards for Fire and Fire

Aviation Operations as well as the Interagency Prescribed Fire Planning and Implementation Procedures Guide. All prescribed burns on BLM-managed lands will be submitted to the BLM for technical review and approval prior to any ignitions. All prescribed burns conducted by PCGP on federal lands will be under the direct oversight of a qualified federal burn boss.

3.2.5 Smoking

Smoking is prohibited at all times while working in the construction right-of-way, temporary extra work areas, and uncleared storage areas in forested areas or while traveling on roads identified as access for the Pipeline Project in forested areas unless confined to an enclosed vehicle.

3.2.6 Spark Arresters

All non-turbo charged engines used on or to access the construction right-of-way must be equipped with an approved spark arrester that meets Spark Arrester Guide specifications except:

- engines in motor vehicles operating on public roads equipped with an adequate muffler and exhaust system;
- engines of 50 cubic inch displacement or less, except ATVs and motorcycles, equipped with an adequate muffler and an exhaust system;
- engines in light trucks (26,000 GVW or less) equipped with an adequate muffler and exhaust system;
- engines in heavy trucks (greater than 26,000 GVW) equipped with an adequate muffler and exhaust system; if the engine is not fully turbo-charged, then the exhaust must extend above the cab and discharge upward or to the rear or to the end of the truck frame;

3.2.7 Parking, Vehicle Operation and Storage Areas

In no case will motorized equipment, including worker transportation vehicles, be driven or parked outside of the designated and approved construction work areas or access roads. Equipment parking areas, the right-of-way, and temporary extra work areas will be cleared of all flammable material. Glass containers will not be used to store gasoline or other flammables.

3.2.8 Equipment Required During Fire Season in Forested Areas

PCGP shall comply with applicable state and local rules and regulations and the IFPL regarding the location, type and amount of fire prevention and suppression equipment available for use by the Holder and its contractors during the fire season or periods of fire danger.

Operation Site

- Each operation site on forested lands will have:
 - Supply hand tools – including an even mix of Pulaskis, axes, shovels, hazel hoes. Each worker will be provided enough tools with a minimum equipment requirement for four workers.
 - All hand tools for fire control in a sturdy box clearly identified as containing firefighting tools (at least one box for each operation area).
 - Each internal combustion engine used in an operation, except power saws, will be equipped with one chemical fire extinguisher rated as not less than 2 ½ pounds ABC that meets Oregon OSHA standards and is inspected annually. (Note: OR-OSHA requires a 5#, the districts require a 2 ½ #)
 - Pump, hose, and water supply as no fire hydrants exist on the Pipeline right-of-way within NFS or BLM lands.

- A tank truck or trailer with a pump, hose, and water supply will be supplied for equipment used on an operation site for more than 2 consecutive days.
- Pump will be maintained ready to operate and capable to provide a discharge of not less than 20 gallons per minute when pumping through 50' of hose equipped with a nozzle 1/4" in diameter at pump level.
- Water supply will be a minimum of 300 gallons if coming from a self-propelled engine.
- Water supply will be a minimum of 500 gallons if not self-propelled (pond, stream, tank, sump, etc.).
- At least 500' of hose not less than 3/4" inside diameter will be provided.
- Water supply, pump, and at least 250' of hose and nozzle will be maintained as a connected, operating unit ready for immediate use.
- If a trailer is used, it will be equipped with a hitch to facilitate prompt movement. A serviceable tow vehicle will be immediately available for attachment to the trailer. Such a truck or trailer will be equipped to operate for a minimum of 8 hours.

Motor Vehicles and ATVs

- All motor vehicles and equipment used by construction personnel will carry the following as specified in the Industrial Fire Precaution Regulations (IFPR) and Industrial Fire Precaution Level (IFPL) (see Attachment 1) during the declared fire season:
 - 1 round pointed shovel at least 8 inches wide, with a handle at least 26 inches long;
 - 1 axe or Pulaski with 26 inch handle or longer;
 - 1 fire extinguisher rated not less than 2 1/2 pound ABC; and
 - 1 refill for each type or one extra extinguisher sufficient to replace each size extinguisher shall be safely stored in the fire tool box or other agreed upon place on the Pipeline Project where it is available for immediate use.
- ATVs are required to meet the same requirements as vehicles that carry passengers as described in the IFPR and IFPL. The current requirements are:
 - One ABC fire extinguisher not less than 2 1/2 lbs capacity;
 - One "D" handled or long handled round point shovel, size "0" or larger; and
 - One 3.5 pound or larger double-bit axe or Pulaski.

Helicopters

- All helicopters will be equipped with:
 - A pressurized chemical fire extinguisher of not less than 8-ounce capacity by weight, and one long handled round point shovel, size 0 or larger, except at a landing where a suitable fire extinguisher and shovel are immediately available;
 - One fire extinguisher sufficient to replace each size extinguisher required on equipment will be safely stored in the fire tool box or other agreed upon place on the construction right-of-way that is protected and readily available; and
 - At each area where helicopters are serviced or supplied along the Pipeline Project area, a carbon dioxide fire extinguisher with a UL rating of at least 20 ABC per Oregon OSHA will be provided on the site and placed where it is available for immediate use.

Fire Equipment Inventory

A list of fire equipment will be maintained at each construction office as well as at the Klamath Compressor Station.

3.2.9 Road Closures

The appropriate fire suppression agency will be notified of the scheduled closures prior to the open cut crossing of a road that is on or provides access to Forest Service or BLM managed forested lands. If required, a bypass will be constructed prior to the open cut installation of a road crossing, unless a convenient detour can be established on existing approved roads or within approved work limits. All bypasses will be clearly marked. During road closures, one person, who knows the bypass, will be designated to direct traffic. To the extent possible, the duration of road closures will be minimized. Additional information regarding road closures is provided in the Transportation Management Plan.

3.2.10 Refueling

Fuel trucks will have a large fire extinguisher charged with the appropriate chemical to control electrical and gas fires. The extinguisher will be a minimum size 35-pound capacity with 40 ABC or higher rating. Fueling mobile equipment in the field will take place on a road or in another location cleared to mineral soil. No vehicle will carry in excess of 660 gallons of fuel to a mobile fueling location on NFS lands without making arrangements with the lead forest (Umpqua National Forest) to establish the terms and conditions for handling volumes of fuel in excess of this amount. Requests to exceed this limit should be directed to: _____

3.2.11 Burning

No burning of slash, brush, stumps, trash, or other debris will be permitted on the construction right-of-way or temporary extra work areas unless specifically authorized by the applicable land management agency. No campfires, lunch fires, or warming fires will be allowed unless permitted through the appropriate agencies.

3.2.12 Blasting

Whenever the Industrial Fire Precaution Level is 2 or greater, a designated individual equipped with a long-handled, round point, No. 0 or larger shovel and a 5-gallon backpack pump filled with water will stay at the blasting location for 1 hour after blasting is finished.

Fuses will not be used for blasting. Explosive cords will not be used without the written authorization of the Forest Service or Bureau of Land Management, which may specify conditions under which such explosives may be used and the precautions that must be taken.

3.2.13 Welding and Powersaws

One 5-gallon backpack pump will be required with each welding unit in addition to the standard fire equipment required in all vehicles.

Each power saw will be equipped with an exhaust system which retains at least 90% of carbon particles over .023" in diameter. A standard exhaust screen with 0.023" holes meets this requirement. All power saws will meet Spark Arrester Guide specifications. The following will be immediately available for prevention and suppression of fire involving a power saw:

- a fire extinguisher of at least 8 oz. capacity; and
- 1 round pointed shovel at least 8 inches wide with a handle at least 26 inches long.

The power saw must be moved at least 20 feet from the place of fueling before it is started.

3.2.14 Monitoring

Inspectors for PCGP will inspect the construction right-of-way limits and the construction operations for compliance with all provisions of this Plan. In addition, federal, state, and local agencies may perform monitoring inspections in areas under their jurisdiction.

3.3 Post-Construction

In order to minimize fire risk, post construction maintenance and activities will continue to follow the guidelines laid out in this section according to the Industrial Fire Precaution Regulations and Industrial Fire Precaution Levels laid out by the U.S. Forest Service and Oregon Department of Forestry (see Attachments 1, 2, and 3).

4.0 EMERGENCY COORDINATION

4.1 Notification Process

In the case of fire caused by Project activities, PCGP shall follow its internal notification procedures, which includes calling 911. PCGP will also follow the Emergency Notification Process (see Attachments 2 and 3), immediately notifying the appropriate agencies (see Table 4-1 for contact numbers). Notification is required even if the fire has been extinguished.

**Table 4-1
Fire Suppression Contacts**

Contact	MPs	Telephone Number
Coos Forest Protective Association (CFPA)	MP 0.00 – MP 56	911 or 541-267-3161
Douglas Forest Protective Association (DFPA)	MP 56 – MP 110	911 or 541-672-6507
Oregon Department of Forestry (ODF) Jackson County	MP 110 – MP 166.4	911 or 541-664-3328
ODF Klamath County	MP 166.4 – MP 228	911 or 541-883-5687
Umpqua National Forest: Roseburg Interagency Communications Center	99.31 to 99.91 101.23 to 101.92 102.33 to 102.85 104.11 to 113.20	911 or 541-957-3325 (24 hour)
Rogue River-Siskiyou National Forest: Rogue Valley Interagency Communications Center	153.82 to 154.92 155.45 to 167.50	911 or 541-618-2510 (daytime) 800-267-3126 (24 hour)
Fremont-Winema National Forest: Lakeview Interagency Fire Center	167.50 to 169.37 170.05 to 171.11 171.30 to 172.07 176.26 to 176.37	911 or 541-947-6313 541-947-6259 (24 hour)

4.2 Suppression

The Contractor will take the following actions should a fire occur within the right-of-way during construction.

- Take immediate action to suppress fires using all available manpower and equipment;
- . Immediately notify PCGP's Chief Inspector of the fire location and action taken;
- The Chief Inspector will immediately notify the nearest fire suppression agency of the fire location, action taken, and status (see Table 4-1); and
- The Chief Inspector will provide information regarding the property ownership and closest access roads to the dispatch office.

4.2.1 Structural Suppression

In the event of a structural fire, the Forest Service, BLM, CFPA, DFPA and ODF are not responsible for suppression or protection of PCGP's facilities. The Forest Service, CFPA, DFPA and ODF can assist qualified structural firefighters to prevent the spread of fire to the wildland. PCGP will notify the local fire department whose goal will be to prevent these fires from spreading to other structures or nearby woodlands.

4.2.2 Communications

During operations (excluding timber powersaw falling and bucking), PCGP will provide adequate two-way communication facilities and shall immediately report a fire to the agency with fire suppression responsibility. Citizen Band (CBs) radios are not considered adequate two-way communications because FCC Regulations prohibit commercial use.

Every aircraft used in conjunction with construction operations will be equipped with an operable radio system. The radio system will be capable of transmitting and receiving on VHF frequency 122.85 Megahertz (MHz) with a minimum output of 5 watts at the transmitter. The system will be located and installed so that the pilot can operate it while flying. A shielded all-weather broad-band antenna will be part of the system. Radio and antenna will be properly installed and maintained. Upon discovery or notification of a fire in the Pipeline right-of-way, all aircraft pilots controlled by PCGP will monitor VHF frequency 122.85 when within 5 miles of a fire and broadcast their intentions.

All aircraft being used over National Forest lands must be reported to the Forest Service Dispatch in the local area (see Table 4-1).

4.3 Monitoring

PCGP will mark the location and boundaries of all extinguished fires. Extinguished fire sites will be monitored for a minimum of 24 hours or as required by the appropriate agency.

Attachment 1 Industrial Fire Precaution Regulations

Fire Danger Protocols

Unless a waiver is obtained, PCGP will observe the following protocol within the Pipeline Project area during construction in accordance with each level of fire danger.

Protocol for areas west of the Cascades (MPs 0.00 to 168.00):

PCGP will contact the appropriate ODF District or Forest Service listed in Table A-1 below to obtain fire closure information and the predicted Industrial Fire Precaution Level (IFPL) to determine the applicable protocol.

**Table A-1
Fire Closure Information**

24-Hour Fire Closure Information	541-672-0379 www.oregon.gov/ODF/Fire/pages/FireStats.aspx
ODF Districts:	
Coos Bay – CFPA	541-267-3161
Roseburg – DFPA	541-672-6507
Jackson – ODF	541-664-3328
Klamath - ODF	541-883-5687
Forest Service:	
Umpqua National Forest	541.957.3371 Reva Duncan, Fire Management Officer
Rogue River-Siskiyou National Forest, High Cascades North Ranger District - Prospect	541-560-3400 Larry Pringle, Fire Management Officer
BLM:	
Coos Bay	541-751-4288 Fire Management Officer 541-751-4343 Adam Kohley, Duty Officer
Roseburg	541-413-0241 Kim Valentine, Duty Officer

I. **Closed Season (fire precaution requirements are in effect)**

- Each operation area will have a fire watch (after daily construction activities have ceased)
- Fire watch will be on duty for the following durations after power driven equipment has been shut down for the day
 - During *IFPL 1 = 1 hour
 - During *IFPL 2 = 2 hours
 - During *IFPL 3 = 3 hours

*IFPL = “industrial fire precaution level” (used by all wildland fire protection agencies in OR and WA to regulate operation activity during fire season)
- Fire watch will:
 - Be physically capable and experienced to operate firefighting equipment
 - Have facilities for transportation and communications to summon assistance.
 - Observe all portions of the operation on which activity occurred during the day.

- Immediately proceed to control and extinguish a fire and summon assistance.

II. Partial Hootowl

The following may only operate between the hours of 8PM and 1PM local time:

- power saws except at loading sites
- cable yarding
- blasting
- welding/cutting of metal.

III. Partial Shutdown

The following are prohibited except as indicated:

- Cable yarding: except gravity operated logging systems employing non-motorized carriages may operate between 8PM and 1PM when all blocks and moving lines are suspended 10 feet above the ground except the line between the carriage and the chokers.
- Power saws: except power saws may be used at loading sites and on tractor/skidder operations between the hours of 8PM and 1PM local time.

The following are permitted between the hours of 8PM and 1PM local time:

- tractor, skidder, feller-buncher, forwarder, or shovel logging operations where tractors, skidders, or other equipment with a blade capable of constructing a fireline are immediately available to quickly reach and effectively attack a fire start;
- mechanized loading or hauling of any product or material;
- blasting;
- welding or cutting metal;
- any other spark emitting operation not specifically mentioned.

IV. General Shutdown

All operations are prohibited.

Protocol for areas east of the Cascades (MPs 168.00 to 228.81):

PCGP will contact the appropriate ODF District or Forest Service listed in Table A-2 below to obtain fire closure information and the predicted Industrial Fire Precaution Level (IFPL) to determine the applicable protocol.

**Table A-2
24-Hour Fire Closure Contacts**

24-Hour Fire Closure Information	541-672-0379 http://www.oregon.gov/ODF/Fire/pages/FireStats.aspx
ODF Districts:	
Jackson	541-664-3328
Klamath	541-883-5687
Forest Service:	
Fremont-Winema National Forest:	541-947-6313
Lakeview Interagency Fire Center	541-947-6259 (24 hour)

Fire watch will be on duty for the following durations after the power driven equipment used by the operator has been shut down for the day:

- Low = 1 hour fire watch
- Medium = 2 hour fire watch
- High = 3 hour fire watch

Waiver

Advance written waiver of the precautions detailed in Section 3.2 may be issued by the ODF or Forest Service Representative.

Such waiver, or substitute precautions, will prescribe measures to be taken by PCGP to reduce the risk of ignition, and/or the spread of fire. The ODF or the Forest Service Representative will consider site specific weather factors, fuel conditions, specific operations and fire prevention precautions that result in less risk of fire ignition and/or spread than contemplated when precaution level was predicted. Consideration will also be given to measures that reduce the precaution levels above. PCGP will assure that all conditions of such waivers or substitute precautions are met.

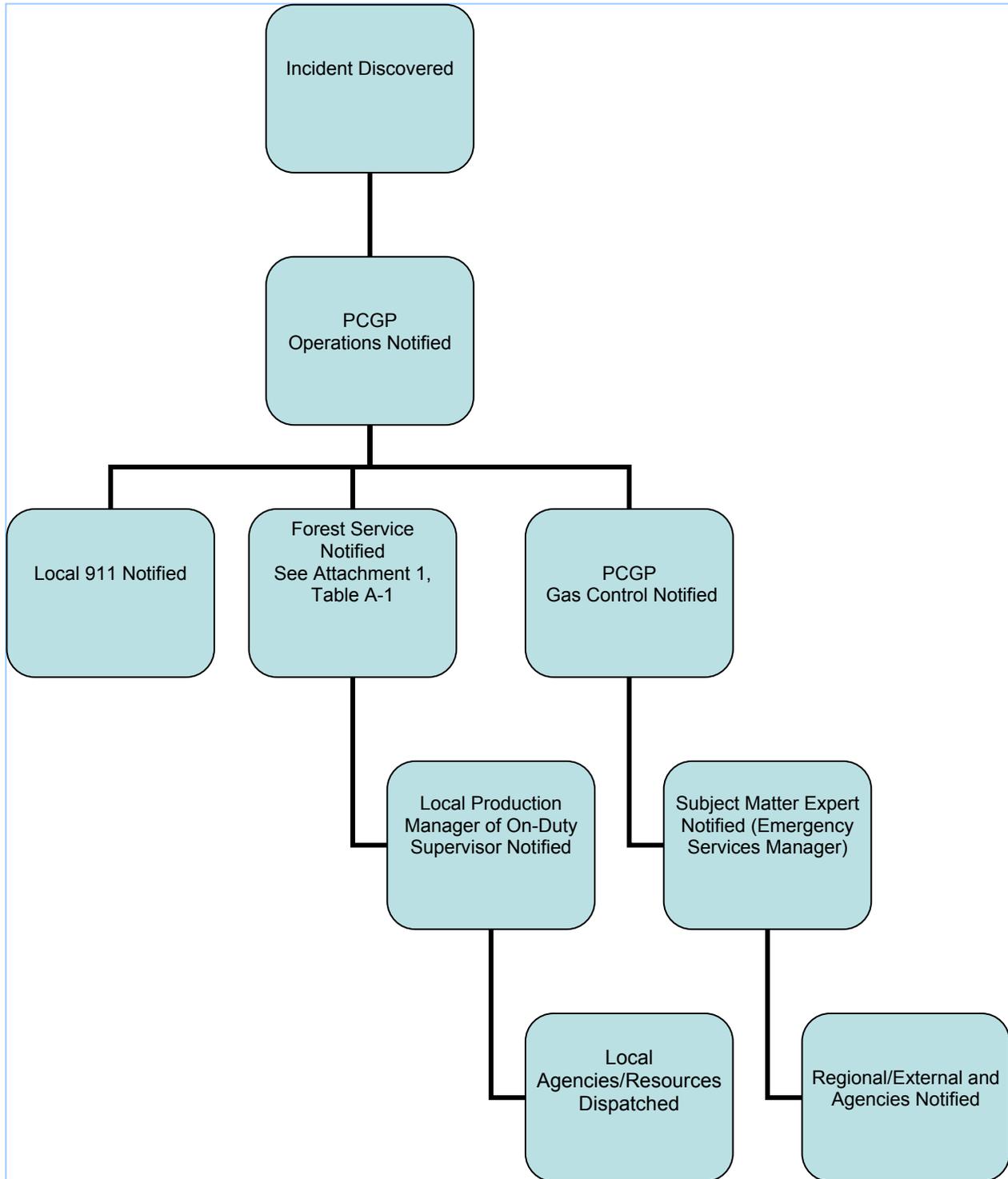
Pipeline Operation and Maintenance

During pipeline operation, the risk of fire danger is minimal. The primary causes of fire on the right-of-way result from unauthorized entry by individuals utilizing the right-of-way for recreational purposes and from fires started outside of the right-of-way. In the latter case, the right-of-way can be used by authorities as a potential fire break provided that the grade is not altered above the pipeline. During maintenance operations, PCGP will equip personnel with fire-fighting equipment including fire extinguishers and shovels. Maintenance crews will also carry fire suppression contacts as listed in Table 4-1.

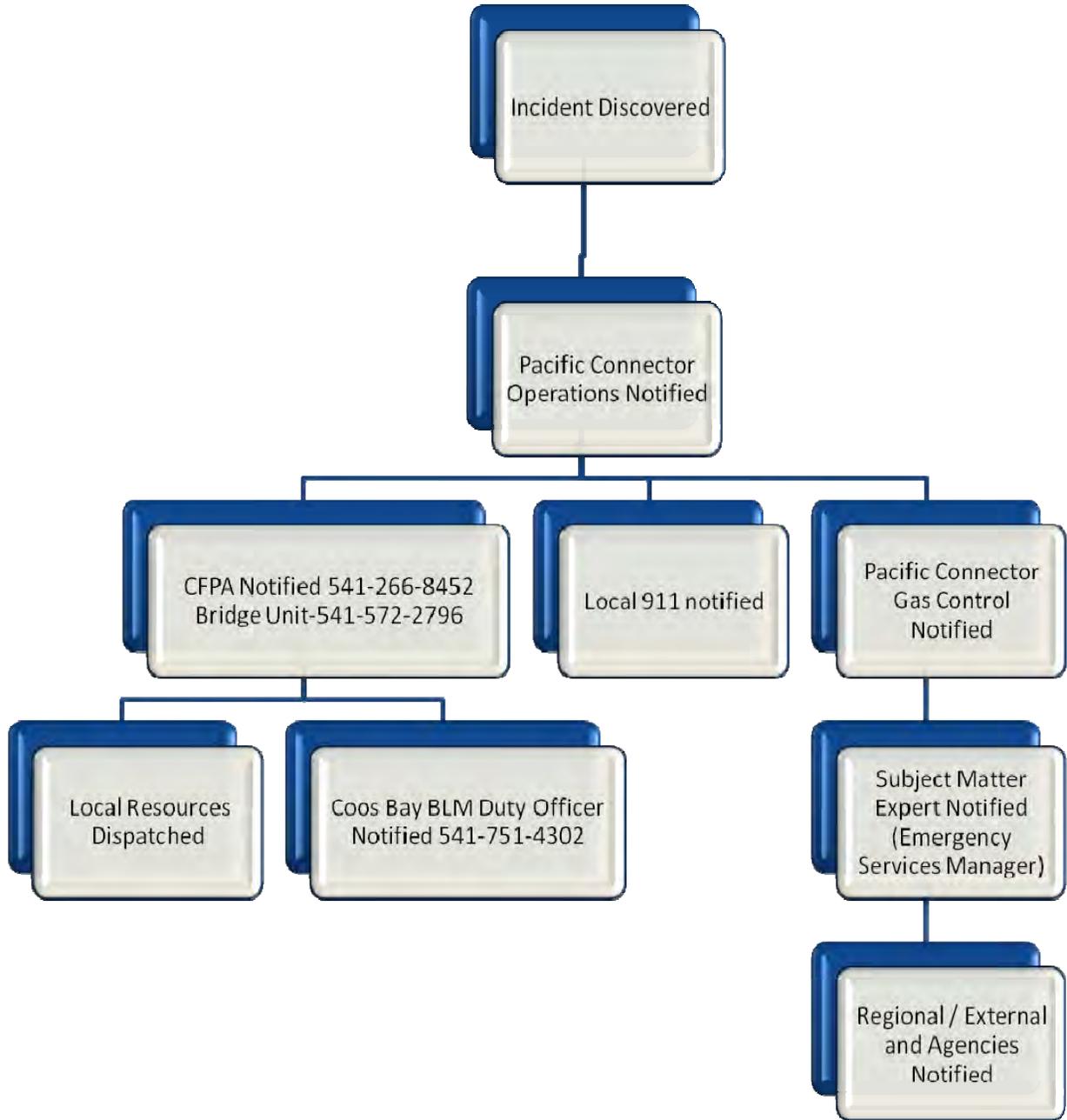
Aboveground Appurtenances

A 50' x 50' fenced and graveled space will be created around any aboveground Pipeline facilities.

Attachment 2 Emergency Notification Process



**Attachment 3
EMERGENCY NOTIFICATION PROCESS under IFPRs**



Attachment 4
FOREST SERVICE PACIFIC NORTHWEST REGION

FIRE PROTECTION AND SUPPRESSION

R6-FS-6300-52 (Rev. 5/97)

1. Fire Period and Closed Season

Specific fire prevention measures are listed below and shall be effective for the period April 1 to October 31 of each year. The Forest Service may change the dates of said period by advance written notice if justified by unusual weather or other conditions. Required tools and equipment shall be kept currently in serviceable condition and immediately available for initial attack on fires.

2. Fire Plan

Before starting any operations on the project, the Contractor, Permittee, Licensee, or Purchaser, hereinafter referred to as the "Contractor," shall prepare a fire plan in cooperation with the Contracting Officer providing for the prevention and control of fires in the project area.

The Contractor shall certify compliance with fire protection and suppression requirements before beginning operations during the fire period and closed season, and shall update such certification when operations change.

3. Substitute Measures

The Contracting Officer may by written notice authorize substitute measures or equipment or may waive specific requirements during periods of low fire danger.

4. Emergency Measures

The Forest Service may require emergency measures, including the necessary shutting down of equipment or portions of operations in the project area during periods of fire emergency created by hazardous climatic conditions.

5. Fire Control

The Contractor shall, independently and in cooperation with the Forest Service, take all reasonable action to prevent and suppress fires in the project area. Independent initial action shall be prompt and shall include the use of all personnel and equipment available in the project area.

For the purpose of fighting forest fires on or in the vicinity of the project, which are not caused by the Contractor's operations, the Contractor shall place employees and equipment temporarily at the disposal of the Forest Service. Any individual hired by the Forest Service be employed in accordance with the Interagency Pay Plan for Emergency Firefighters. The Forest Service will compensate the Contractor for equipment rented at fire fighting equipment rates common in the area, or at prior agreed to rates.

6. Compliance with State Forest Laws

Listing of specific fire precautionary measures herein is not intended to relieve the Contractor in any way from compliance with the State Fire Laws covering fire prevention and suppression equipment, applicable to operations under this contract, permit or license.

7. Fire Precautions

Specific fire precautionary measures are as follows:

a. Smoking and Open Fires

Smoking and fires shall be permitted only at the option of the Contractor. The Contractor shall not allow open fires on the project area without advance permission in writing from Forest Service.

Unless restricted by State Law or Federal Regulation, smoking shall be permitted only in such portions of the project area that are free of flammable material. Smokers shall sit down to smoke in such a position that any burning material will fall within a cleared area, and shall extinguish and press out in mineral soil all burning material before leaving the cleared area.

b. Fire Extinguishers and Equipment on Trucks, Tractors, etc.

All power-driven equipment operated by the Contractor on National Forest land, except portable fire pumps, shall be equipped with one fire extinguisher having a UL rating of at least 5 BC, and one "D" handled or long handled round point shovel, size "0" or larger. In addition, each motor patrol, truck and passenger-carrying vehicle shall be equipped with a double-bit axe or Pulaski, 3-1/2 pounds or larger.

Equipment shall be kept in a serviceable condition and shall be readily available.

c. Power Saws

Each gasoline power saw operator shall be equipped with a pressurized chemical fire extinguisher of not less than 8-ounce capacity by weight, and one long-handled round point shovel, size "0" or larger. The extinguisher shall be kept in possession of the saw operator at all times. The shovel shall be accessible to the operator within 1 minute.

d. Extinguishers

One refill for each type or one extra extinguisher sufficient to replace each size extinguisher required on equipment shall be safely stored in the fire tool box or other agreed upon place on the project area that is protected and readily available.

e. Spark Arresters and Mufflers

Each internal combustion engine shall be equipped with a spark arrester meeting either (1) USDA Forest Service Standard 5100-1a, or (2) appropriate Society of Automotive Engineers (SAE) recommended practice J335(b) and J350(a) as now or hereafter amended unless it is:

(1) Equipped with a turbine-driven exhaust supercharger such as the turbocharger. There shall be no exhaust bypass.

(2) A passenger-carrying vehicle or light truck, or medium truck up to 40,000 GVW, used on roads and equipped with a factory-designed muffler complete with baffles and an exhaust system in good working condition.

(3) A heavy duty truck, such as a dump or log truck, or other vehicle used for commercial hauling, used only on roads and equipped with a factory designed muffler and with a vertical stack exhaust system extending above the cab.

Exhaust equipment described in this subsection, including spark arresters and mufflers, shall be properly installed and constantly maintained in serviceable condition.

f. Emergency Fire Precautions

The Contractor shall restrict operations in accordance with the IFPL listed below. The Forest Service may change the Industrial Fire Precaution Levels to other values upon revision of the National Fire Danger Rating System and may change the specific Industrial Fire Precaution Levels when such changes are necessary for the protection of the National Forest. When sent to the Contractor, the revised Industrial Fire Precaution Levels will supersede the attached levels.

INDUSTRIAL FIRE PRECAUTIONS SCHEDULE
INDUSTRIAL FIRE PRECAUTION LEVEL (IFPL)

I. Closed season - Fire precaution requirements are in effect. A fire watch/security is required at this and all higher levels unless otherwise waived.

II. Partial hootowl - The following may operate only between the hours of 8 p.m. and 1 p.m., local time:

- a. Power saws, except at loading sites,
- b. Cable yarding,
- c. Blasting, and
- d. Welding or cutting of metal.

III. Partial shutdown - The following shall be prohibited except as indicated:

Cable yarding - except that gravity operated logging systems employing non-motorized carriages may be operated between the hours of 8 p.m. and 1 p.m., local time, when all block and moving lines, except the line between the carriage and the chokers, are suspended 10 feet above the ground;

Power saws - except power saws may be used at loading sites and on tractor/skidder operations between the hours of 8 p.m. and 1 p.m., local time.

In addition, the following are permitted between the hours of 8 p.m. and 1 p.m., local time:

- a. tractor/skidder operations;

- b. mechanized loading and hauling of any product or material;
- c. blasting;
- d. welding or cutting of metal;
- e. any other spark-emitting operation not specifically mentioned.

IV. General shutdown - All operations are prohibited.

The following definitions shall apply to these Industrial Fire Precaution Levels:

Cable yarding systems: A yarding system employing cables and winches in a fixed position.

Closed season (Fire Precautionary Period): That season of the year when a fire hazard exists as declared by the responsible agency official.

Contracting Officer: The person executing the contract, permit or license on behalf of the Government and includes that person's designated representative, acting within the limits of their authority or the duly appointed successor to the individuals.

Loading sites/woods site/project area: A place where any product or material (including but not limited to logs, firewood, slash, soil, rock, poles, posts, etc.) is placed in or upon a truck or other vehicle.

Low hazard area: Means any area where the responsible agency representative (WDNR, ORF, BIA, BLM) determines the combination of elements reduces the probability of fire starting and/or spreading.

Tractor/skidder operations: Includes a harvesting operation, or portion of a harvesting operation, where tractors, skidders, or other harvesting equipment capable of constructing fireline are actively yarding forest products and can quickly reach and effectively attack a fire start.

Waivers, written in advance, may be used for any and all activities. Activities for which waivers may be issued include, but are not limited to:

- a. Mechanized loading and hauling;
- b. Road maintenance such as sprinkling, graveling, grading and paving;
- c. Cable yarding using gravity systems or suspended lines and blocks, or other yarding systems where extra prevention measures will significantly reduce the risk of fire;
- d. Power saws at loading sites or in felling and bucking where extra prevention measures will significantly reduce the risk of fire;
- e. Maintenance of equipment (other than metal cutting and welding) or improvements such as structures, fences and powerlines.

Such waiver or substitute precautions will prescribe measures to be taken by the Contractor to reduce the risk of ignition, and/or the spread of fire. The Contracting Officer shall consider site specific weather factors, fuel conditions, and specific operations that result in less risk of fire ignition and/or spread than contemplated when precaution level was predicted. Consideration shall also be given to measures that

reduce the precaution levels above. The Contractor shall assure that all conditions of such waivers or substitute precautions are met.

The Contractor shall obtain the predicted Industrial Fire Precaution Level daily, prior to the start of work, from the appropriate Ranger District headquarters. If predictions made after 6:00 p.m., local time, are significantly different than the original prediction, the Forest Service will inform the Contractor when changes in restrictions or industrial precautions are made.

NOTE: The IFPL system does not apply on lands protected by ODF east of the summit of the Cascades.

Where hauling involves transit through more than one shutdown/regulated use area, the precaution level at the woods loading site shall govern the level of haul restriction, unless otherwise prohibited by other than industrial precaution level system.

8. Fire Tools

The Contractor shall furnish serviceable fire fighting tools in a readily accessible fire tool box or compartment of sound construction with a hinged lid and hasp so arranged that the box can be secured or sealed. The box shall be red and marked "Fire Tools" in letters one inch high. It shall contain a minimum of:

- a. 2 axes or Pulaskis with a 32-inch handle;
- b. 3 adze eye hoes. One Pulaski may be substituted for 1 adze eye hoe;
- c. 3 long-handled, round point shovels, size "0" or larger.

9. Fire Security

When the Industrial Fire Precautions Level is "I" or higher, unless a waiver is granted, the Contractor shall designate a person who shall perform fire security services listed below on the project area and vicinity. The designated person shall be capable of operating the Contractor's communications and fire fighting equipment specified in the contract, excluding helicopters, and of directing the activities of the Contractor's personnel on forest fires. In lieu of having the designated person perform the required supervisory duties, the Contractor may provide another person meeting the qualifications stated above to direct the activities of Contractor's personnel and equipment during all fire fighting activities.

Services described shall be for at least 1 hour from the time the Contractor's operations are shut down. For the purposes of this provision, personnel servicing equipment, and their vehicles, who are not engaged in cutting or welding metal are excluded.

Fire security services shall consist of moving throughout the operation area or areas constantly looking, reporting, and taking suppression action on any fires detected. Where possible, the designated person shall observe inaccessible portions of helicopter operating areas from vantage points within or adjacent to project area.

10. Blasting

Whenever the Industrial Fire Precaution Level is "II" or greater, a fire security person equipped with a long-handled, round point, No. "0" or larger, shovel, and a five-gallon

backpack pump can filled with water will stay at location of blast for 1 hour after blasting is done. Blasting may be suspended by Forest Service in writing, in an area of high rate of spread and resistance to control.

Fuses shall not be used for blasting. Explosive cords shall not be used without written permission of Forest Service, which may specify conditions under which such explosives may be used and precautions to be taken.

Attachment 5
Fire Prevention and Suppression Contact Information Form
(to be provided to ODF and Forest Service for each spread)

Spread _____ MP _____ to _____

PCGP's Construction Chief

Name	Telephone	Alt. Telephone
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Contractor's Construction Chief

Name	Telephone	Alt. Telephone
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Environmental Inspector

Name	Telephone	Alt. Telephone
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PCGP's Project Manager

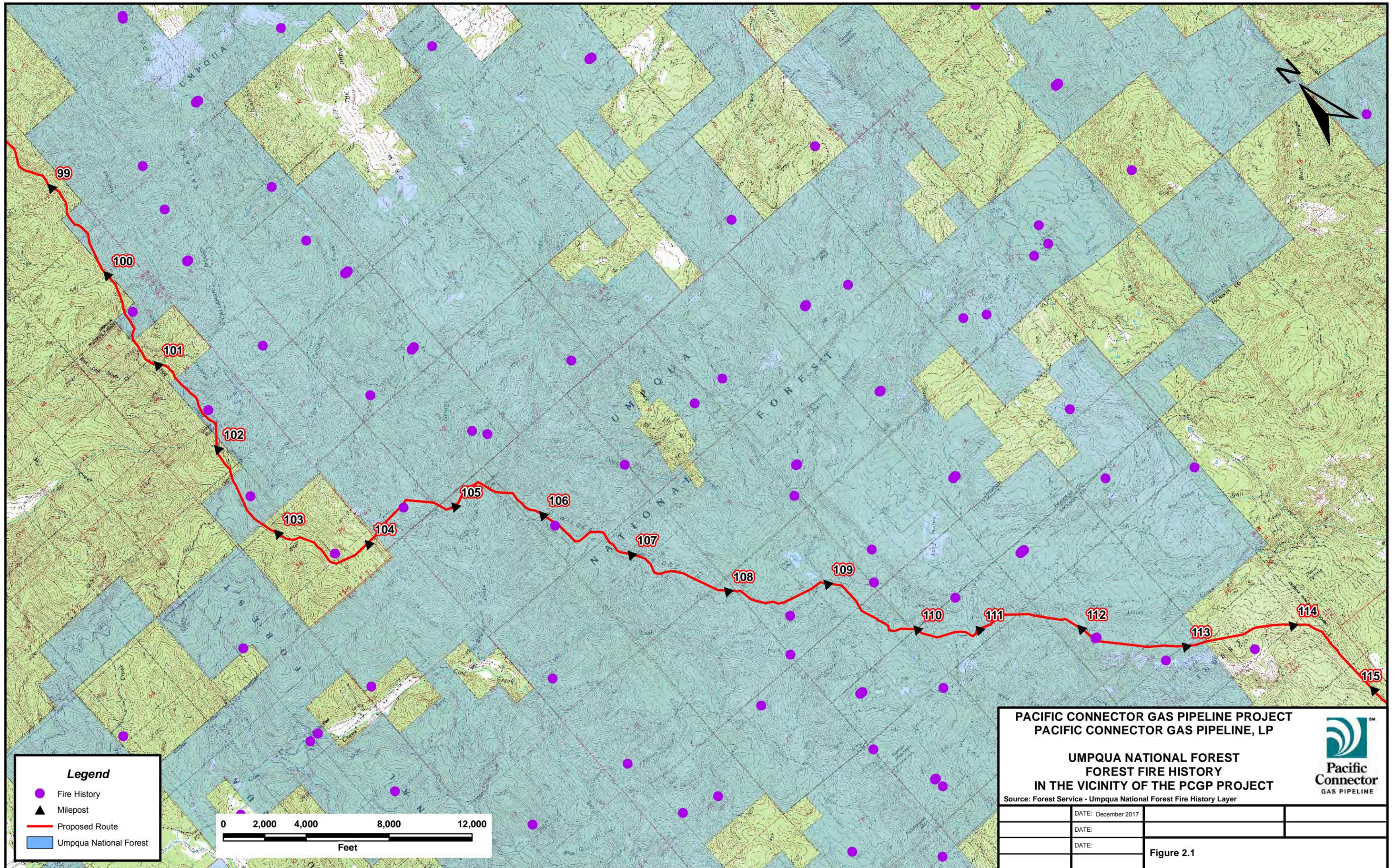
Name	Telephone	Alt. Telephone
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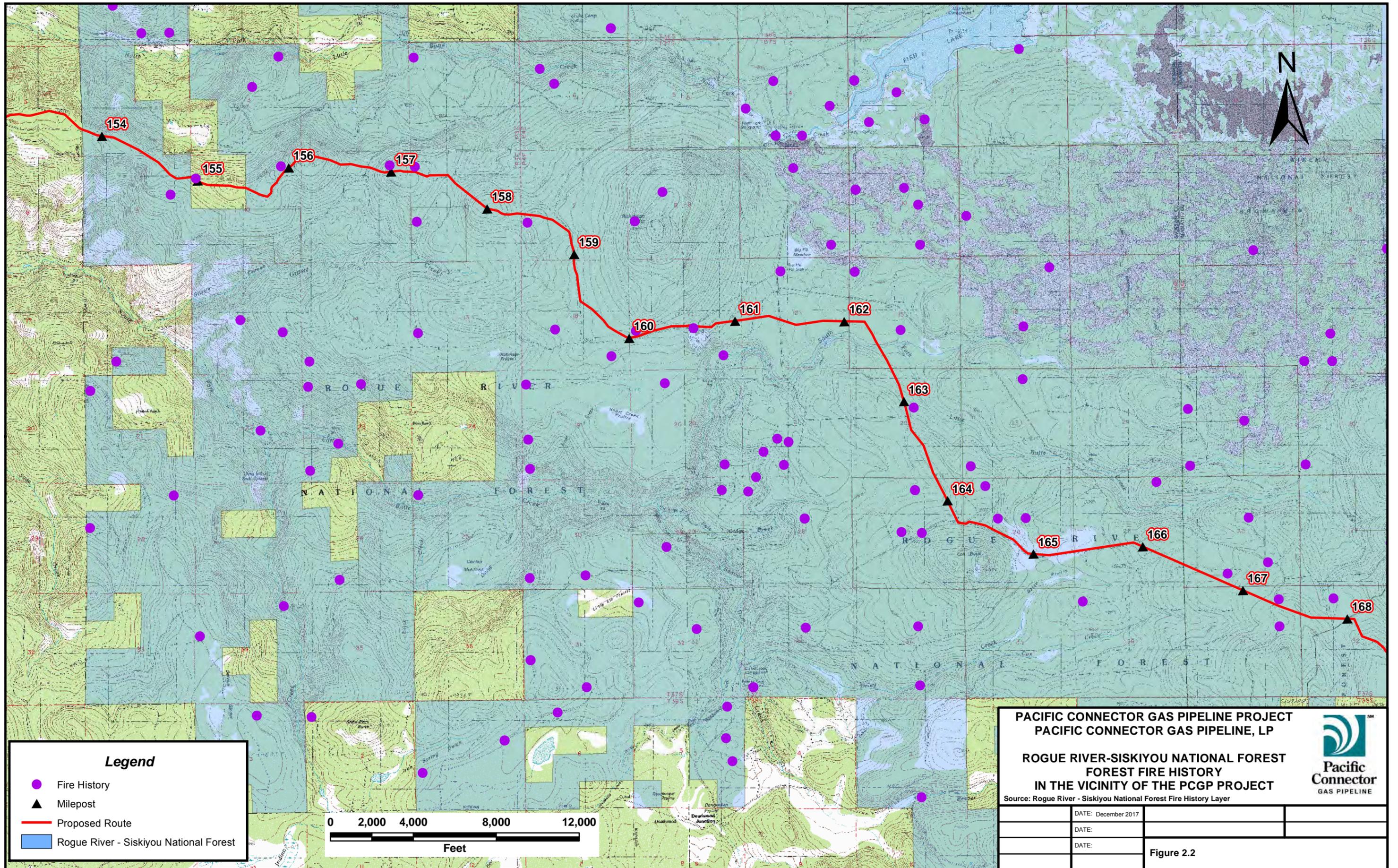
PCGP's Sr. Environmental Lead

Name	Telephone	Alt. Telephone
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**Attachment 6
Figures**

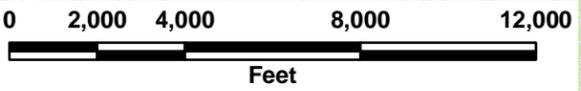
- Figure 2.1 Umpqua National Forest 37-Year Forest Fire History in the Vicinity of the PCGP Pipeline Project
 - Figure 2.2 Rogue River-Siskiyou National Forest 20-Year Forest Fire History in the Vicinity of the PCGP Pipeline Project
 - Figure 2.3 Umpqua National Forest Fire Behavior Ratings in the Vicinity of the PCGP Pipeline Project
 - Figure 2.4 Fremont-Winema Fire Behavior Ratings in the Vicinity of the PCGP Pipeline Project
 - Figure 2.5 Coos Bay BLM 20-Year Fire History
 - Figure 2.6 Roseburg BLM 20-Year Fire History
 - Figure 2.7 Medford BLM 20-Year Fire History
 - Figure 2.8 Lakeview BLM 20-Year Fire History
-





Legend

- Fire History
- ▲ Milepost
- Proposed Route
- Rogue River - Siskiyou National Forest



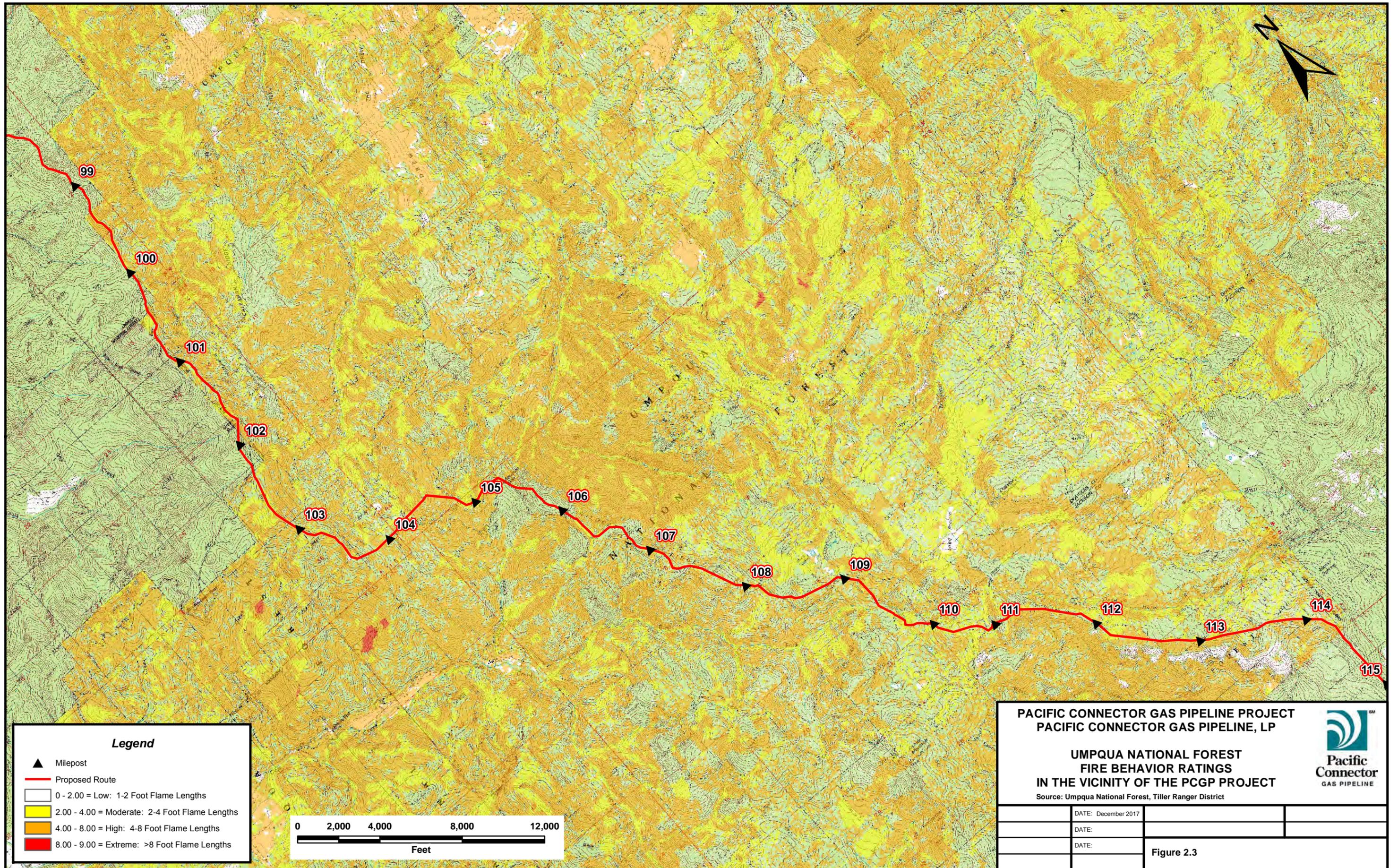
PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP

ROGUE RIVER-SISKIYOU NATIONAL FOREST
FOREST FIRE HISTORY
IN THE VICINITY OF THE PCGP PROJECT

Source: Rogue River - Siskiyou National Forest Fire History Layer



DATE: December 2017		
DATE:		
DATE:		Figure 2.2

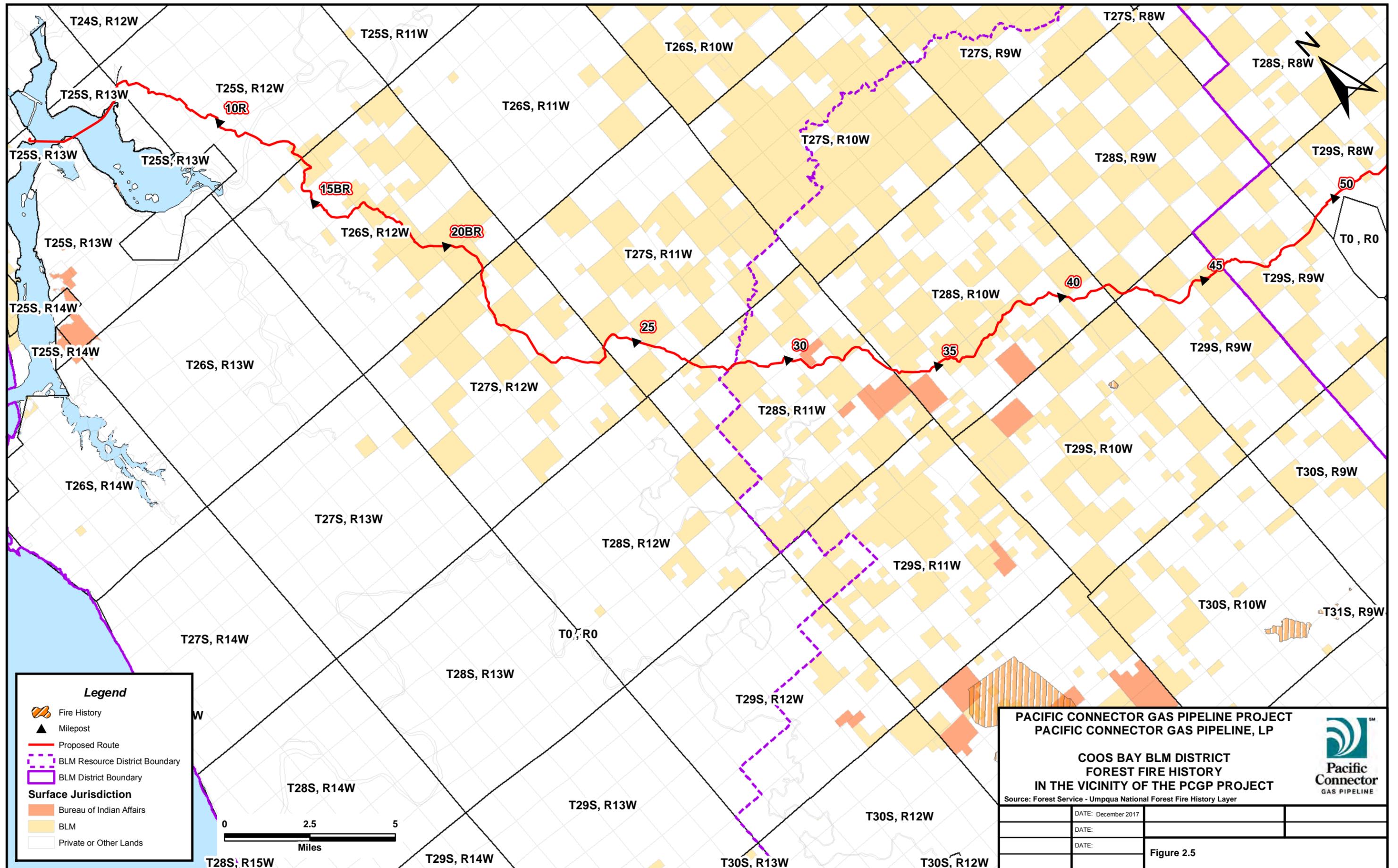


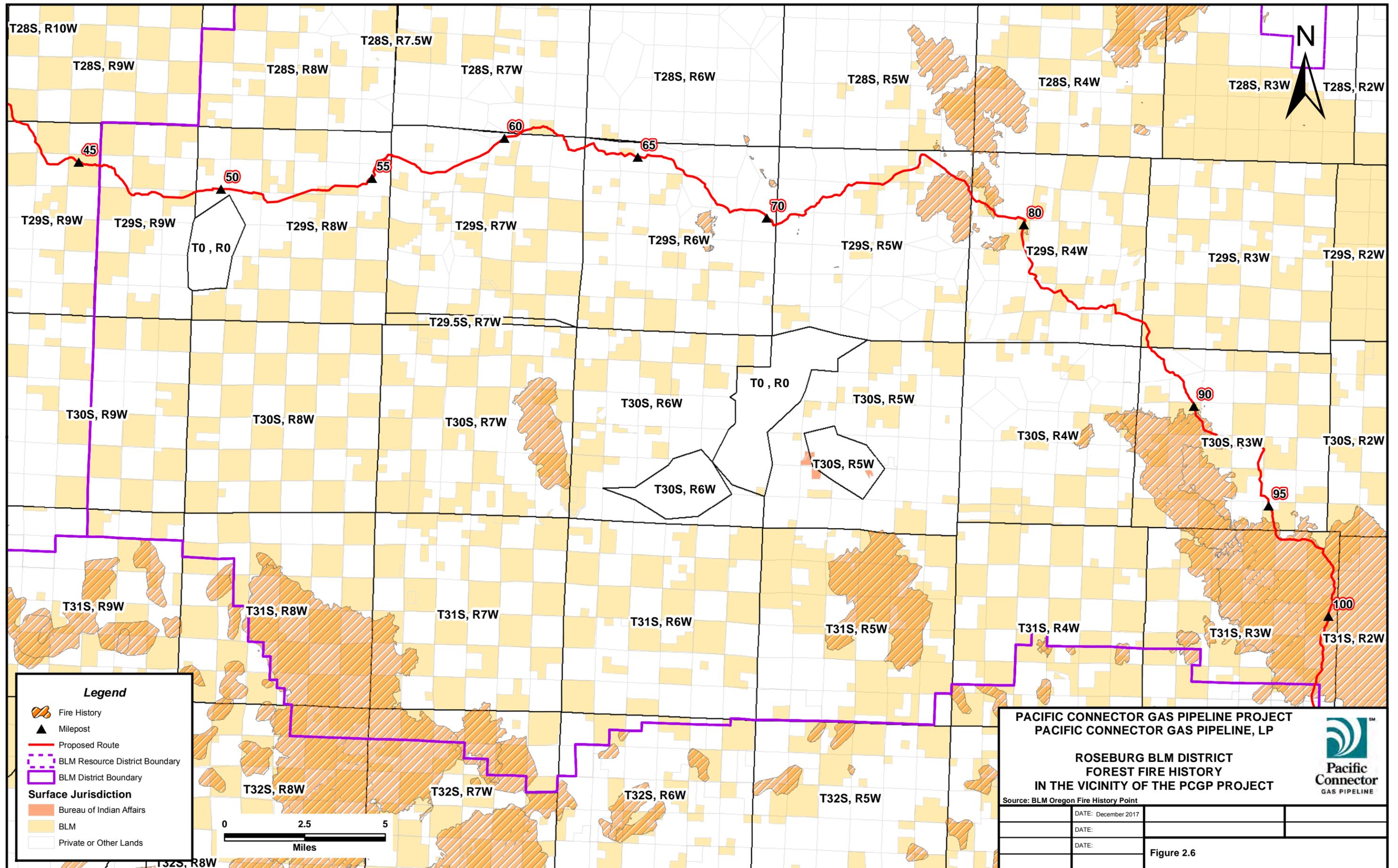
Legend

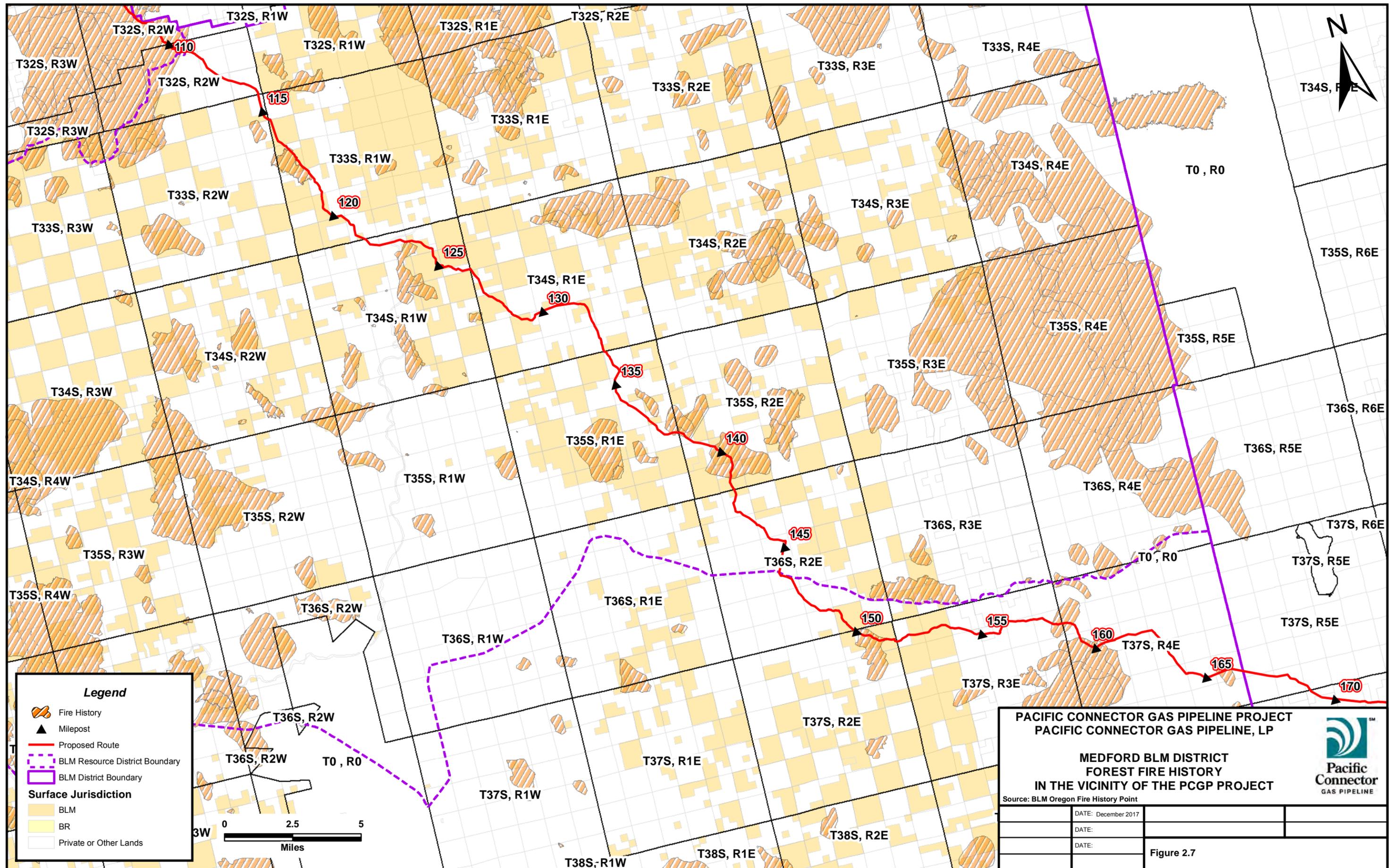
- ▲ Milepost
- Proposed Route
- 0 - 2.00 = Low: 1-2 Foot Flame Lengths
- 2.00 - 4.00 = Moderate: 2-4 Foot Flame Lengths
- 4.00 - 8.00 = High: 4-8 Foot Flame Lengths
- 8.00 - 9.00 = Extreme: >8 Foot Flame Lengths

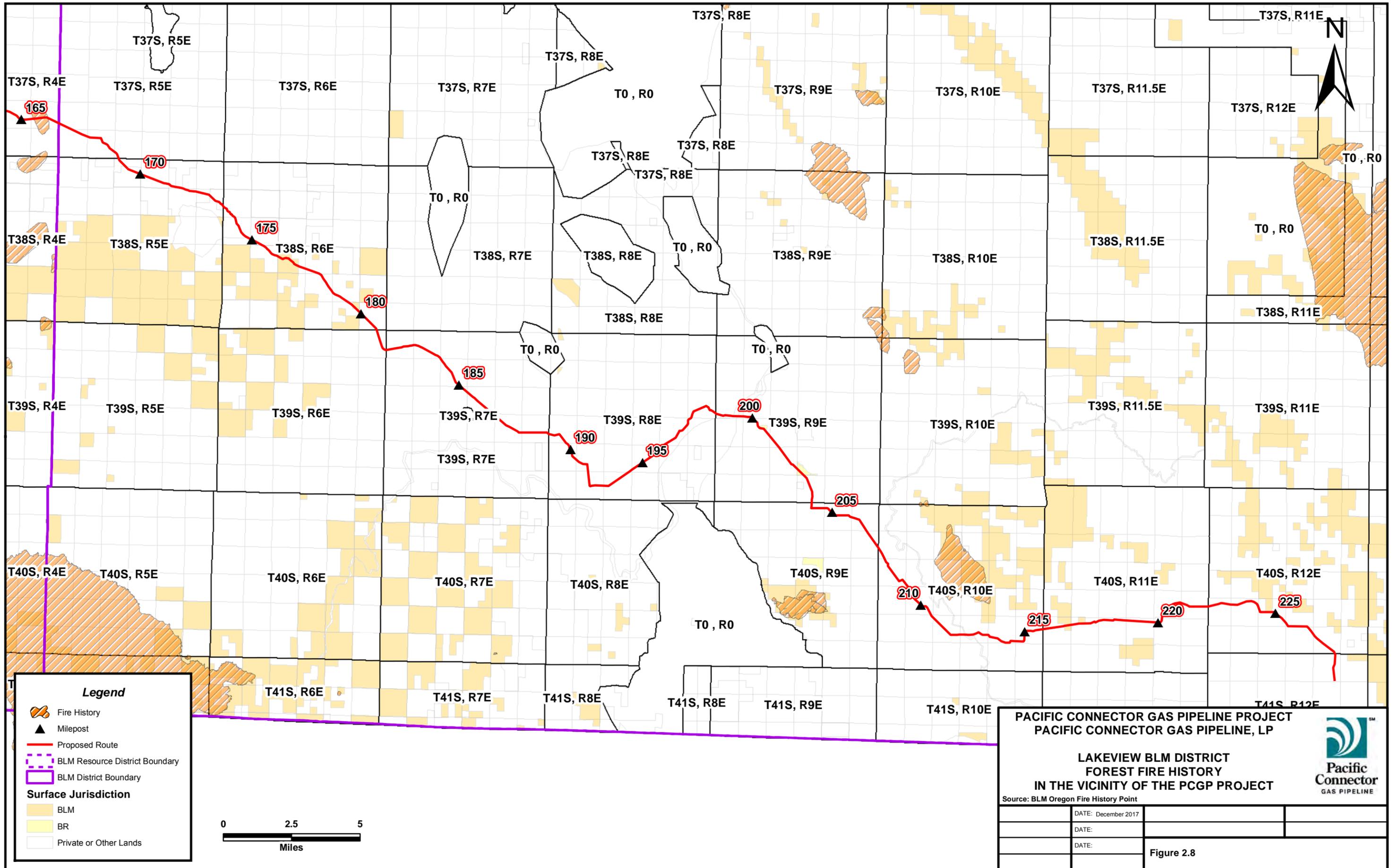


PACIFIC CONNECTOR GAS PIPELINE PROJECT PACIFIC CONNECTOR GAS PIPELINE, LP		
UMPQUA NATIONAL FOREST FIRE BEHAVIOR RATINGS IN THE VICINITY OF THE PCGP PROJECT <small>Source: Umpqua National Forest, Tiller Ranger District</small>		
	DATE: December 2017	
	DATE:	
	DATE:	Figure 2.3









PACIFIC CONNECTOR GAS PIPELINE PROJECT
PACIFIC CONNECTOR GAS PIPELINE, LP

LAKEVIEW BLM DISTRICT
FOREST FIRE HISTORY
IN THE VICINITY OF THE PCGP PROJECT

Source: BLM Oregon Fire History Point

DATE:	December 2017
DATE:	
DATE:	

Figure 2.8



Appendix L
Fish Salvage Plan



Pacific Connector Gas Pipeline, LP

Fish Salvage Plan

Pacific Connector Gas Pipeline Project

(During the previous NEPA process, PCGP submitted a Plan of Development to meet BLM Right-of-Way Grant requirements based on BLM regulations. These plans will be updated in consultation with the Federal land managing agencies [BLM, USFS, and Reclamation] during the current NEPA process.)

September 2017

1.0 INTRODUCTION

This fish salvage plan has been developed to minimize adverse effects to Endangered Species Act (ESA) listed salmonids (Southern Oregon/Northern California Coast coho salmon and Oregon Coast coho salmon), non-listed salmonids (Chinook, steelhead, cutthroat trout) and ESA-listed catostomids (Lost River sucker and shortnose sucker) during construction of the Pacific Connector Gas Pipeline Project (Pipeline project). The plan has been developed to:

1. Exclude fish from instream construction sites;
2. Minimize risk of injury or death while capturing fish that might remain after exclusion efforts,
3. Minimize risk of injury or death due to handling captured fish, and
4. Release fish to non-impacted environments.

Portions of the plan relevant to salvaging ESA-listed salmonids were adapted from the protocol developed by Washington State Department of Transportation (WSDOT, 2008) which specifies procedures to 1) isolate the work area, 2) remove fish and dewatering the work area, 3) handle, hold and release fish, and 4) document fish that have been captured, handled, held and released and notify the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS). Application of the same protocol will be suitable for salvaging ESA-listed catostomids (Larson, 2009).

2.0 PERMITS

ODFW requires an Oregon Scientific Take Permit to take fish for scientific purposes, including rescue/salvage required for construction activities. (Required by ORS 497.298 and OAR 635-043, see http://www.dfw.state.or.us/fish/license_permits_apps/scientific_taking_permit.asp#oar).

In addition, an In Water Blasting Permit from the ODFW “is required for any use of explosives in the cause of removing any obstruction in any waters of this state, in constructing any foundations for dams, bridges or other structures, or in carrying on any trade or business” (Required by ORS 509.140, see http://licenseinfo.oregon.gov/?fuseaction=license_icon&link_item_id=14778).

For threatened endangered species, permits may be issued by NMFS and FWS for scientific research, enhancement of propagation or survival, and taking that is incidental to an otherwise lawful activity.

3.0 INSTREAM CONSTRUCTION

Construction across waterbodies will occur within the Oregon Department of Fish and Wildlife (ODFW) recommended instream construction timing window, although the majority of bridges, where required, will be installed prior to and removed after the instream timing window. General timing of activities for each of the 5 construction spreads is discussed below and shown schematically in Resource Report 1. A more comprehensive project description specific to each listed species will be included in the Applicant-Prepared Draft Biological Assessment (APDBA).

If water is present in the streambeds at the time of construction, PCGP will utilize a dry-open cut crossing method (flume or dam and pump) to cross all minor and intermediate waterbodies consistent with the requirements of Section V.B.6 of the Federal Energy Regulatory Commission’s (FERC) Wetland and Waterbody Procedures. Fluming and dam-and-pump

procedures are described in Resource Report 2. Both techniques require that the work space within a waterbody is isolated, usually by dams constructed of sand bags with interwoven plastic sheeting installed upstream and downstream from the site where the pipeline will be installed. Sand bag dams would be placed on the edges of the certificated construction right-of-way, whether 95 feet or 75 feet wide at the stream crossing site.

If blasting is required because the streambed is exposed bedrock, the dam-and-pump procedure will be utilized. Generally, the pipeline trench is not in the center of the instream construction right-of-way but offset to one side so that a temporary equipment crossing bridge can be placed on the opposite side of the right-of-way. The equipment bridge would be located across the stream within the area eventually to be isolated by the sand bag dams.

3.1 Fish Exclusion

Prior to any instream work and placement of the sand bags to be used for fluming or dam-and-pump procedures, as many fish as possible will be excluded from an area that includes the construction right-of-way. If blasting within the streambed or on stream banks is necessary during construction, the area of fish exclusion will likely be larger than the limits of the construction right-of-way across the waterbody. In order to minimize risk to listed and non-listed fish by blasting, they should be excluded from a distance where the overpressure change from the blast dissipates to 2.7 psi (Alaska Department of Fish and Game, 1991) a level for which no fish mortality would be expected (see Resource Report 3). Typical trench blasting scenarios use multiple 1 to 2 pound charges separated by an 8-millisecond delay to excavate the trench. With use of 1 to 2 pound charges in rock, the set back distance (at which 2.7 psi would occur) from the blast trench to the fish habitat is between 34 and 49 feet.

When using the dam-and-pump stream crossing methodology, the typical right-of-way distribution of an isolated streambed (dry open-cut) will be no less than 25-feet on one side of the pipe trench and 50+ feet on the opposite side of the pipe trench depending on whether it's a 75 or 95 foot width crossing. Therefore, an area within the waterbody crossing equivalent to length of the blasting trench and approximately 25-feet wide (in the worst case scenario) would be exposed to instantaneous hydrostatic pressure changes above 2.7 psi. Thus, fish would be excluded within waterbodies from an additional 25 feet beyond the construction right-of-way.

One or more block nets will be installed upstream from the pipeline crossing, farther than 50 feet from the pipeline trench if blasting is required, and upstream from where the sand bag dam will be installed. The block net material is typically a 9.5 millimeter stretched mesh (WSDOT, 2008) that will prevent fish and other organisms from moving into the work area from upstream locations. Sites will be selected based on desirable attributes such as slower flows and without heavy vegetation, undercut banks, or deep pools so that the block net seals off the work area to the maximum extent possible. The block net(s) will have to be frequently inspected for sealing capacity and leaf/debris collected will be frequently removed. Block nets need to be secured on both banks and within the stream channel to prevent failure during rain events or debris collection (WSDOT, 2008).

Once the upstream block net is in place, one or more seining crews will proceed from that site to the downstream block net site. The objective of seining is not to capture fish but to maneuver them downstream and out of the construction zone. Small two-stick seines will be operated by at least 2 people although a third person may be required to move the seine over bottom debris and/or to seal the bottom of the net along the streambed. Similar to the block net, seines would

be made of a 9.5 millimeter stretched mesh (WSDOT, 2008) that will prevent fish and other organisms from escaping.

In some situations where heavy instream and/or stream bank vegetation is present, or with undercut banks or deep pools, a haul seine or two-stick seine may not completely seal the water column from bank to bank or from water surface to streambed. In those situations, compressed air will be used to generate underwater bubbles, either from a perforated hose, wand or nozzle, that will drive fish away from vegetation debris, out from undercut banks or from deep pools in advance of the seining crew. Whether one or more air compressors are required to generate bubbles through more than one hose will depend on site conditions and the distances over which the bubble generator must operate. The use of bubble scare tactics will be site-dependent and may require one or more people in addition to the seining crew(s) to dislodge fish from difficult instream situations, to increase the efficiency of the seine, and to exclude as many fish as possible from the construction area.

Once the seining crew(s) reaches the downstream block net site, the downstream block net will be installed behind (upstream from) the seining crew(s). Similar precautions to insure an adequate seal as those employed at the upstream site will be necessary. The downstream block net will also be monitored for accumulated litter and debris that will be removed during the entire construction operation. These actions to exclude fish from the construction right-of-way and from areas where they could be affected by blasting should reduce or eliminate the risk of death or injury to fish by construction and by dewatering the isolated work area that will require other fish removal methods.

When construction is completed and flume pipe or dam-and-pump diversion is removed, the upstream and downstream block nets will remain in place as the sand bag dams are removed. Generally, the downstream dam is the first to be removed. Retention of the block nets will limit fish from entering the construction zone as water flows over the site and when turbidity is most likely. Turbidity and sedimentation impacts associated with dry open cut methods are generally minor and are associated with 1) installation and removal of the upstream and downstream dams, 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 (Reid et al., 2004). Both block nets will be removed when turbidity at the construction site has dissipated.

3.2 Dewatering and Fish Removal

Once the upstream and downstream block nets are in place, construction crews will begin building sand bag and plastic sheeting dams on the edges of the construction right-of-way to completely isolate the construction zone. When the dams are functional with flume pipes or dam-and-pump diversion is installed and working, water contained between the dams will be pumped out and discharged within dewatering structures (see Resource Report 2). All water intakes, whether for dewatering or for dam-and-pump diversion, will be screened according to NMFS standards to prevent entrainment of aquatic species. The screens will also prevent aquatic life from entering the intake hose if a block net should fail. Screens shall be placed approximately 2 to 4 feet from the end of the intake hose to assure fish are not pinned upon the screen (WSDOT, 2008). Dewatering will be slow enough to allow for additional removal of fish if any remain after the fish exclusion procedures described above. During dewatering, the construction site will be monitored to prevent stranding organisms.

PCGP will retain contracted fish removal and handling personnel to conduct the fish removal operations. Agency personnel will be allowed to observe the fish removal activities but active participation will be limited to contractor personnel. When crossing Bureau of Reclamation (Reclamation) facilities, fish salvage will be performed in coordination with Reclamation and the Klamath Falls U.S. Fish and Wildlife Service office. Additional fish removal from within the isolated construction site may include additional seining with two-stick seines, using dip nets, or removing fish and other organisms by hand. Additional fish removal will also be conducted in the remaining water column between the block nets and sand bag dams only if blasting is required to construct the pipeline through bedrock. Even though electrofishing can result in injury to fish, the risk of injury due to blasting in those water columns is likely to be greater and warrant electrofishing. Electrofishing will be used only when other methods have been determined to be ineffective (WSDOT, 2008), and if its use is approved by NMFS. At other (non-blasting) work areas, if other methods are ineffective, electrofishing will be utilized if its use is approved by NMFS.

The following have been incorporated or adapted from procedures and conditions developed by WSDOT (2008) to minimize risks to ESA-listed species by electrofishing to remove fish from construction zones:

1. The USFWS and NMFS will be provided a project schedule 10 working days prior to the potential initiation of construction, whether or not electrofishing is actually utilized at a specific location.
2. Electrofishing shall only be conducted when a biologist with at least 100 hours of electrofishing experience is on site to conduct or direct all activities associated with capture attempts. Appropriate experience includes knowledge about electrofishing including the interrelated effects of voltage, pulse width and pulse rate on fish species and associated risk of injury/mortality, knowledge and abilities to recognize symptoms associated with galvanotaxis, narcosis, and tetany, and their respective relationships to injury/mortality rates.
3. The following table provides guidance for electrofishing in water where the potential to encounter ESA-listed juvenile fish exists. Only direct current (DC) or pulsed DC current will be used. Visual observation of the size classes of fish in the work area is helpful to avoid injury to larger fish by the mistaken assumption that they are not present.

Parameter	Initial Setting	Conductivity ($\mu\text{S/cm}$)	Maximum Settings
Voltage	100 V	≤ 300	800 V
		> 300	400 V
Pulse Width	500 μs		5 ms
Pulse Rate	15 Hz		60 Hz ¹

¹ In general, exceeding 40 Hz will injure more fish
Source: WSDOT, 2008 - adapted from NMFS Backpack Electrofishing Guidelines, June 2000, and WDFW Electrofishing Guidelines for Stream Typing, May 2001

4. Electrofishing within each waterbody will begin with low settings for pulse width and pulse rate. If fish present in the area being electrofished do not exhibit an appropriate response, the settings shall be gradually increased until the appropriate response is achieved (galvanotaxis). The lowest effective setting for pulse width, pulse rate and voltage will be used to minimize personnel safety concerns and help minimize injury/mortality rates to listed fish species.

5. If blasting is required and electrofishing is necessary to remove fish from the water column between the sand bag dam and block net (whether upstream or downstream from the blasting site), an individual will be stationed at the downstream dam or block net continuously during electrofishing sessions to recover stunned fish in the event they are washed downstream and pinned against the structure or net.
6. The electrofishing operator will avoid allowing fish to come into contact with the anode. The zone of potential fish injury is 0.5 m from the anode. Netting shall never be attached to the anode. Techniques employed when using an unnetted anode keep fish farther from the anode and expose them to significantly less time in the zone of potential injury. Extra care shall be taken near in-water structures or undercut banks, in shallow waters or high-density fish areas. In these areas, fish are more likely to come into close contact with the anode because fish may be less visible and the voltage gradients may be abnormally intensified.
7. Voltage settings in shallow water sections shall be checked and readjusted by the operator, if necessary. When electrofishing areas near undercut banks or where structures may provide cover for fish, the anode will be used to draw the fish out by placing the activated anode near the area fish are likely present and slowly drawing the anode away. Fish experiencing galvanotaxis will be attracted to the anode and will swim away from the structure toward the anode so that they can be netted. This will not work on fish that experience narcosis or tetany. Therefore, fish response will be noted in adjacent areas prior to attempts made near structures. This should help avoid prolonged exposure of fish to the electrical field while in an immobilized state.
8. Electrofishing shall be performed in a manner that minimizes harm to fish. Once an appropriate fish response (galvanotaxis) is noted, the stream segment should be worked systematically, moving the anode continuously in a herringbone pattern through the water without electrofishing one area for an extended period of time. The number of passes will be kept to a minimum, will be dependent upon site-specific characteristics, and be at the discretion of the directing biologist. Adequate numbers of personnel shall be on-site to minimize the number of passes required for fish removal. Adequate staff to net, recover, and release fish as soon as possible shall be present. Fish shall be removed from the electrical field immediately. Fish shall not be held in the net while continuing to capture additional fish.
9. Condition of captured fish will be carefully observed and documented. Dark bands on the body and extended recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit and/or manner in which the electrofishing session is proceeding will require adjustment and evaluation as to whether continued electrofishing is appropriate at the site.
10. Electrofishing will not occur when turbidity reduces visibility to less than 0.5 meter, when water conductivity exceeds 350 $\mu\text{S}/\text{cm}$, or when water temperature is above 18°C (64.4°F) or below 4°C (39.2°F).

Adult Pacific lamprey, and possibly ammocoetes, are expected to be captured during fish salvaging by seining. However, salvage techniques for salmonids may not be effective for salvaging ammocoetes which may remain in dewatered sediments. Electrofishing procedures to sample larval Pacific lampreys have been recommended (see Appendix A in FWS, 2010) but seining and use of dip-nets may also be effective once the workspace has been dewatered, depending on substrate conditions at the time of construction. PCGP will contract with either ODFW or a qualified consultant to capture the fish. Personnel that would handle and/or remove

fish on federal lands would be approved by the Forest Service or the BLM or Reclamation or be done directly by agency personnel if approved by ODFW.

3.3 Fish Handling, Holding and Release

The following has been adapted from procedures and conditions developed by WSDOT (2008) to minimize risks to ESA-listed species during their removal from construction zones and release:

1. Fish handling will be kept to the minimum necessary to remove fish from the work site.
2. Fish will not be sampled or anesthetized during removal activities as this protocol is intended to address fish removal not research. Fish species, number, age class estimate, and release location will be documented.
3. Individuals handling fish will ensure that their hands are free of sunscreen, lotion, or insect repellent and bare skin will be wetted to avoid drying out fish skin at points of contact and increasing potential for fungal or other skin lesions.
4. Fish or other aquatic life captured will immediately be put into dark colored containers filled with clean stream water. Fish removal personnel shall provide a healthy environment for fish with minimum holding periods and low fish densities in holding containers to avoid effects of overcrowding. Large fish shall be kept separate from smaller fish to avoid predation during containment. Water-to-water transfers will occur whenever possible.
5. ESA listed fish should not be transferred out of water to prevent added stress. Holding container temperature and well being of specimens will be frequently monitored to assure that all specimens will be released unharmed. Potential shade areas and supplemental oxygen for fish holding shall be considered in designing fish handling operations.
6. Unless site conditions require alternative release locations, all fish captured by any means will be released upstream from the upstream block net. Release at an upstream site will ensure that the captured fish will be held for very short durations. Also, release upstream will minimize effects of turbidity generated when the sand bag dams are removed and water flows over the dry open-cut construction site.
7. Each released fish shall be capable of remaining upright and have the ability to actively swim upon release. ESA-listed or proposed fish will have priority over other species for release. One person shall be designated to transport specimens in a timely manner to the site selected for release.
8. All dead ESA-listed fish will be preserved and delivered to the pertinent regulatory agency (see documentation below) as outlined in the appropriate permit conditions.
9. If authorized level of take is exceeded, the pertinent regulatory agency shall be notified as soon as possible.

3.4 Documentation

1. All work area isolation, fish removal and fish release activity shall be thoroughly documented in a log book with the following information: project location, date, methods, personnel, instream temperature, visibility, electrofisher settings, and other comments.
2. Species, number of each species, age class estimate, and location of release will be recorded for all fish handled.
3. Information regarding injuries or mortalities to ESA-listed or proposed species will be documented and provided within to NMFS or USFWS, depending on which agency has jurisdiction over that species, within a timeframe specified by each agency.

4.0 REFERENCES

- Alaska Department of Fish and Game. 1991. Rationale for Blasting Standards (11 AAC 95) Developed to Prevent Explosive Injury to Fish. Alaska Department of Natural Resources Office of Habitat Management and Permitting. Online at:
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