KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX A
Wetland and Waterbody Tables

Table 1
Wetlands Crossed by the Project

Milepost	Wetland ID	Cowardin Type [1]	Approximate Crossing Length (feet)	Construction Impacts (Acres)	Operation Impacts (Acres)	Duration of Impact	Excavated Volume (cubic yards)	Comments
2.0	W-2A1	PEM	0	0.04	0	1 growing season	0	Small slope wetland; east side of gravel road.
2.2	W-2A2	PSS	25	0.04	<0.01	Permanent <0.01 acre	35	Hill slope wetland composed mainly of red alder, adjacent to stream S-2A3.
2.2 and 2.3	W-2A4	PFO	0	0	0	N/A	0	Large Oregon ash forested wetland; south of sand and gravel processing site along the east side of Old Pacific Highway 99.
2.4-2.8	W-2A5	PEM	2050	3.95	0	1 growing season	2,227.4 [2]	This NWI wetland is presently used for crop production. About 955 feet will be crossed using HDD; about 1,095 feet will be open cut.
2.8-2.9	W-2A8	PFO	297	0	0	N/A	0	This NWI wetland is located between I-5 and the railroad and will be crossed using HDD.
		Total		4.03	<0.01		2,262.4	

[1] PEM = Palustrine Emergent; PSS= Palustrine scrub-shrub; PFO = Palustrine Forested
[2] This volume represents 1,095 feet of pipeline trench and the excavation required to accommodate the HDD entry point.

Table 2
Waterbodies Crossed by the Project

Milepost	Waterbody ID	Flow Regime	Tributary to	WDNR Stream Type[1]	Impact location	Impact Duration	Crossing Method	Excavated Volume (cubic yards)	Description
0.9	S-0A1	Intermittent	Kalama River	Ns	Within stream	2 weeks	Dry Open Cut	44.8	Narrow, steep, deeply incised, confined
1.0	S-1A1	Intermittent	Kalama River	Ns	Within stream	2 weeks	Dry Open Cut	44.8	Narrow, steep, deeply incised, confined
1.7	S-1A2	Intermittent	Kalama River	Ns	Within stream	2 weeks	Dry Open Cut	44.8	Narrow, steep, deeply incised, confined
1.9	S-1A3	Intermittent	Kalama River	Ns	Within stream	2 weeks	Dry Open Cut	44.8	Narrow, steep, deeply incised, confined
2.2	S-2A3	Intermittent	Columbia River	Ns	Within stream	2 weeks	Dry Open Cut	44.8	Narrow, steep, deeply incised, confined. Drains to Columbia River via Kress Lake and waterbodies S-2A6 and S-2A7
2.6	S-2A6	Perennial	Columbia River	F	100-year floodplain	N/A	HDD	0	This is a channelized stream through a pasture; there is no riparian vegetation at the crossing location. Crossed using HDD.
2.8	S-2A7	Perennial	Columbia River	F	100-year floodplain	N/A	HDD	0	This is a channelized stream adjacent to I-5 with a narrow riparian corridor at the crossing location. Crossed using HDD.

[1] Type F=Fish=Streams and waterbodies that are known to be used by fish, or meet the physical criteria to be potentially used by fish. Fish streams may or may not have flowing water all year; they may be perennial or seasonal.
Type Ns=Non-Fish Seasonal=Streams that do not have surface flow during at least some portion of the year, and do not meet the physical criteria of a Type F stream.

KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX B
Project Description

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1.0 LOCATION AND DESCRIPTION OF PROPOSED 24-INCH-DIAMETER KALAMA LATERAL PROJECT

The Project is comprised of approximately 3.1 miles of 24-inch-diameter pipeline lateral, a system interconnect at Northwest's 30-inch-diameter mainline, a delivery meter station, and appurtenant facilities (i.e., launcher/receivers). Figure 1 behind the figures tab provides a general location map of the Project's proposed facilities.

All facilities described herein will be designed, constructed, tested, operated, and maintained to conform with or exceed the requirements of Title 49 Code of Federal Regulations (CFR) Part 192, "*Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*;" Federal Energy Regulatory Commission (FERC) regulations in 18 CFR Part 380.15, "*Guidelines to be Followed by Natural Gas Pipeline Companies in the Planning, Clearing, and Maintenance of Rights-of-Way and the Construction of Aboveground Facilities*;" and other applicable federal and state laws and regulations.

1.1 Pipeline Facilities

The proposed Project has been designed to minimize potential environmental and landowner impacts while installing the facilities in a location that is geologically stable to ensure the long-term safety of the pipeline and preserve the human environment.

The proposed 24-inch-diameter pipeline and associated facilities will be designed to a 960 pounds per square inch gauge (psig) maximum allowable operating pressure (MAOP). The pipeline will be installed with a minimum three-foot of depth of cover; however, deeper cover depths may be required for in-road construction, road crossings, foreign line crossings, waterbody crossings, and other special areas.

The preferred route, also known as the Timber Rock Route, is 3.1 miles long and begins near MP 1254.1 of the existing Northwest mainline system. The route runs west following the Mt. Pleasant ridgeline for approximately 0.8 mile. It then turns sharply and heads southwest for approximately 0.1 mile before turning west for 0.2 mile to Raven Ridge Road, and continues west 0.1 mile crossing the intersection of Raven Ridge and Hale Barber roads. After crossing the intersection, the route continues southwest following West Raven Ridge Road and the Mt. Pleasant ridgeline for about 0.3 mile before heading down slope in a westward direction to the floodplain of the Kalama River for approximately 0.8 mile passing the north side of Kress Lake recreation area. From there it continues to the northwest, crossing the Olympic Pipeline right-of-way (ROW), a Bonneville Power Administration (BPA) power line ROW, a Public Utility District No. 1 of Cowlitz County power line ROW, and Old Pacific Highway 99 before turning to the southwest and crossing Interstate 5 (I-5) and the Burlington Northern Santa Fe Railroad line. After crossing the railroad, it enters the Methanol Plant site on property owned by the Port.

1.2 Aboveground Facilities

This section describes the launchers, receivers, and meter station facilities that will be installed as part of the Project. A description of each aboveground facility is included in Table B-1. The locations of these facilities are shown on the alignment sheets provided under the Figures Tab.

Kalama Lateral Take-Off and Interconnection Facility (MP 0.0)

At the beginning of the proposed Project at MP 0.0, a new take-off and interconnection facility will be installed including a new 24-inch diameter tap, automated shutoff valve, pig launcher, and other associated piping. The take-off facility will include a newly constructed 0.2 acre (75 foot by 100 foot) fenced and graveled yard.

NWIW Meter Station (MP 3.1)

At the terminus of the pipeline at MP 3.1, Northwest will construct the NWIW Meter Station to provide up to 320,000 Dth/d at 490 psig. The NWIW Meter Station will include two 12-inch ultrasonic meter assemblies, a six-foot by eight-foot Electronic Flow Measurement (EFM) building, a pig receiver, and other associated piping. The NWIW Meter Station facility will include approximately 0.7 acre of permanent land disturbance within an approximate 150-foot by 200-foot fenced facility to be located within the Methanol Plant site.

Table B-1
Aboveground Facilities

Facility	MP	Installation	New Permanent Disturbance (Acres)
Kalama Lateral Interconnection with existing 30-inch pipeline mainline	0.0	Installation of lateral take-off facilities including 30-inch diameter pig launcher, 24-inch diameter automated shutoff valve and tap assembly.	0.2
NWIW Delivery Meter Station	3.1	Installation of a new meter station facility and 30-inch diameter pig receiver. Major facility components include two 12-inch ultrasonic meter assemblies, EFM building, and associated facility piping.	0.7

1.3 Access Roads

To construct the Project, Northwest will utilize existing state, county, and private roads to provide ingress and egress points to and from the proposed construction ROW. These roads primarily include the paved county roads that are crossed by the proposed Project including Old Pacific Highway 99, Kalama River Road, Mount Pleasant Road, Tradewinds Road, and Eastwind Road. In addition, some private roads will be utilized to facilitate construction access to the Project (e.g., Hale Barber Road). These private roads are either graveled or paved and will generally not require significant modification; however, minor improvements within the existing road footprint (blading, grading, or graveling) may be necessary to return these roads to their original or better condition after construction. Project access roads are shown in attached Figure 1A-1.

Northwest will obtain landowner permission prior to use of any private roads.

Temporary Access Roads

One Temporary Access Road (TAR) is currently proposed for the Project. This road is listed and described in Table B-2.

Table B-2
Temporary Access Roads

Access Road Number	MP	Length (feet)	Width (feet)	Acres of Temporary Impact	Description
TAR 1	NA	7,115	25	4.1	Existing timber haul road. Use of this road for construction will require some vegetation trimming and grading/graveling of the existing surface. These modifications will occur within the current road prism and will not result in additional impacts. TAR 1 will also require construction of an approximately 186-foot-long section of new road to connect TAR 1 with the east end of PAR 2.
Totals	**NA**	**7,115**	**25**	**4.1**	

Permanent Access Roads

Northwest will require one new Permanent Access Road (PAR) and utilize seven existing PARs to construct and operate the proposed facilities. The new PAR (PAR 8) will connect the proposed NWIW Meter Station to Eastwind Road. This road is located at the end of PAR 7 and will be 10-feet long, 30-feet wide, and will be surfaced with gravel.

In addition to PAR 8, Northwest will obtain long-term easements to use seven other existing private roads to construct and operate the proposed facilities. These PARs include Hale Barber Road, Raven Ridge Road, and five other existing private roads, which are described in Table B-3.

Table B-3
Permanent Access Roads

Access Road Number	MP	Length (feet)	Width (feet)	Acres of Temporary Impact [a]	Description
PAR 1	0.0	6,785	30	4.8	Existing private timber road
PAR 2	0.5	3,960	25	2.3	Existing private timber road
PAR 3	1.2	1,163	20	0.5	Existing private Hale Barber Road
PAR 4	1.3	790	10	0.2	Existing private Raven Ridge Road
PAR 5	2.1	3,561	30	2.5	Existing private road; the first 0.2 mile is asphalt, the reminder of the road is gravel. A small portion of the gravel portion of the road beginning near the junction with PAR 6 will require grading and widening to accommodate pipe stringing activities and gravel additions for construction.
PAR 6	2.2	550	20	0.3	Existing private road.
PAR 7	3.1	3,815	20	1.8	Existing private paved roads (Tradewinds and Eastwind Roads) within the Port property.
PAR 8	3.1	10	30	<0.1	This new road will connect Eastwind road with the NWIW Meter Station. It will be 10 feet long and 30 feet wide and will be surfaced with gravel.
Totals	**NA**	**20,634**	**NA**	**12.3**	

[a] The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the exact sum of the addends in all cases.

1.4 Contractor and Pipe Storage Yard

Northwest has identified one potential contractor yard (Table B-4) for use during construction of the Project. The yard is an existing graded lot within an industrial park located in Section 31, Township 7 North, Range 1 West in Cowlitz County within the Port at the location of the pipeline terminus and the Methanol Plant. This yard will be used to off-load and store pipe and other materials, and stage contractor equipment. Stored materials may include the following: construction mats, fencing materials, fuel and lubricants, and stormwater control materials (e.g., straw bales, erosion control fabric, silt fence materials) among other materials. The yard will also be used for contractor office trailers and employee parking facilities. The location of the yard is shown on the Figure 4 behind the Figures Tab.

2.0 LAND REQUIREMENTS

2.1 Pipeline Facilities

Construction of the Project will require acquisition of temporary construction rights-of-way and temporary extra work areas (TEWAs), as well as a new permanent easement to operate and maintain the pipeline. Table B-4 summarizes the construction and operation land requirements for the Project.

Table B-4
Total Project Land Requirements for Construction and Operation

Project Component	Length (miles) or Number of Sites	Land Affected During Construction (acres) [a]	Land Affected (acres) During Operation - Permanent Easement
Pipeline Facilities	3.1 mi	35.6	19.4
TEWA [b]	28	73.8	0.0
Existing Roads Needing Improvements in Limited Locations	7	0.4	0.0
TAR	1.4 mi	4.1	0.0
PAR	3.9 mi	12.3	12.1
Aboveground Facilities	2	0.9	0.9
Total		**127.1**	**32.4**

[a] The numbers in this table have been rounded for presentation purposes. As a result, the totals may not reflect the exact sum of the addends in all cases.

[b] Includes area to be used for contractor/pipe yard.

Temporary Construction ROW

Northwest proposes to use a 100-foot-wide temporary construction ROW (Figures 1B-1, 1B-2, 1B-3 and 1B4, attached). This width is required for the following purposes:

- To accommodate the clearing and grading activities necessary to prepare the ROW.
- To temporarily store spoil material as well as to accommodate the excavation necessary to prepare the trench for installation of the 24-inch lateral pipeline. The pipeline will be buried a minimum of three feet below the surface. To achieve this depth, Northwest will need to excavate a trench at least six feet deep, and potentially deeper in places such as in roads, at waterbody crossings and possibly utility crossings. This excavation will generate a large volume of spoil, which will be temporarily store on the ROW.
- To salvage and segregate topsoil in residential areas to prevent it from mixing with trench spoil.
- To minimize the need for TEWAs along the proposed alignment as much as practical.
- To provide a secondary lane for construction equipment movement in steep terrain.

The temporary construction ROW will also be used as the primary transportation corridor for equipment during construction, to provide for construction staging and a passing lane to facilitate construction traffic movement up and down the ROW, and for non-construction vehicular access during in-road construction.

Where warranted, based on wetland type, quality, and function, the construction ROW will be reduced to 75 feet in width to minimize impacts to wetland and waterbody resources. The reduced construction ROW, or "neckdown," is consistent with FERC's Wetland and Waterbody Construction and Mitigation Procedures (FERC Procedures) (Section VI. A.3) (See Appendix C). These neckdowns are illustrated on the alignment sheets behind the Figures Tab.

Temporary Extra Work Areas

TEWAs will be required outside of the construction ROW at specific feature crossings. The locations of the TEWAs are shown on the alignment sheets. Generally, TEWAs are required at the following locations:

- Road crossings;
- Waterbody and wetland crossings;
- Horizontal directional drill (HDD) staging at the railroad/I-5 crossing;
- Aboveground facility location work areas;
- Tie-in areas (e.g., waterbody crossings, residential/industrial areas, road crossings);
- Pipe and equipment staging areas;
- Additional spoil storage areas; and
- Dewatering areas.

Road and waterbody crossings and tie-ins are typically constructed by a separate crew.

Following construction these areas will be restored and relinquished to the landowner without restrictions.

The FERC Procedures contain a number of specifications regarding the location of TEWAs in proximity to waterbodies and wetlands and specify that TEWAs be set back 50 feet from these features, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land (see Sections V.B.2.a., V.B.2.b., VI.B.1.a., and VI.B.1.b. of the FERC Procedures). Pursuant to these specifications Northwest incorporated a 50-foot TEWA setback where feasible based on site-specific conditions. Additionally, the FERC Procedures require all spoil from minor and intermediate waterbody crossings, and upland spoil from major waterbody crossings, must be placed in the construction ROW at least 10 feet from the water's edge or in additional extra work areas as described in section V.B.2 (see Section V.B.4.a.). The areas where Northwest believes

compliance with FERC Procedures is not practicable and is requesting a modification from the FERC Procedures are listed in Table B-5 The table also describes the conditions at each location and explains why Northwest believes a variance is justified.

Table B-5
Site-Specific Modifications to FERC Procedures

MP	Wetland or Waterbody	Cowardin Type	TEWA	Alignment Sheet	Variance Rationale
Modifications Requested for Temporary Extra Work Areas Located within Wetlands					
2.0	W-2A1	PEM	1.97-N	2	This TEWA is needed to store spoil from side slope construction in this part of the ROW. Impacts to this isolated wetland from use of the TEWA total less than 0.1 acre.
2.4	W-2A5	PEM	2.36-N 2.36-S	3	These two TEWAs are needed for the road bore of Old Pacific Highway 99. Based on local topography and the limited area on the east side of Old Pacific Highway 99, the small area of wetland is needed to store spoil and topsoil. Northwest has not had permission to conduct biological surveys on this property and the wetland area is still based on NWI data. Aerial photo interpretation suggests the area may not be wetland. The wetland is a farmed emergent wetland of low quality. The impacts total 0.1 acre.
2.5-2.6	W-2A5	PEM	2.55-N 2.51-S	3	These two TEWAs are required for the HDD of two unnamed tributaries to the Kalama River, I-5, the Burlington Northern Santa Fe Railroad, and Tradewinds Road. The wetland area that will be impacted is presently used for agricultural production. The use of the HDD method significantly minimizes overall impacts to this wetland and to the forested wetland between I-5 and the railroad.
Modifications Requested for Temporary Extra Work Areas Located within 50 feet of Wetlands or Waterbodies and Areas Where the Construction ROW is Greater than 75 feet Wide.					
2.0	W2A1	PEM	N/A	2	The construction ROW here has not been reduced to 75 feet to accommodate the grading and spoil storage needed to create a safe workspace in this area of side hill construction. The impact on this wetland from maintaining the standard ROW width amounts to less than 0.1 acre.
2.2	W-2A2	PEM	2.20-N 2.20-S	2	Reducing the ROW width to 75 feet in this location is not feasible due to the grading and spoil storage required to create a safe workspace to install the pipe. Maintaining the standard ROW width will result in wetland impacts of less than 0.1 acre.

Table B-5
Site-Specific Modifications to FERC Procedures

MP	Wetland or Waterbody	Cowardin Type	TEWA	Alignment Sheet	Variance Rationale
2.2	S-2A3	NA	2.20-N 2.20-S	2	A 50-foot setback from this waterbody is not feasible at this location due to topographic conditions. TEWA 2.20-N is required for spoil storage associated with the stream crossing and the road bore of Old Pacific Highway 99. TEWA 2.20-S is required for the stream crossing and there is limited space to allow a 50 foot setback due to the presence of wetland W-2A4.
2.2-2.3	W-2A4	PFO	2.20-S 2.34-S	2	A 50-foot setback for these two TEWAs is not feasible given the topographic constraints (2.20-S) and the limited space between Old Pacific Highway 99 and the edge of wetland W-2A4.
2.4-2.6	W-2A5	PEM	2.51-N 2.51-S	3	The ROW was not reduced to 75 feet in this area to accommodate topsoil segregation through this farmed wetland. Northwest has not had permission to conduct biological surveys on this property and the wetland area is still based on NWI data. Aerial photo interpretation suggests the area may not be wetland. Reducing the ROW to 75 feet would reduce wetland impacts by 0.9 acre, but would hamper topsoil segregation and would limit efficient movement of equipment between Old Pacific Highway 99 and the HDD workspace near MP 2.6.
Modifications Requested for Placement of Spoil from Minor Waterbody Crossings within 10 Feet of (and within) the Waterbodies					
0.9	S-0A1	Intermittent	NA	1	Due to the steep terrain in the project area and limited TEWA adjacent to waterbodies, Northwest is not likely to have sufficient ROW or TEWA to store trench spoil adjacent to the waterbody channels during construction at these waterbody crossings and is requesting approval to store trench spoil within the waterbody channel. Spoil storage would be short-term given that the crossing will be completed within 24 hours. Northwest will endeavor to store trench spoil adjacent to waterbody if ample room is available.
1.0	S-1A1	Intermittent	NA	2	
1.7	S-1A2	Intermittent	NA	2	
1.9	S-1A3	Intermittent	NA	2	
2.2	S-2A3	Intermittent	NA	3	

Permanent/Operational Easement

Northwest proposes to retain a new 50-foot-wide permanent easement to operate the proposed pipeline. This new permanent easement will be subject to Northwest's safety, maintenance, and operation requirements. The landowner will retain ownership and have the right to use the land on the permanent easement so long as the proposed use does not hinder, conflict, or interfere with Northwest's surface or subsurface rights to operate, maintain, and protect the pipeline facilities. Examples of uses that would not be allowed include excavations that result in a change in the surface grade or obstruct access to the

permanent easement and the construction of buildings or other permanent structures on the permanent easement.

2.2 Aboveground Facilities

The temporary disturbance associated with the aboveground facilities will occur within the footprint of the construction ROW and TEWAs identified for installation of the Project. Both the take-off facility at MP 0.0 and the location of the proposed NWIW Meter Station at MP 3.1 will require new permanent aboveground facilities as described above in Table B-1.

2.3 Permanent Access Roads

The Project will utilize several existing roads to access the ROW and will require one new PAR to provide operational access to the NWIW Meter Station (Figure 1A-1, attached).

2.4 Contractor and Pipe Storage Yard

As described above, Northwest proposes to use one contractor and pipe storage yard during construction. This yard is located at an existing graded lot within an industrial park in the Port. Use of this yard will temporarily disturb cleared industrial land (See Figure 4 behind Figures Tab).

3.0 CONSTRUCTION PROCEDURES

The Project will be designed, constructed, operated, and maintained in accordance with U.S. Department of Transportation (DOT) regulations in 49 CFR Part 192, "*Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards;*" FERC regulations in 18 CFR Part 380.15, "*Guidelines to be Followed by Natural Gas Pipeline Companies in the Planning, Clearing, and Maintenance of Rights-of-Way and the Construction of Aboveground Facilities;*" and other applicable federal, state, and local regulations. In addition to the federal requirements listed above, Northwest will construct and reclaim the pipeline and aboveground facilities in accordance with FERC Procedures and the FERC Upland Erosion Control, Revegetation, and Maintenance Plan (FERC Plan) (See Appendix C). Where exceptions to the FERC Plan and FERC Procedures have been identified, modifications have been requested (Table B-5). This section describes the general procedures that will be used to construct the Project and aboveground facilities under typical conditions and consistent with the requirements of the FERC Plan and FERC Procedures.

<u>Coldwater Fisheries</u>

Section V.B.1 of FERC Procedures in Appendix C contains recommended crossing timeframes/windows for coldwater fisheries where crossing dates are not otherwise specified by an appropriate state agency. The State of Washington does not formally classify fresh water streams as either coldwater or warmwater habitats. Rather, they are classified by specific Aquatic Life Use categories (Washington Administrative Code [WAC] 173-201A-200). The Washington Department of Fish and Wildlife (WDFW) under the Hydraulic Code (Revised Code of Washington 77.55) issues a Hydraulic Project Approval (HPA) for any construction activity, including pipeline crossings, that will use, divert, obstruct, or change the natural flow or bed of state waters. WDFW provides guidelines for in-water construction that are designed to minimize impacts to spawning fish species

and their eggs[1].

Four of the seven waterbodies crossed by the Project are non-fish bearing intermittent tributaries to the Kalama River that are expected to be dry at the time of construction. One waterbody (S-2A3) is a non-fish bearing intermittent tributary to the Columbia River that is expected to be dry at the time of construction. The two remaining waterbodies (S-2A6 and S-2A7) are intermittent to perennial artificial channels with hydrologic connections to the Columbia River. If water is present in an intermittent waterbody at the time of construction, to minimize impacts to fish and aquatic habitats, Northwest will work within the appropriate WDFW recommended in-water work periods and install the pipeline using conventional dry open cut crossing techniques (i.e., flume, dam and pump, see description below and Appendices D and E). For all Kalama River tributaries the WDFW recommended in-water work window is August 1 to August 15, and for Columbia River tributaries within the Project area the WDFW recommended in-water work window is August 1 to March 31, and for Columbia River tributaries within the Project area the WDFW recommended in-water work window is August 1 to March 31.

For the two perennial waterbodies that drain to the Columbia River (S-2A6 and S-2A7), Northwest does not intend to work within the recommended in-water work window because the pipeline will be installed beneath these two waterbodies using the HDD method.

Northwest will request permission to install temporary equipment bridges prior to the WDFW-recommended in-water work period because the construction ROW will be utilized as the primary transportation corridor to move equipment and materials along the ROW. The temporary equipment bridges will be needed by equipment involved in the early stages of construction through the final restoration of the ROW, and some of these activities will occur outside of the recommended in-water work periods.

Northwest completed wetland and waterbody surveys for the Project corridor and TEWAs wherever survey permission was granted. In areas where Northwest was unable to obtain landowner permission for survey, National Wetland Inventory (NWI) mapping, aerial photography and Light Detection and Ranging (LIDAR) mapping were utilized for wetland assessment and delineation purposes as discussed with the resource agencies. Table 1 in Appendix A provides details about the wetlands that will be crossed. Table 2 in Appendix A describes the waterbodies that will be crossed by the Project. No blasting is currently expected at any of the waterbody crossings.

Stormwater Pollution Prevention Plan

A Stormwater Pollution Prevention Plan (SWPPP) will be prepared and submitted to authorize stormwater discharge under the Washington State Department of Ecology (WDOE) Construction Stormwater General Permit. The SWPPP will be available on-site pursuant to the FERC Procedures (Section II.C), and WDOE and U.S. Environmental Protection Agency (EPA) regulations.

[1] http://wdfw.wa.gov/licensing/hpa/freshwater_incubation_avoidance_times_28may2010.pdf

Spill Plan

Pursuant to the FERC Procedures (see Section IV.A), Northwest has prepared a Spill Plan for Oil and Hazardous Materials (Spill Plan) for the Project (Appendix F).

Federal and State Land Management Agencies, and Lands Managed by Federally Recognized Tribes

The Project will cross I-5, which is owned and operated by the Washington Department of Transportation. No other state, federal, or tribal lands will be crossed by the Project.

Other Federal and State Agency Requirements

Northwest will prepare applications for additional federal, state and local permits necessary for construction and operation of the Project and file the federal applications shortly after submittal of the Certificate application. Northwest does not expect the permit conditions from these agencies to contradict the FERC Plan or FERC Procedures. However, pursuant to Section I.A of the FERC Plan, Northwest will file other agency requirements prior to the start of construction, if necessary.

Waterbody Crossing Notification Procedures and Permits

Pursuant to Section V.A.1 of the FERC Procedures, Northwest will submit a Joint Aquatic Resource Permit Application (JARPA) to the U.S. Army Corps of Engineers (COE) for a Section 404 Permit pursuant to the Clean Water Act. Northwest anticipates that the COE will issue authorization for the Project through its Nationwide Permit (NWP) 12. WDOE uses the JARPA for 401 Water Quality Certification which may be required for projects authorized under a COE NWP. WDFW also uses the JARPA to review and approve applications for proposed construction work in waters of the state under their HPA process. Northwest will comply with the agencies' individual, regional, or nationwide permit requirements as applicable.

The Project is not located within Washington's Coastal Zone as Cowlitz County is not considered a coastal county. As such, the Project is not subject to requirements for consistency pursuant to the Coastal Zone Management Act.

Municipal Water Intakes

No municipal water intake structures have been identified within 3 miles downstream of any waterbody crossings.

Wetland/Stream Inventory Report

As required by Section II.A of the FERC Procedures, Northwest has completed a wetland and waterbody survey on accessible properties. In areas where survey permission for biological surveys has not been granted, NWI mapping, aerial photography interpretation, and LIDAR mapping were used to assess wetland features and conditions and delineate potential boundaries. The results of this survey are included in Appendix G. The locations of wetlands and waterbody crossings are provided in Figure 2A and on the alignment sheets behind the Figures Tab.

Environmental Controls, Supervision, and Inspection

Northwest's contract documents will include the requirements of federal, state, and local permits and the FERC Plan and FERC Procedures. Sensitive environmental areas will be shown on the alignment sheets and will be identified in the contract documents. Procedures for completing construction and restoration within these areas will be discussed with the construction contractor prior to construction. Permit specifications will not be a separate portion of the contract(s), but will be incorporated with all other specifications. All inspectors, including the Environmental Inspector (EI), Northwest's project management, and the contractor's project management and foremen will receive all applicable specifications.

Northwest will employ at least one EI during construction, cleanup, and restoration activities, consistent with FERC Procedures. The EI will have knowledge of the wetland and waterbody characteristics in the Project area. The EI will have peer status with all other activity inspectors and will have authority to stop activities that violate environmental conditions of the FERC Certificate or other authorizations and permits. The EI will be authorized to order corrective action, as necessary. All contractor foremen and inspectors will receive training on the specifications and requirements of the Project. Environmental compliance procedures will receive special attention during the training of contractor foremen and company inspectors. These individuals will support the EI by communicating potential conditions that may jeopardize environmental compliance if observed during their daily jobs. All other personnel employed on the Project, including personnel that are employed after construction begins, will receive basic training on actions necessary to ensure compliance.

Northwest's Project staff will have ultimate compliance responsibility for the Project. This group has many years of experience in implementing similar projects under current federal, state, and local environmental regulations. If noncompliance occurs, all personnel employed on the Project will be made aware of the noncompliance. Training and/or adjustments in current procedures and techniques will be provided to ensure that the same noncompliance does not occur again.

Preconstruction Planning

Northwest will complete agency coordination for this Project as required by the FERC Plan (Section III.F.1). Northwest is consulting with the Natural Resources Conservation Service (NRCS) regarding erosion control and revegetation specifications. The Cowlitz County Noxious Weed Control Board's data has been reviewed regarding potential noxious weed occurrences in the Project area. The board has developed guidelines for the prevention of the potential spread of noxious weeds, if present. These procedures will be incorporated into the Project-specific Erosion Control and Revegetation Plan (ECRP) that is provided in Appendix C.

3.1 Typical Pipeline Construction Procedures

Construction Spreads

Northwest will utilize one construction spread for installation of the Project including: clearing, grading, trenching, trench preparation for the 24-inch diameter pipeline, pipe stringing, welding, lowering-in, backfilling, regrading, and restoration. The construction

spread activities will occur in sequence or in assembly-line fashion along the ROW with one crew following the next from clearing until final cleanup. As work proceeds, there are often small periods between job tasks when work at a specific location on the ROW is delayed such as between trenching and pipe stringing or pipe stringing and welding. In some areas Northwest will utilize tie-in crews that would complete most of the construction activities together as one operation in areas such as residential areas or at waterbody and road crossings.

It is estimated that approximately 75 construction personnel and about 12 construction inspectors and support personnel will be required at the peak of the approximately five-month construction schedule.

Certificated Work Areas

Consistent with Section IV.A.1 of the FERC Plan, Northwest will confine Project-related disturbance to those areas shown on the alignment sheets or described in its FERC Application. No disturbance will be allowed to occur outside of these areas without appropriate surveys (wetland, cultural, threatened and endangered species, etc.), obtaining other applicable federal, state, or local permits, and securing prior written approval from FERC.

Surveying and Staking

Civil, cultural, and environmental surveys have been completed for all areas where survey permission is granted.

Prior to construction, the exterior ROW limits and the boundaries of TEWAs shown on the alignment sheets will be staked, and the EI will verify the staked boundaries. The survey stakes will be maintained throughout construction. Wetlands and other sensitive areas will be appropriately flagged or identified.

Construction ROW Egress and Ingress/Equipment Mobilization

Access roads that will be used during construction or crossed by the pipeline are identified in Tables B-2 and B-3 and on Figure 1A-1, attached. The locations of egress and ingress points are shown on the alignment sheets provided under separate cover. Generally, all county roads crossed by the ROW will be used for access. If unanticipated improvements/widening become necessary, the activities would not occur without first completing an environmental analysis and obtaining the appropriate written authorization from FERC and/or other agencies, if applicable.

Generally, equipment moved to the construction ROW will proceed along the ROW performing their tasks and in a manner that minimizes the need to transport the equipment to various areas along the ROW. A Noxious Weed Control section is included in the ECRP (Appendix C) which addresses measures (such as cleaning) that will be utilized to minimize the potential spread of noxious weeds onto the ROW from equipment transported from outside of the Project area.

Vegetation Clearing

Vegetation clearing will be necessary along the Project where coniferous and mixed forest

and shrub types are crossed. Vegetation clearing in upland areas will be consistent with the FERC Plan. Vegetation clearing in and adjacent to wetlands and at waterbody crossings will be consistent with the FERC Procedures.

The Project will be constructed, in part, through forested lands, which are subject to the State of Washington Forest Practices Act and associated rules (WAC 222-12-040). Northwest has evaluated the streams that will be crossed by the Project based on Washington Forest Practices Rules and determined that all of the streams that are crossed by the proposed route that will require removal of riparian vegetation are Type N streams that do not meet the requirement for coverage under the Riparian Management Zone best management practices (BMP). Therefore no alternate plan is required for the Project. Northwest will purchase all merchantable timber that will be removed from the ROW during clearing. The clearing contractor will remove the merchantable timber and haul it to nearby saw mills, unless other requests are made by the landowner.

Temporary Erosion Control

Temporary erosion controls will be installed immediately after vegetation clearing and will be properly maintained throughout construction and reinstalled as necessary until replaced by permanent erosion controls or until restoration is complete. Temporary erosion control structures and procedures are discussed in detail in the Project's ECRP (Appendix C).

Topsoil Segregation

The FERC Plan (Section IV.B.1) requires topsoil segregation in the following areas: 1) all residential areas; 2) annually cultivated or rotated agricultural lands and pasture; 3) hayfields; and 4) other areas at the landowner's request. In these areas, the FERC Plan requires either full work area or trench line and subsoil storage area stripping (see Section IV.B.1.a of the FERC Plan). The FERC Procedures (Section VI.B.2.h) address topsoil segregation in wetlands. In wetland areas, FERC generally requires the top 12 inches over the trench line to be salvaged, except in areas where standing water or saturated soils are present. The upland areas of the Project where topsoil segregation will occur according to FERC Plan will be shown on the final alignment sheets.

Blasting

Based on a combination of preliminary field review, NRCS soils data and Project-specific geotechnical investigations, Northwest estimates that blasting may be required in two locations along the pipeline route. The first location is to the northeast of the Kalama Quarry between approximate MP 1.4 and 1.5. The second location is at the base of the Mt. Pleasant ridge for several hundred feet between approximate MP 2.0 and MP 2.2. Upon receipt of access permission Northwest may conduct additional investigations to determine the need for blasting in these areas and will provide additional detail regarding blasting prior to construction.

Trenching

For installation of the 24-inch-diameter pipeline it will be necessary to excavate a trench. The trench will be excavated with track-hoes or similar equipment. Where required, subsoil will be stockpiled separately from topsoil. Generally, excavated topsoil will be

stockpiled along the ROW on the side of the trench away from the construction traffic and pipe assembly area (Figures 1B-1, 1B-2, 1B-3 and 1B-4, attached); however, where specific constraints exist, topsoil may be stored in other areas.

Pipe Installation and Backfilling

The trench will be excavated to a sufficient depth to allow a minimum of three feet of soil cover, and up to five feet in specific areas, between the top of the pipe and the final land surface after backfilling. These cover depths exceed the DOT regulations provided in 49 CFR Part 192, which allow a minimum depth of cover over the pipeline of 30 inches in normal soil in Class I locations. For Class II, III, and IV locations, as well as drainage ditches of paved county, city, and state road and railroad crossings, the DOT regulations provided in 49 CFR Part 192 require a minimum cover of 36 inches in normal soil. Northwest will use a minimum of three feet of cover in all areas.

After trenching is complete, the 24-inch-diameter pipe sections will be strung along the trench, bent to fit the contour of the trench bottom, 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. The entire pipeline coating will be inspected and tested to locate and repair any faults or voids. The pipe assembly will then be lowered into the trench by side-boom tractors, and 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.

Northwest will install trench plugs consistent with the requirements of the FERC Plan (Section V.B.1). Trench plugs will be installed at the base of slopes adjacent to wetlands and waterbodies and where needed to avoid draining of wetlands. Trench plugs may be constructed from sandbags, foam, or bentonite. Topsoil will not be used to fill the bags. Trench plugs will be installed on slopes to minimize water flow down the trenchline to prevent potential subsurface erosion and to maximize slope stability.

Hydrostatic Testing

After backfilling, the pipeline will be hydrostatically tested in accordance with DOT regulations to ensure that the system is capable of operating at the MAOP. Should a leak occur during testing, the pipeline will be repaired and retested until the test specifications are achieved. A total of approximately 304,645 gallons or 0.94 acre feet of water will be required to test the proposed 24-inch pipeline in one test section. In addition, the pipestring for the combined I-5 and railroad crossing (2,397 feet) will require approximately 51,735 gallons (0.16 acre feet) for hydrostatically testing prior to pull back. The total hydrostatic test water volume estimate for the Project is approximately 356,380 gallons or 1.10 acre feet.

Hydrotest water will be obtained from the City of Kalama's municipal system or from sources developed to serve the Methanol Plant. Hydrostatic test water required to test the HDD pipe section will likely be acquired from the same source.

Once the hydrostatic test is complete the test water will be discharged to a TEWA adjacent to the construction ROW or to a water tank or water trucks. If discharged to the ROW,

the discharge would occur to the surface for infiltration in an upland area and would occur through an appropriately sized discharge structure as described in the ECRP provided in Appendix C. Similarly, discharge of the hydrostatic test water for the HDD would occur within the construction ROW or TEWAs through a discharge structure as surface discharge in an upland area for infiltration or to a water tank or water trucks.

Permission to discharge the hydrostatic test water will be applied for with WDOE and will be permitted through the National Pollution Discharge Elimination System (NPDES) stormwater discharge permit. Hydrostatic test water will be discharged at a rate to prevent scour, erosion, and sediment migration to sensitive resources such as wetlands and waterbodies (ECRP in Appendix C). Prior to discharge the hydrostatic test water will be tested according to requirements stipulated in WDOE's stormwater permit and the SWPPP.

Cleanup and Permanent Erosion Control Devices

Northwest will make every effort to complete final cleanup of an area within 20 days after backfilling the trench. Final cleanup will include final grading and installation of permanent erosion control structures. During final cleanup, Northwest will remove all construction debris and grade disturbed areas to approximate preconstruction grade to the extent practical. In areas where restoration of pre-construction contours is not practicable, Northwest will restore grades to a stable slope condition to minimize the risk of erosion and hill slope instability (Figure 1B-3 and 1B-4, attached). Grades will be restored such that there are no abrupt changes in grade (exposed cut banks or obvious fill slopes) at the margins of the construction ROW. Northwest anticipates completing final cleanup during the late fall of 2017.

Travel Lane - Because there is sufficient access to the short length of the proposed pipeline, Northwest does not foresee the need to leave a travel lane open over extended portions of the construction ROW except during initial construction and restoration.

Excess Rock Removal – The FERC Plan (Section V.A.3) requires the removal of excess rock from the top 12 inches of soil in cultivated or rotated croplands, hayfields, pastures, residential areas, and other areas at the landowner's request. Northwest will comply with the FERC Plan and will clean up excess rock to a condition (size, density, and distribution) similar to areas adjacent to the construction ROW.

Permanent Erosion Control Devices - Northwest will install permanent erosion control devices or BMPs consistent with the requirements of Section V.B. of the FERC Plan and as described in the Project-specific ECRP provided in Appendix C. These BMPs will consist predominantly of trench breakers, slope breakers or waterbars, and revegetation measures to permanently stabilize disturbed areas. Northwest will utilize the spacing for these structures as specified in the FERC Plan (Section V.B.1.b, and V.B.2.b).

Soil Compaction - Northwest will test for soil compaction in the residential and agricultural areas crossed by the pipeline. Tests will be conducted on the same soil type under similar moisture conditions as specified in Section V.C. of the FERC Plan. Pursuant to Section II.B.8 of the FERC Plan, the EI will be responsible for conducting subsoil and topsoil compaction testing and for determining corrective measures. Measures will be implemented to mitigate potential compaction.

Rugged Topography

The Project crosses steep slopes along much of the Project alignment, but most significantly along the Mt. Pleasant ridge before approaching I-5. Specifically, the proposed route crosses approximately 0.8 mile of land with slopes ranging from 15 to 30 percent and 0.7 mile of slopes greater than 30 percent. The proposed route also crosses approximately 1.7 miles of land with side-slopes ranging from 15 to 30 percent (moderate) and 0.6 mile of side-slopes greater than 30 percent (steep). During construction, the ROW in areas of moderate and steep side-slopes will require substantial grading to provide a safe working plane to facilitate construction. During restoration, these areas will be regraded to a stable configuration to minimize erosion and allow long-term maintenance (Figures 1B-3 and 1B-4, attached). Grades will be restored such that there are no abrupt changes in grade (exposed cut banks or obvious fill slopes) at the margins of the construction ROW. The ECRP also provides the various BMPs that will be utilized, as necessary, to ensure erosion is minimized and slopes are revegetated and properly stabilized.

Revegetation

As required by the FERC Plan, Northwest will consult prior to construction with the NRCS regarding specific seeding dates and recommended seed mixtures for the Project area. The ECRP describes the procedures that will be implemented to minimize erosion and enhance revegetation success for the entire Project. Similarly, the FERC Procedures require restoration and revegetation of wetlands and waterbodies disturbed by construction. The ECRP describes the procedures that will be utilized to minimize the spread of noxious weeds as a result of Project construction.

Off-Highway Vehicle Control

Off-highway vehicle control issues are not anticipated along the proposed Project because the alignment crosses private lands, most of which are large residential lots or private timberlands.

3.2 Road Crossings

Northwest will install the pipeline under roads (except for I-5) in accordance with the requirements of Cowlitz County, which is the responsible permitting agency. Northwest anticipates that all but two roads and a railroad will be open cut. I-5 and the railroad that will be crossed using the HDD method. Only Old Pacific Highway 99 will be crossed using the bore crossing method. Typically, each open cut road crossing, including cutting the road, installing the pipeline, and repairing the road will be completed in a single day. Northwest will prepare a traffic plan in coordination with the County to limit disturbance and ensure safety to both workers and the public. At paved county road crossings, Northwest will maintain five feet of cover between the road surface and the top of the pipe.

3.3 Waterbody Crossings

The Project will affect seven waterbodies. Table 2 in Appendix A includes the name of each waterbody, its MP location along the pipeline route and its flow type (i.e., perennial versus intermittent).

Major Waterbodies

No major waterbodies (i.e., greater than 100 feet in width) will be crossed by the Project.

Minor and Intermediate Waterbodies

The HDD Method for crossing waterbodies S-2A6 and S-2A7 is described below. If water is present in a streambed at the time of construction, Northwest will utilize a dry-ditch crossing method (flume or dam and pump) to cross minor and intermediate waterbodies not crossed using HDD techniques, consistent with the requirements of Section V.B.6 of the FERC Procedures. Northwest's proposed fluming and dam and pump procedures are described in Appendix D and Appendix E. If water is not present in the streambed at the time of construction, Northwest will utilize standard upland construction methods to complete the crossing.

Hazardous materials, chemicals, fuels, and lubricating oils will be stored in clearly marked upland areas at least 100 feet from waterbodies and wetlands in accordance with the FERC Procedures. Concrete coating, refueling and equipment maintenance activities will be conducted according to the FERC Procedures. Concrete trucks will not be washed on the ROW. All hazardous materials will be handled in accordance with the Spill Plan (Appendix F). If an unanticipated spill occurs during construction, Northwest will implement the procedures outlined in the Spill Plan to contain, clean up and properly dispose of the spill.

If water is present in any streambed at the time of construction, Northwest will install a temporary construction bridge. Pursuant to the FERC Procedures (Section V.B.5.a.), these bridges will be used by equipment to cross the waterbodies. The only exceptions will be the clearing equipment and the equipment that is used to install the temporary bridges. Northwest may allow these pieces of equipment to cross each waterbody once prior to bridge placement.

Bridges will be designed and maintained according to the FERC Procedures (Section V.B.5.b) to prevent soil from entering the waterbody. Soil will not be used to stabilize equipment bridges and each bridge will span the entire Ordinary High Water Mark (OHWM) of the waterbody so it can withstand and pass the highest flow expected to occur while the bridge is in place. To provide equipment and material access up and down the construction ROW, it may be necessary to install and leave equipment bridges in place beyond the WDFW-recommended in-water work period.

Sediment barriers will be installed immediately after initial disturbance of the waterbody or adjacent upland areas as shown in the Project-specific ECRP (Appendix C). 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 until restoration of adjacent upland areas is complete.

All waterbodies will be backfilled with native material removed from the trench consistent with Section V.C.1. of the FERC Procedures. Northwest will return stream bottoms and banks to preconstruction contours. Banks will be stabilized; and temporary sediment barriers will be installed before returning the flow across the construction work area and removing the flumes and other temporary structures that are used to isolate the stream flow from the work area during installation of the pipeline.

Maintenance

During operation of the 24-inch diameter pipeline, vegetation maintenance adjacent to waterbodies may be required. Where existing riparian vegetation (trees/shrubs) is present, a riparian strip will be allowed to re-establish using native trees and shrubs to the same extent as any existing riparian vegetation adjacent to the construction ROW. However, to facilitate periodic pipeline corrosion/leak surveys, a corridor centered on the pipeline and up to 10 feet wide will be maintained in an herbaceous state. Trees that are located within 15 feet of the pipeline and that are greater than 15 feet in height will be cut and removed from the ROW consistent with Section V.D.1 of the FERC Procedures. Herbicides will not be used in or within 100 feet of the OHWM of each waterbody.

HDD Crossing Method

Northwest will install the pipeline at the two perennial waterbodies (S-2A6 and S-2A7) using HDD crossing methods.

The HDD method involves drilling under a feature and pulling the pipeline into place through the hole that is reamed to accommodate the diameter of the pipeline. This procedure involves three main phases, pilot hole drilling, subsequent reaming passes and pipe pullback. The HDD method is typically used for the crossing of major waterbodies (greater than 100 feet wide) and other significant natural and man-made features where site geometry and geology are amenable to the technique. As part of the planned HDD crossing of I-5 and the Burlington Northern Santa Fe Railroad corridor west of I-5, Northwest will also install the pipeline below waterbodies S-2A6 and S-2A7, which may support federally-listed anadromous fish species. Northwest is proposing to use the HDD method to cross these two waterbodies in part to avoid potential impacts to aquatic species, sensitive resources and water quality if successfully employed.

Pilot Hole

The pilot hole establishes the ultimate position of the installed pipeline. For this operation, an initial hole will be drilled from the entry point to the exit point on the opposite side of the crossing. The head of the pilot drill string contains a pivot joint to provide directional control of the drill string. By altering or steering the drill head, the operator can control the direction as the drill progresses. Thus, the pilot hole can be directed downward at an angle until the proper depth is achieved, then turned and directed horizontally for the required distance and finally angled upward to the surface.

Tracking and steering of the HDD drill head (referred to as a bottom hole assembly, BHA) is generally guided by two different methods: 1) down-hole survey tools that use an instrument referred to as a probe that utilizes the Earth's gravitational and magnetic fields to determine the location of the BHA; and 2) a secondary, TruTracker, ParaTrack, or equivalent survey system that uses a wire (about 0.25-inch in diameter) installed on the ground surface. By inducing an electrical current in the wire, a magnetic field is generated that the probe uses to triangulate its location relative to the wire. If a TruTracker survey system is used, the most commonly used wire layout is a survey coil loop that is laid on the ground, centered on the alignment with the survey coil loop positioned at least as wide as the survey probe is deep. Typically, multiple survey coils are installed, with at least one on each side of the feature being crossed (i.e. Interstate 5). The wire can be placed beneath railroad tracks, or across secondary roads provided permission is granted from

the railroad owner or local roadway department. If the ParaTrack survey system is used, it is common for the survey coil to be laid down the centerline with the return wire a minimum of 300 feet left or right of the proposed centerline. If ground conditions or landowner agreements do not allow for the installation of a survey coil (such as when crossing I-5), a beacon may be used with the ParaTrack or TruTacker system. The beacon does not require a coil wire to be installed, but does require repositioning, generally along the centerline of the alignment, as the pilot hole progresses. It is also possible that the contractor would rely solely on the downhole survey probe calculated survey of the BHA position while drilling in between the two surface survey coils laid out on either side of I-5.

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

Reaming

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

Pullback

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

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

Failure of the HDD method can result from the inability to keep the hole open or the inability to direct/steer the HDD (common in cobbly/gravelly substrates), or from the collapse of the hole around the pipeline during pullback. If this occurs, Northwest will abandon the planned hole and re-attempt the HDD along an alternate, but parallel, drill path. Northwest will make every reasonable attempt to complete a successful HDD. The contingency plan for a failed HDD will be conventional borings of I-5 and the BNSF railroad. If water is present at the time of the crossing, waterbody S-2A6 will likely be installed using a dry open cut crossing method within the in-water work window for Columbia River tributaries

in this reach of the Columbia (August 1 to March 31). Waterbody S-2A7 will either be installed as part of the standard road bore under I-5, or using a dry open cut method during the in-water work window if water is present. Northwest does not anticipate the need to implement this contingency plan based on the favorable geotechnical conditions at the proposed crossing location.

The HDD method has the potential for inadvertent releases of drilling fluid to the land surface or into the waterbody. Drilling mud is composed primarily of water and bentonite, a naturally occurring clay. The drilling fluid generally consists of 1 to 5 percent active clays, approximately 0 to 40 percent inert solids and the remainder consists of water. However, occasionally, some HDD applications require additional additives to maximize drilling fluid performance to meet specific subsurface conditions. The additives typically include polymers, surfactants, and dispersants, all of which are available in non-toxic forms. Northwest will approve any additive compounds prior to use by the drilling contractor to ensure compliance with all applicable environmental and safety regulations. Northwest will only approve the use of non-toxic additives in the drilling fluid.

If a fault or crack in the overburden is encountered, the drilling fluid can escape to the surface in an upland and/or waterbody/wetland area. This is referred to as an inadvertent surface return. Inadvertent returns of drill fluid can range from minor releases, which are easily controlled and cleaned up, to larger releases, which may be more difficult to clean up and may affect water quality in waterbodies and wetlands or upland areas.

Northwest has prepared a Drilling Fluid Contingency Plan for HDD Operations (Appendix I) that describes response procedures for an inadvertent release of drilling fluid during the HDD operation and the methods used to contain the release.

An HDD operation requires a relatively flat TEWA that is large enough for the drill rig and other equipment as needed. A good access road to the drill site with large turnouts is also required for the water trucks and fluid trucks that typically run 24 hours per day during active drilling operations. Additional TEWAs that are straight and aligned with and slightly longer than the drill path are required to weld and test the pipe section for the crossing. It is optimal for the entry and exit holes to be as close to the same elevation as possible. This allows better circulation and return of the drilling fluid and cuttings and mitigates the risk of drill failure.

Where feasible based on engineering and site-specific conditions, TEWAs have not been located closer than 50 feet from waterbody boundaries, in accordance with Section V.B.2.a. of the FERC Procedures. In those locations where Northwest believes a 50-foot setback is not practicable it is requesting a modification from the FERC Procedures as listed in Table B-5. The table also describes the conditions at each location and explains why Northwest believes a modification is justified.

3.4 Wetland Crossings

Wetland surveys have been completed for the portions of the Project footprint where survey permission has been granted (currently about 58.8 percent of the route). It should be noted that access permission for wetland surveys was not granted on all of the properties for which cultural resources and civil survey was granted. The Wetland/Stream Inventory Report is provided in Appendix G. The locations of all wetlands within the Project footprint (both surveyed and determined from aerial photography, public data

sources, and professional judgment) are shown on the wetland figures included behind the Figures Tab.

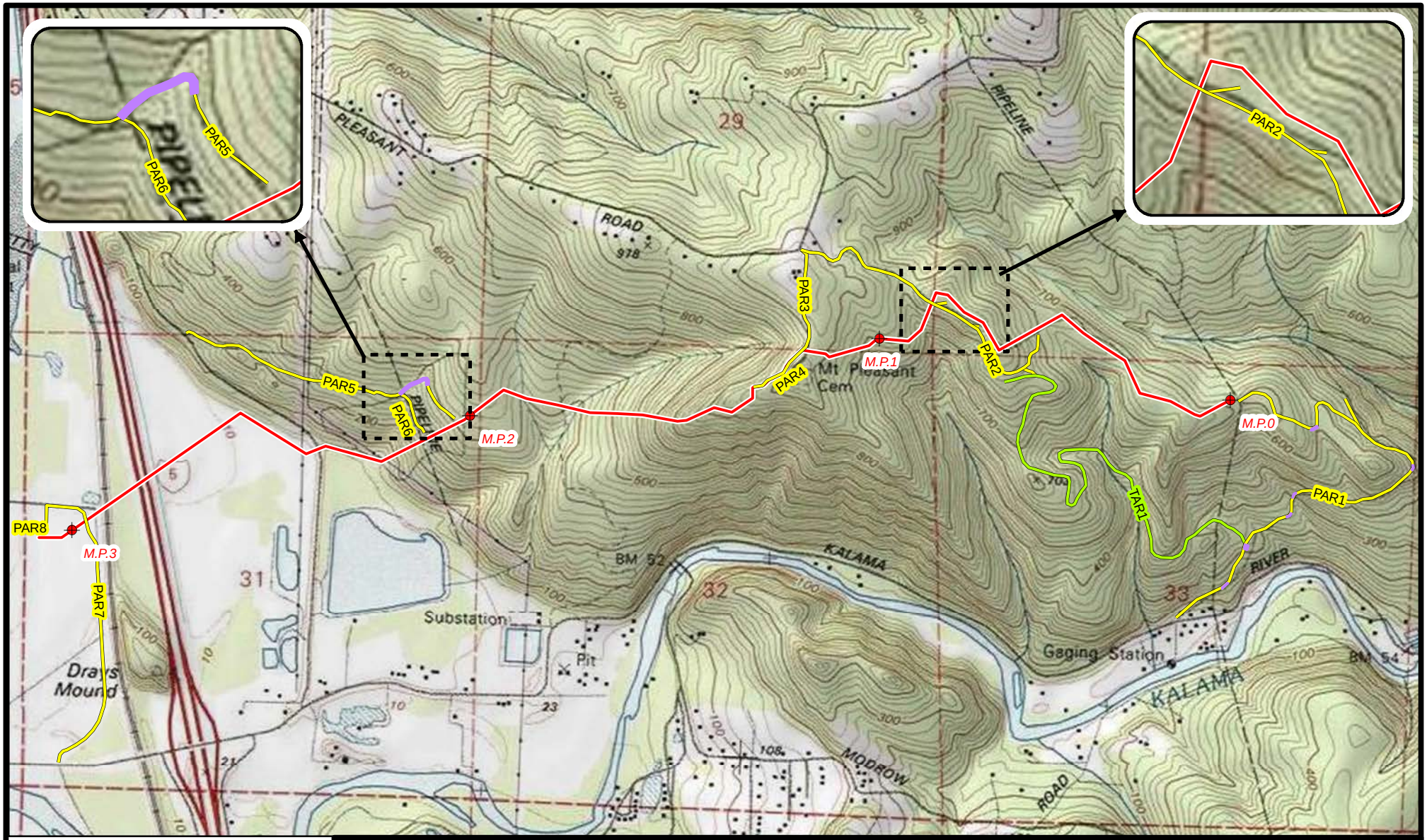
Consistent with the FERC Procedures, Northwest is proposing several measures to minimize wetland impacts. Specifically, Northwest has attempted to limit the width of the construction ROW through wetlands to 75 feet, where practical. Northwest has also incorporated 50-foot setbacks for TEWAs into the proposed design where practicable. In areas where a 75-foot-wide construction ROW or a 50-foot setback is impracticable due to site-specific conditions such as soils, topography, or engineering constraints, Northwest has requested modifications from these requirements (Table B-5).

Other measures that Northwest is proposing to minimize wetland impacts include but are not limited to:

- Limiting the clearing of vegetation between TEWAs and the edge of the wetland to the certificated construction ROW.
- Cutting vegetation just above ground level, leaving existing root systems in place, to facilitate reestablishment of vegetation from sprouting.
- Removing cleared vegetation from the wetland for disposal.
- Limiting tree stump removal and grading activities to directly over the trenchline in wetlands, and not grading or removing stumps or root systems from the rest of the construction ROW unless the Chief Inspector and EI determine that safety-related construction constraints require removal of stumps from under the working side of the construction ROW.
- Segregating the top 12 inches of topsoil from the area disturbed by trenching, except in areas where standing water is present or soils are saturated.
- Restoring segregated topsoil to its original location immediately after backfilling is complete.
- Using low-ground-weight construction equipment, or operating normal equipment in wetlands on prefabricated equipment mats or similar measures where standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil.

3.5 Aboveground Facility Construction

Typical construction activities associated with the proposed aboveground facility construction and modifications will be the same as those described for the pipeline facilities, except that these sites will be graveled and fenced. In all cases, these facilities will meet the same standards and requirements established for pipeline construction.



N
W E
S

TAR = Temporary Access Road
PAR = Permanent Access Road

Legend

- Permanent Access Road
- Temporary Access Road
- Proposed Kalama Lateral Pipeline
- Mileposts

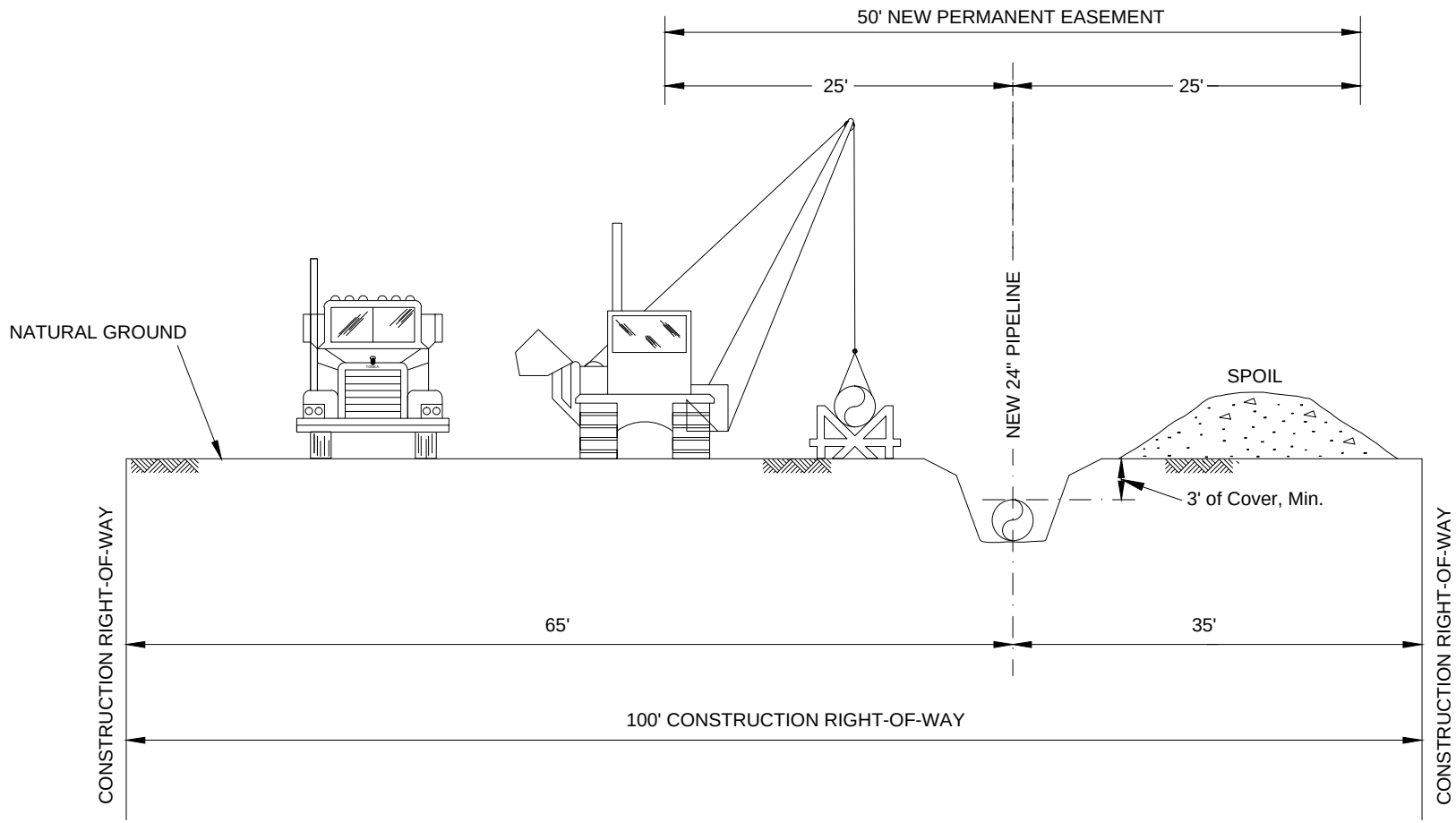
0 1,000 2,000 4,000 Feet

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

FIGURE 1A-1

ACCESS ROAD OVERVIEW
COWLITZ COUNTY, WASHINGTON

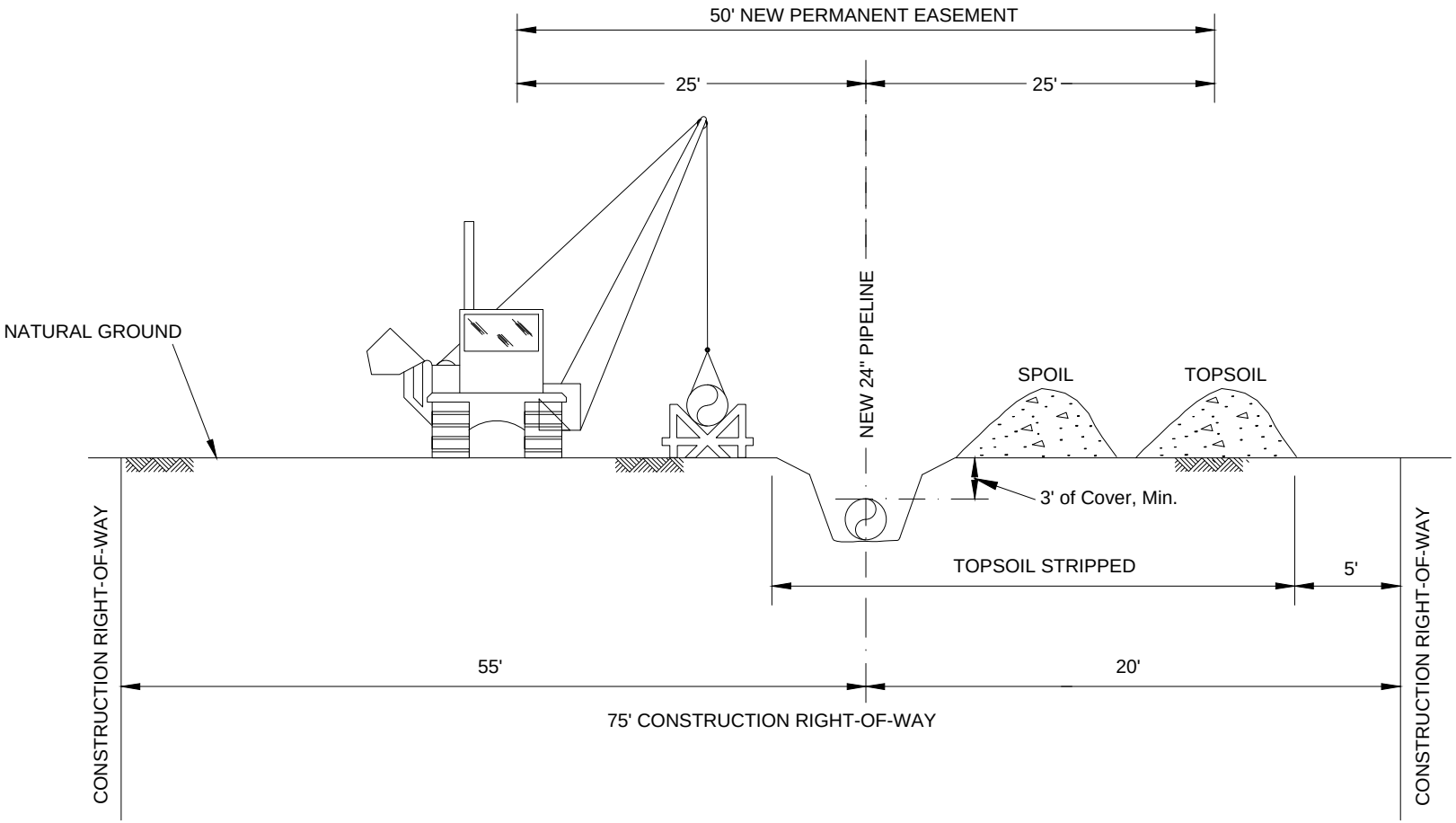
Williams
GAS PIPELINE



NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT
TYPICAL RIGHT-OF-WAY CROSS SECTION
COWLITZ COUNTY, WASHINGTON

Williams
GAS PIPELINE

DRAWN BY: NWP	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NO SCALE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: FIGURE 1B-1	



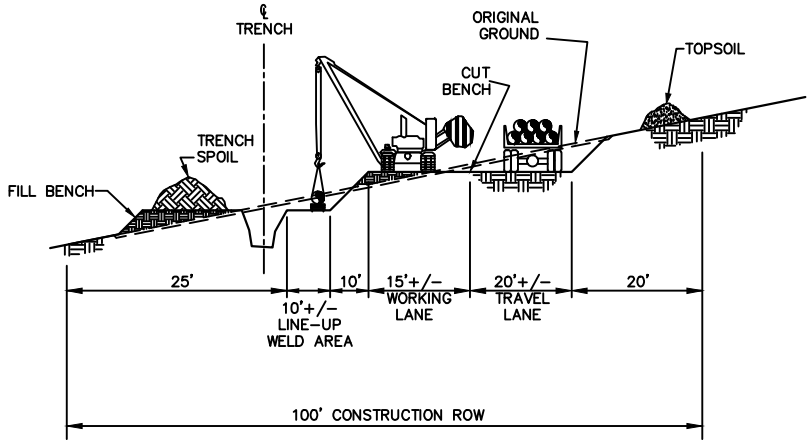
NOTE:
Typical spoil placement shown.

Spoil placement may also occur on the working side of the construction right-of-way as determined by site specific conditions.

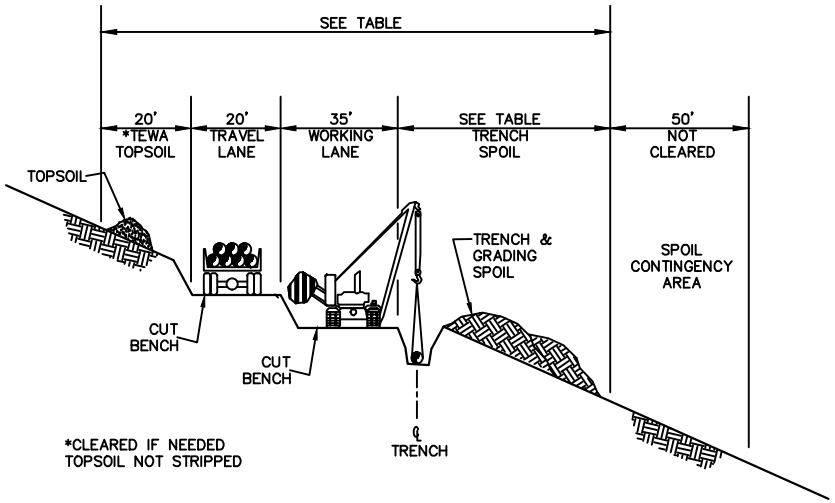
NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT
TYP. RIGHT-OF-WAY CROSS SECTION IN WETLANDS
COWLITZ COUNTY, WASHINGTON

Williams
GAS PIPELINE

DRAWN BY: NWP	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NO SCALE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: FIGURE 1B-2	



SIDE HILL R.O.W.
SECTION A
GENTLE SLOPE
NOT TO SCALE



SIDE HILL R.O.W.
SECTION B
SEVERE SLOPE
NOT TO SCALE

NOTES:

1. STRIP AND STOCKPILE TOPSOIL WHERE GRADING IS REQUIRED.

2. TOPSOIL SHALL BE STOCKPILED UPHILL (AS SHOWN) UNLESS OTHERWISE APPROVED BY THE COMPANY. KEEP TOPSOIL PILE CLEAN OF ALL CONSTRUCTION DEBRIS. MAINTAIN SEPARATION BETWEEN TOPSOIL, GRADING SPOIL AND TRENCH SPOIL PILES.

3. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL OR SPOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING.

4. WHERE SIDE HILL SECTION IS OF SEVERE GRADE, ONLY A SINGLE COMBINED WORKING LANE AND TRAVEL LANE SHALL BE CONSTRUCTED. WHERE REQUIRED, PIPE LINE–UP, WELDING AND JOINT COATING SHALL BE PERFORMED AT AN ADJACENT AREA AND THE LINE INSTALLED AS A "DRAG SECTION."

5. IN AREAS WHERE PERMANENT ROW IS NOT LEFT AS ACCESS, SURFACE SHALL 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 WHEN STATED IN OTHER PROJECT REQUIREMENTS OR ORDERED BY THE COMPANY.

SIDE SLOPE R.O.W. CONSTRUCTION TABLE

GRADE	WIDTH
2% TO 10% GRADE	100'
10% TO 20% GRADE	125'
20% TO 30% GRADE	150'

REFERENCE DRAWINGS

DRAWING NO.	TITLE

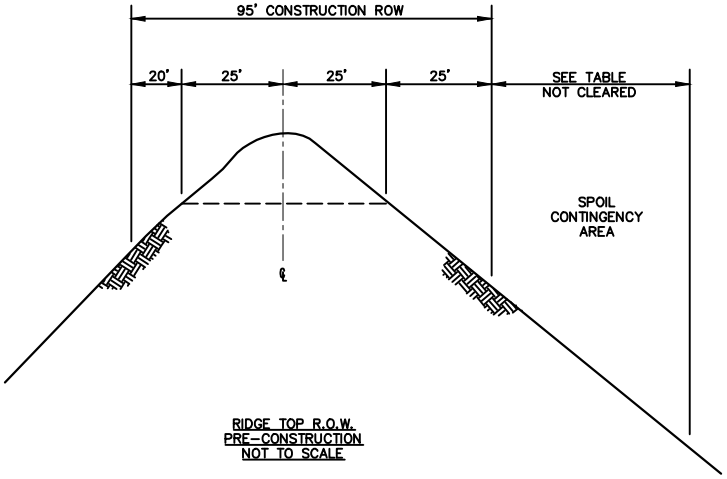
NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT
TYPICAL SIDE HILL
RIGHT-OF-WAY SECTION
WITH TWO-TONE GRADING

Williams GAS PIPELINE

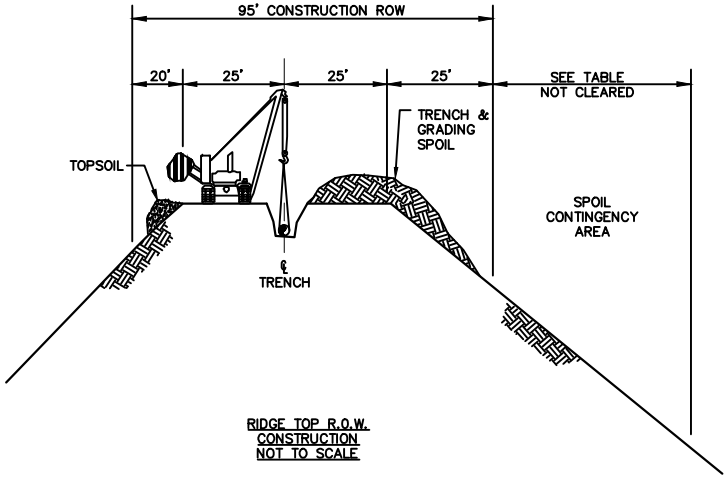
REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

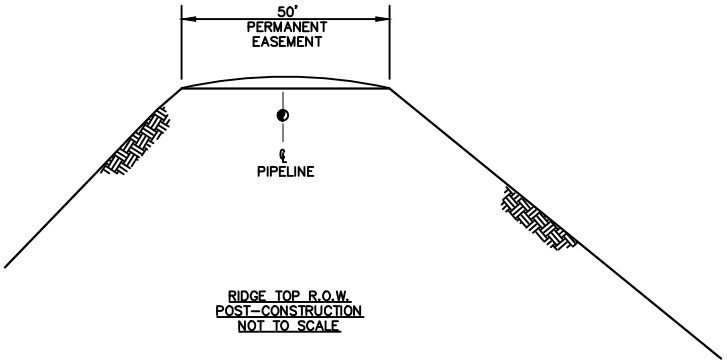
DRAWN BY: KLL	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NONE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: FIGURE 1B-3	SHEET 1 OF 1



RIDGE TOP R.O.W.
PRE-CONSTRUCTION
NOT TO SCALE



RIDGE TOP R.O.W.
CONSTRUCTION
NOT TO SCALE



RIDGE TOP R.O.W.
POST-CONSTRUCTION
NOT TO SCALE

NOTES:

1. STRIP AND STOCKPILE TOPSOIL WHERE GRADING IS REQUIRED FOR RIDGE TOP CUT AND FILL.

2. TOPSOIL SHALL BE STOCKPILED AS NEAR AS POSSIBLE TO WORKING LANE (AS SHOWN) UNLESS OTHERWISE APPROVED BY THE COMPANY. KEEP TOPSOIL PILE CLEAN OF ALL CONSTRUCTION DEBRIS. MAINTAIN SEPARATION BETWEEN TOPSOIL, GRADING SPOIL AND TRENCH SPOIL PILES.

3. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH TOPSOIL OR SPOIL INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING.

4. WHERE RIDGE TOP SECTION IS NARROW OR OF SEVERE GRADE, ONLY A SINGLE COMBINED WORKING LANE AND TRAVEL LANE SHALL BE CONSTRUCTED. PIPE LINE-UP, WELDING AND JOINT COATING SHALL BE PERFORMED AT AN ADJACENT AREA AND THE LINE INSTALLED AS A "DRAG SECTION."

5. IN AREAS WHERE PERMANENT ROW IS NOT LEFT AS ACCESS, SURFACE SHALL BE RESTORED AS SLOPE CONDITIONS ALLOW. THE FINISHED SURFACE SHALL HAVE WATER BARS INSTALLED, SLOPE MATTING PLACED, RESEEDING AND RE-VEGETATION WORK COMPLETED AS REQUIRED.

RIDGE TOP SPOIL CONTINGENCY TABLE

GRADE	WIDTH
2% TO 10% GRADE	100'
10% TO 20% GRADE	125'
20% TO 30% GRADE	150'
OVER 30%	SITE SPECIFIC

REFERENCE DRAWINGS

DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT
TYPICAL RIDGE TOP
RIGHT-OF-WAY SECTION

Williams
GAS PIPELINE

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

DRAWN BY: KLL	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NONE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: FIGURE 1B-4	SHEET 1 OF 1

KALAMA LATERAL PIPELINE PROJECT

Joint Aquatic Resources Permit Application

APPENDIX C

Erosion Control and Revegetation Plan

(ECRP)

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Attachment C FERC's Wetland and Waterbody Construction and Mitigation Procedures

1.0 INTRODUCTION

The intent of this Erosion Control and Revegetation Plan (ECRP) is to outline the erosion control and revegetation procedures that Northwest Pipeline LLC (Northwest) will utilize during construction of the Kalama Lateral Project (Project) in Cowlitz County, Washington. The Project involves construction of approximately 3.1 miles of 24-inch diameter natural gas pipeline and related facilities extending from Northwest's mainline to Northwest Innovation Works' (NWIW) proposed methanol production facility (Methanol Plant) located within the north industrial area of the Port of Kalama, in Cowlitz County, Washington.

The Project, which is designed to deliver 320,000 dekatherms per day of natural gas, will begin at the interconnection of Northwest's existing Ignacio/Sumas 30-inch diameter mainline at approximate milepost (MP) 1254.1 in Section 33, Township 7 North, Range 1 West in Cowlitz County, Washington and will be located within a new 50-foot wide permanent pipeline easement. The Project will require new appurtenances including a new tap and isolation valve, to tie the proposed 24-inch diameter lateral pipeline into the existing 30-inch diameter mainline. Additionally, pigging facilities will be installed at the beginning of the Project (MP 0.0) and at the new delivery meter station (NWIW Meter Station) (MP 3.07) to be constructed within the boundary of the Methanol Plant. The NWIW Meter Station will include standard appurtenances, piping, and buildings within an approximate 150-foot-wide by 200-foot-long fenced area.

1.1 Schedule

Northwest proposes to commence construction of the Project in July 2017 to take advantage of the dry summer construction season and place the new facilities in service by November 2017. The proposed schedule will minimize potential landowner and environmental effects and facilitate construction progress.

2.0 SITE DESCRIPTION

2.1 Pipeline Facilities

At MP 0.0, a new take-off and interconnection facility will be installed including a new 24-inch tap, valve, pig launcher and other associated piping. The take-off facility will include a newly constructed 0.2 acre (75 foot by 100 foot) fenced and graveled yard.

At the pipeline lateral terminus at MP 3.1, Northwest will construct the Kalama Lateral Meter Station to provide 320,000 Dth/d. The meter station includes two 12-inch ultrasonic meter assemblies, a 6-foot by 8-foot EFM building, a pig receiver and other associated piping. The meter station facility includes approximately 0.7 acre of permanent disturbance located within the proposed Methanol Plant.

2.2 Existing Site Conditions

The Project is situated within the Puget-Willamette Lowlands Subdivision of the Pacific Mountain Physiographic Division (U.S. Department of Agriculture [USDA], 2006a). The Puget-Willamette Lowlands extend from the Canadian border southward to Eugene, Oregon. In Washington the Puget Sound Valley consists of nearly level lacustrine deposits and dissected glacial till and glacial outwash. The Project area consists of steep

ridges surrounding Mount Pleasant along the eastern portion of the route and nearly level areas surrounding the Columbia River Floodplain along the western portion of the route.

The climate of the Project area is greatly tempered by winds from the Pacific Ocean. Summers are fairly warm, but hot days are rare. Winters are cool, but snow and freezing temperatures are not common. During summer, rainfall is extremely light. Several weeks in summer often pass without precipitation. During the rest of the year rains are frequent, especially in late fall and winter.

In winter, the average temperature is 43 degrees Fahrenheit (°F) and the average monthly minimum temperature is 35.8 °F. In the summer, the average temperature is 64.2 °F and the average monthly maximum temperature is 76.3 °F. Total annual precipitation is 48.15 inches in Kalama. Of the total annual precipitation, 28 percent usually falls during April through September (The Weather Channel, 2014).

The Project will cross seven waterbodies and three wetlands totaling 2,372 feet. Of the seven waterbodies crossed by the Project two are perennial. The remaining five waterbodies are intermittent and expected to be dry at the time of construction.

2.3 Proposed Construction Activities

The Project will be designed, constructed, operated and maintained in accordance with Department of Transportation regulations in 49 Code of Federal Regulations (CFR) Part 192, *"Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards;"* 18 CFR Part 2.6, "*Guidelines to be Followed by Natural Gas Pipeline Companies in the Planning, Clearing and Maintenance of Rights-of-Way and the Construction of Aboveground Facilities;*" above, Northwest will also construct and reclaim the pipeline and aboveground facilities in accordance with the Federal Energy Regulatory Commission (FERC) *Upland Erosion Control, Revegetation, and Maintenance Plan* (FERC's Upland Plan) (Attachment B), FERC's *Wetland and Waterbody Construction and Mitigation Procedures* (FERC's Procedures)(Attachment C) and other applicable federal and state regulations.

2.3.1 Pipeline Construction

Pipeline construction will primarily occur between July 2017 and November 2017. Northwest will prepare to receive materials and pipe at the proposed contractor and pipe yard in Spring 2017. Restoration will occur during the late Summer or early Fall of 2017. The construction sequence is as follows and is described in detail in the following sections:

- Pre-Construction Survey;
- Clearing and Grading;
- Installation of Erosion Control Measures;
- Topsoil Segregation;
- Trenching and Pipeline Installation;
- Hydrostatic Testing; and
- Restoration.

2.3.1.1 Pre-Construction Survey

Prior to construction the limits of disturbance will be clearly marked/staked including the construction right-of-way (ROW), temporary extra workspace areas (TEWA), approved access roads and staging/stockpile areas. Utility lines or other foreign lines and drain lines

will be located and marked to prevent accidental damage during pipeline construction. Sensitive areas to be protected from disturbance will be delineated using t-posts/stakes with brightly colored flagging or construction fence so as to be readily visible to equipment operators and construction personnel. Sensitive areas will be shown on the alignment sheets and discussed during pre-construction environmental training. Equipment will only be allowed to enter and operate within the delineated limits of the construction ROW (including TEWAs and staging/stockpile areas) and approved access roads. Flagging, signs and other markings identifying the limits of disturbance will be maintained through all phases of construction and routinely checked by the Environmental Inspector (EI) to ensure construction activities are restricted to the certificated limits.

Construction will use a 100-foot wide construction ROW, with additional TEWAs at designated locations (i.e., at road or waterbody crossings) where additional staging areas are required. A number of areas (such wetlands and residential areas) will require the construction ROW to be reduced to 75-feet in width to minimize disturbance. Where feasible, based on site-specific conditions and engineering constraints, TEWAs have been located at least 50 feet away from wetland and waterbody boundaries to minimize impacts to wetland buffers and riparian areas consistent with FERC's Procedures.

2.3.1.2 Clearing and Grading

Brush and trees within the construction ROW and TEWAs will be felled or sheared so as to prevent damage to adjacent trees and structures and will be felled away from wetlands and waterbodies. 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. Any 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 will be returned to the waterbody during bank restoration. The Project will not cross any Type F streams. When possible, logs and slash will not be yarded across Washington State Department of Natural Resources (WDNR) Type N streams. Where temporary crossing of Type N streams is necessary, the direction of log movement between stream banks shall be designed to minimize sediment delivery to streams. Landings for clearing operations will not be located in wetlands 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. Construction through these areas will be minimized and the logs will be transported so as to minimize damage to adjacent trees and vegetation, where possible. All clearing operations will follow conditions specified in the Project's Hydraulic Project Approval (HPA) issued by the Washington Department of Fish and Wildlife (WDFW).

No off ROW vegetation shall be cleared between TEWAs and the edge of stream banks and/or wetlands. Grading of the construction ROW in upland areas shall 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 trench in wetlands unless it is determined that safety-related construction constraints require removal of tree stumps from under the working side of the ROW. Minimizing stump and root system removal will accelerate restoration efforts by allowing sprouting species to reestablish from existing root systems.

2.3.1.3 Installation of Erosion Control Measures

Temporary erosion control measures are installed immediately after clearing and prior to grading (initial soil disturbance). 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 3.1 describes in detail the temporary erosion control procedures that will be implemented during Project construction to minimize potential impacts from erosion and sedimentation.

2.3.1.4 Topsoil Segregation

The mixing of topsoil with subsoil from construction activities could result in a loss of soil fertility. To prevent mixing of the soil horizons or incorporation of excess rock into the topsoil, topsoil segregation will be performed. FERC's Upland Plan requires topsoil segregation in 1) actively cultivated or rotated agricultural lands, 2) pastures and hayfields and 3) other areas at the landowner's request. In these areas, FERC's Upland Plan requires either full ROW or trench and subsoil storage area (ditch plus spoil side) stripping. Segregated topsoil will be stockpiled separately from subsoil in accordance with FERC's Upland Plan. In accordance with FERC's Upland Plan Northwest will import and replace topsoil in residential areas to minimize work spaces on residential properties.

In wetland areas FERC's Procedures require the top 12 inches over the trenchline to be salvaged, except in areas where standing water or saturated soils are present. Areas where topsoil segregation will occur are shown on the alignment sheets.

2.3.1.5 Trenching and Pipeline Installation

Section 3.0 in Appendix B describes the procedures that will be implemented during trenching and installation of the new 24-inch diameter pipeline.

After installation of the new 24-inch pipeline and prior to backfilling, Northwest will install trench plugs (Attachment A, Drawing 2504.34-X-0001), consistent with the requirements of FERC's Upland Plan (Section V.B.1). Trench plugs will be installed at the base of slopes adjacent to wetlands and waterbodies and where needed to avoid draining of wetlands. Trench plugs may be constructed from sandbags, foam, or bentonite. Topsoil will not be used to fill the bags. Trench plugs will be installed on slopes to minimize water flow down the trenchline to prevent potential subsurface erosion and to maximize stability.

2.3.1.6 Hydrostatic Testing

After backfilling, the pipeline will be hydrostatically tested in accordance with DOT regulations to ensure that the system is capable of operating at the design pressure. Hydrostatic test water will be discharged to the ROW or to a water tank or water trucks. If discharged to the ROW, the test water would be discharged in a manner to prevent erosion from scour and to prevent sedimentation of adjacent wetlands or waterbodies. The test water would be discharged into a dewatering structure to dissipate energy, filter out any sediment and to allow discharge as sheet flow (Attachment A, Drawing 2504.34-X-0002). Northwest would discharge all hydrostatic test water in a TEWA in an upland area at the end of the Project near MP 3.1 which is at a significant distance from wetland and waterbodies to ensure that all water infiltrates and does not flow into a wetland or waterbody.

2.3.1.7 Restoration

After the pipeline trench is backfilled and the pipe tested, disturbed areas will be restored to original or as near as possible original contours. Permanent erosion control measures will be installed as discussed in Section 3.0 of this ECRP.

3.0 BEST MANAGEMENT PRACTICES

ECRP provides site-specific directions for installing temporary and permanent erosion control measures or best management practices (BMP) to prevent or minimize erosion. Typical BMPs that may be used during construction are illustrated in Attachment A. Erosion control materials will be stored at the Project's proposed contractor yard.

Northwest will employ one EI for the Project. The EI will be on site during active construction and will have peer status with all other activity inspectors. The EI will have authority to stop activities that violate the measures set forth in this ECRP as well as other authorizations and will have the authority to order corrective action. At a minimum, the EI will be responsible for:

- Ensuring compliance with the measures set forth in this ECRP, the requirements of the FERC's Upland Plan, FERC's Procedures and all other environmental permits and approvals, as well as environmental requirements in landowner agreements;
- 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;
- Identifying erosion/sediment control and stabilization needs in all areas;
- Locating dewatering structures and slope breakers to ensure they will not direct water into 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 shall be stopped and corrective action taken to prevent reoccurrence;
- Testing subsoil and topsoil in pastures and residential areas to measure compaction and determine the need for corrective action;
- Advising the Chief Inspector when conditions (such as wet weather) make it advisable to restrict construction activities to avoid excessive rutting;
- Ensuring restoration of contours and topsoil;

- Approving imported soils for use in residential areas and verifying that the soil is certified free of noxious weeds and soil pests;

- Determine the need for and ensuring that erosion controls are properly installed, as necessary, to prevent sediment flow into wetlands, waterbodies, sensitive areas and onto roads. 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 of rainfall. Inspections should be recorded and records maintained for review upon request.

- Ensuring the repair of all ineffective temporary erosion control measures as soon as possible but within 24 hours of 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; and

- Identifying areas that should be given special attention to ensure stabilization and restoration after the construction phase.

3.1 Temporary Erosion Control Procedures

Temporary erosion controls will be installed immediately after initial disturbance (clearing) 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 the EI will determine 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.

3.1.1 Construction Ingress and Egress

Northwest has identified ingress/egress points to the construction ROW using existing public and private roads that are crossed by the ROW. These ingress/egress points are shown on the alignment sheets. Traffic will move along the construction ROW within the construction ROW.

In designated areas, as determined by the EI, Northwest will install construction entrances (Attachment A, Drawing 2504.34-X-0004, at ROW access points that intersect paved roads to reduce sediment transport onto the roadway.

3.1.2 Sediment Barriers

Sediment barriers will be used to confine sediment to the construction ROW and will be constructed of either silt fence or certified weed-free straw bales (Attachment A, Drawing 2504.34-X-0005). Generally, silt fence will be used where sediment barriers are required parallel to the ROW. Certified weed-free straw bales (or comparable) will be used in locations where sediment barriers are required to cross the construction ROW along the

travel lane such as at waterbody and wetland crossings. These structures 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 ROW 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 Procedures; and
- on the down slope side of the ROW where it traverses steep side slopes.

Drawing 2504.34-X-0006 in Attachment A shows the placement of temporary sediment barriers adjacent to road crossings. An example of sediment control in ditches and swales is shown on Drawing 2504.34-X-0007 in Attachment A. Examples of sediment barrier installations during construction at wetlands and streams are shown on Drawings 2504.34-X-0008, 0009 and 0010 in Attachment A. 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. Northwest'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 ROW to ensure that runoff is properly treated and that sediment is properly contained on the ROW.

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, however, state and other local jurisdictions may require more frequent inspection of erosion control structures. The EI will be responsible for ensuring the repair of ineffective temporary erosion control measures as soon as possible but within 24 hours of 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 ROW sedimentation.

Temporary sediment barriers will be maintained in place until permanent revegetation measures are 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.

3.1.3 Temporary Slope Breakers

Northwest will install temporary slope breakers to reduce runoff velocity, concentrated flow and to divert water off the construction ROW to avoid excessive erosion (Attachment A, Drawing 2504.34-X-0011). Temporary slope breakers may be constructed of materials such as soil, silt fence, staked certified weed-free straw bales, 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 ROW. The outfall of the slope breakers will be positioned to avoid sedimentation of wetlands, waterbodies and other sensitive areas. Prior to construction, Northwest will consult with Natural Resources Conservation Service (NRCS) regarding spacing of temporary and permanent slope breakers and will update the spacings listed below if the NRCS spacing recommendations are more stringent than the FERC's standard recommendations below.

Northwest will install temporary slope breakers on all slopes greater than 5 percent at the following spacing, unless the EI determines that a closer spacing is necessary.

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

3.1.4 Mulch

Although not expected, 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, Northwest will apply mulch on all disturbed slopes before seeding. Mulch will also be applied if construction and restoration activities are interrupted for extended periods. 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 (certified weed-free) or its equivalent. In addition, the mulch application rate will also be increased to 3 tons/acre on steep slopes and all slopes within 100 feet of waterbodies and wetlands. The mulch will consist of certified weed-free straw or wood fiber hydromulch.

3.1.5 Erosion Control Fabric

Northwest will install erosion control fabric (such as jute or excelsior) on stream banks at the time of recontouring (Attachment A, Drawing 2504.34-X-0012). The fabric will be anchored using staples or other appropriate devices. The erosion control fabric to be used on stream banks and steep slopes will be designed for the proposed use and will be approved by the EI.

3.1.6 Dust Control

During summer construction in the Project area, fugitive dust may be a potential impact along the construction ROW and especially where construction occurs in residential areas. To control dust the EI will limit traffic speeds and direct watering if necessary, in accordance with Northwest's Fugitive Dust Control Plan. Watering trucks will spray only enough water to control the dust or to reach the optimum moisture content of the soil for compaction. Run-off should not be generated during this operation. Dust will be controlled on paved roadways by sweeping (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 will be disposed of properly. Water for dust control will be obtained from a municipal source.

3.1.7 Waterbody Crossings

Waterbody crossings not installed using horizontal directional drill (HDD) techniques will be completed using dry open cut procedures (i.e., dam and pump or fluming) if water is present at the time of the crossing, (Attachment A, Drawing 2504.34-X-0009 and 0010) consistent with the requirements of federal, state and local agencies with specific authority and expertise to regulate impacts from the Project. Detailed procedures for these crossing methods will be provided to the County.

Five of the seven waterbodies on the Project are intermittent and are expected to be dry during construction. The remaining two waterbodies will be crossed using the HDD method. Where feasible, based on site-specific conditions (e.g., topography, engineering constraints), Northwest designed each crossing such that TEWAs are not closer than 50 feet from waterbody boundaries, except where the adjacent upland consists of other disturbed land consistent with FERC's Procedures (V. B. 2. a. & b.). In those locations where Northwest determined a 50-foot setback was not feasible, a request for a variance from this section of FERC's Procedures has been requested from the FERC.

Northwest will utilize temporary construction bridges during all phases of construction to cross waterbodies. These structures will be designed according to FERC's Procedures as well as according to conditions required by the U.S. Army Corps of Engineers and WDFW HPA. The temporary equipment bridges will be constructed to maintain unrestricted flow and to prevent soil from entering the waterbody. Soil will not be used to stabilize equipment bridges. Bridges will be designed to withstand and pass the highest flow expected to occur while the bridge is in place and, where feasible, bridges will be designed to span the entire ordinary high water mark (OHWM) of the waterbody. If it is not possible to span the OHWM with the bridge, a temporary pier may be required. 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.

Sediment barriers will be installed immediately after initial disturbance of the waterbody or adjacent upland. 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.

3.1.8 Wetland Crossings

All wetlands will be crossed in accordance with FERC's Procedures. Drawing 2504.34-X-0008 in Attachment A shows the typical wetland crossing methods that would be utilized during construction. Wetlands crossed by or in close proximity to the Project are shown on the alignment sheets.

Sediment barriers will be installed immediately after initial disturbance (clearing) of the wetland or adjacent upland. 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 ROW immediately upslope of the wetland boundary to prevent sediment flow into the wetland. Where wetlands are adjacent to the construction ROW, sediment barriers will be installed along the edge of the construction-ROW, 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.

Where feasible, based on site-specific conditions (topography, engineering constraints), Northwest designed each crossing such that TEWAs are not closer than 50 feet from

wetland boundaries, except where the adjacent upland consists of other disturbed land consistent with FERC's Procedures (VI. B. 1. a. & b.).

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, Northwest will use low-ground-weight construction equipment or will operate normal equipment on timber riprap or standard prefabricated equipment mats utilized on current projects. Equipment mats are comprised of wood and serve to distribute the weight of equipment. Rocks, soil imported from outside the wetland, tree stumps, or brush riprap will not be used to support equipment on the construction ROW. If trees are utilized as timber riprap or equipment mats to support equipment in saturated areas on the ROW, they will be obtained from clearing operations and will not be cut outside of the approved construction work areas. Where timber riprap is used, Northwest will attempt to use no more than two layers of riprap to support equipment on the construction ROW. All materials utilized to support equipment on the construction ROW 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 ROW, dig the trench, fabricate and install the pipe, backfill the trench and restore the ROW. 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, Northwest will limit all other construction equipment to one pass through the wetland using the ROW in wetlands that cannot be appropriately stabilized.

3.1.9 Spill Prevention and Equipment Fueling and Maintenance

Northwest has developed a Spill Plan for Oil and Hazardous Materials (Spill 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 Spill Plan will be updated with site-specific information prior to construction. All Project employees will receive Spill Plan training.

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 ROW. However, certain areas are restricted from these activities. Hazardous materials, chemicals, fuels and lubricating oils will be stored in upland areas at least 100 feet from waterbodies and wetlands or in accordance with FERC's Procedures. Restricted areas for storage of these materials will be clearly marked in the field. Concrete coating, refueling and equipment maintenance activities will also be conducted according to FERC's Procedures. Concrete trucks will not be washed on the ROW. All hazardous materials will be handled in accordance with the Spill Plan. If any unanticipated spill occurs during construction, Northwest will implement the procedures outlined in the Spill Plan.

3.1.10 Material Delivery and Storage

Northwest will use the proposed contractor yard for the Project for material delivery and storage. Materials will be brought onto the ROW as they are needed and will be located away from waterbodies and wetlands. Secondary containment will be provided for liquids.

3.2 Permanent Erosion Control Measures

Permanent erosion control measures that will be used to reduce pollutants in 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 pollutant discharges, including sediments from the site after the Project is complete.

3.2.1 Trench Breakers

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 hydrology. Northwest 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 (Attachment A, Drawing 2504.34-X-0001).

Trench breakers will generally be spaced according to the following spacing, unless directed by the EI or authorized company representative.

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

Trench breakers shall consist of foam or approved sacks filled with a minimum 0.6 cubic feet of sand. Sacks shall not be filled with topsoil. Trench breakers shall be keyed into the trench sidewall where determined necessary by the EI or authorized company representative.

3.2.2 Permanent Slope Breakers

As required by FERC's Upland Plan, slope breakers (water bars) (Attachment A, Drawing 2504.34-X-0011) will be installed with a two to eight percent outslope, and flow will be diverted to a stable area. If a stable area is not present, a temporary energy-dissipating device will be installed at the end of the breaker.

The frequency of permanent slope breakers will be based on the Upland Plan which is the same spacing as temporary slope breakers (Section 3.1.3) since the NRCS did not provided a spacing recommendation. The EI or Northwest's authorized representative may modify the spacing based on site-specific characteristics such as slope, surface materials, elevation, expected waterfall and opportunity to install the slope breakers based on the ROW configuration and topography, as well as experience. The permanent slope breakers will be installed in all areas except agricultural fields, hayfields, pastures and lawns Soil Compaction

Northwest will test for soil compaction in agricultural (e.g., pastures) and residential areas. Tests will be conducted on the same soil type under similar moisture conditions as specified in Section V.C.1 of FERC's Upland Plan. Pursuant to Section II.B.8 of FERC's

Upland Plan, the EI will be responsible for conducting subsoil and topsoil compaction testing and determining corrective measures. Compaction will be relieved in residential areas based on site-specific conditions.

3.2.3 Revegetation

Revegetation will be performed as outlined in Section 7.0 of this ECRP.

4.0 MAINTENANCE AND PERIODIC EVALUATION

Erosion control structures will be maintained in accordance with FERC's Upland Plan. 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 should evaluate erosion control measures prior to a predicted storm event and implement measures needed to prevent off ROW sedimentation. Inspections should 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. The EI will notify Project construction crews when poor weather conditions prevail and when to initiate adequate 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.

5.0 HYDROSTATIC TEST WATER AND DEWATERING

5.1 Hydrostatic Testing

After trench backfilling, the pipeline will be hydrostatically tested in accordance with DOT regulations to ensure that the pipeline is capable of operating at design pressure. The HDD will also require pre-installation and post-installation hydrostatic testing. All hydrostatic test water will be obtained from the City of Kalama's municipal system or from sources developed to serve NWIW's proposed Methanol Plant. Hydrostatic test water will not be withdrawn from surface waters, unless approvals are obtained from the WDOE and WDFW.

5.2 Dewatering

During construction there is the potential, in areas of high groundwater, that trench dewatering may be required. Generally, these areas are associated with the Columbia River floodplain and wetlands. However, the construction schedule will generally coincide with the period when the soils in these areas are expected to be at their driest.

5.3 Water Discharge

No hydrostatic test water or water from trench dewatering will be discharged directly to waterbodies or wetlands. The water discharge from these activities will be directed to a certified weed-free straw bale dewatering structure to dissipate energy to prevent erosion and to filter the discharge in order to avoid sedimentation (Attachment A, Drawings

2504.34-X-0002 and 2504.34-X-0003). The discharge will occur to an appropriately sized dewatering structure based on the expected quantity of water to be discharged. The discharge location is located in an upland area 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. Northwest's EI will visually monitor the release of hydrostatic test water and trench dewatering activities to ensure that no erosion or sedimentation occurs. In addition, the EI will ensure that turbid water is not discharged to waters of the State. If the EI determines that a discharge is occurring, the receiving water will be visually monitored for turbidity. If turbidity is observed, the dewatering operations would be immediately adjusted or reinstalled or maintained to ensure that the discharge to surface water is stopped and water quality standards are not exceeded.

6.0 NON-STORMWATER DISCHARGES

The main non-stormwater discharges associated with construction of the pipeline are trench dewatering and hydrostatic test water discharge. All water associated with trench dewatering will be pumped to an appropriately sized discharge structure (Attachment A, Drawing 2504.34-X-0003). Water associated with trench dewatering and hydrostatic testing will not be directly discharged to waterbodies.

7.0 RESTORATION AND REVEGETATION

Initial reclamation of the disturbed areas will begin as soon as practical after construction. Open cut crossings and waterbodies will be stabilized and temporary sediment barriers will be installed within 24 hours in accordance with FERC's Procedures (Section V.C.2). Final grading and permanent erosion control measures will be completed within 20 days (10 days in residential areas) after the trench is backfilled, weather and soil conditions permitting. During final clean-up and initial reclamation, permanent repairs of fences, gates, drainage ditches and other structures removed or damaged during construction will be completed.

Northwest will work with individual landowners to address restoration of pastures and residential lawns, ornamental shrubs and other landscaping. In residential areas, Northwest will utilize contractors familiar with local horticultural and lawn establishment procedures for reclamation work or will compensate the landowner to restore these areas. In residential areas, specific reclamation procedures will be determined during negotiations with individual landowners.

7.1 Recontouring

All graded areas associated with pipeline construction will be regraded and contoured to blend into the surrounding landscape and to reestablish natural drainage patterns. Emphasis during recontouring will be to return the entire ROW to its approximate original contour, to stabilize slopes, control surface drainage and to provide a more aesthetic appearance. During restoration, areas of rugged topography will be regraded to a stable configuration to minimize erosion and allow long-term maintenance (See Figure 1B-4 in Appendix B, Project Desc). Grades will be restored such that there are no abrupt changes in grade (exposed cut banks or obvious fill slopes) at the margins of the construction ROW. Ruts and other scars will be filled 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 the original or better condition. No other culverts will be installed except those permitted by the appropriate federal, state and/or local agencies.

7.2 Construction Debris Disposal

During final cleanup, all construction debris (e.g., timber, slash, mats, garbage, drilling fluids, excess rock, etc.) will be cleared from the ROW and disposed of in accordance with state and local regulations.

7.3 Soil Compaction

Northwest will test for soil compaction in residential areas and pastures. Tests will be conducted on the same soil type under similar moisture conditions as specified in Section V.C.1. in FERC's Upland Plan. Pursuant to FERC's Upland Plan, the EI will be responsible for conducting subsoil and topsoil compaction testing and determining corrective measures. Compaction will be relieved in residential areas based on site-specific conditions.

7.4 Scarification

Prior to respreading the topsoil, the ROW will be scarified (where necessary as determined by the EI) by ripping or chiseling to loosen compacted areas from equipment traffic. Scarifying the subsoil will also promote water infiltration and improve better soil aeration and root penetration.

Where compaction is evident and deemed necessary, scarification will occur in disturbed areas, including the passing lane or TEWA, even if these areas were only scalped of vegetation or driven over. Scarification will be at least 12 inches deep with rippers spaced not more than 16 inches apart. Ripping and chisel plowing will also occur when materials are dry to promote the shattering of compacted layers.

In wetlands, scarification is not anticipated because traffic will be limited in these areas to that needed to clear the ROW, dig the trench, fabricate and install the 24-inch pipeline, backfill the trench and restore the ROW. Equipment mats will be utilized in wetlands where soils are saturated, or where standing water is present, to stabilize these areas and minimize compaction. Therefore, 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.

7.5 Soil Replacement

All topsoil salvaged will be uniformly spread over the portions of the ROW 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 retopsoiled areas will be restricted. The EI will be responsible for ensuring that topsoil imported into residential areas for replacement is free of noxious weeds or other deleterious materials.

7.6 Rock Removal

FERC's Upland Plan requires the removal of excess rock the top 12 inches of soil to the extent practicable in all rotated and permanent croplands, hayfields, pastures, residential areas and other areas at the landowner's request. In these areas, Northwest will clean up excess rock to a condition similar to adjacent portions of the construction ROW (e.g., size, density and distribution of rock) unless the landowner and Northwest negotiate other requirements. The rock collected from these operations will either be hauled to an approved landfill or commercial quarry or will be disposed of in upland areas within the certified construction limits, with approval of the landowner. The use of alternate disposal locations will be approved by FERC.

7.7 Seedbed Preparation

Seedbed preparation will be conducted 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 ROW cleanup procedures should be sufficient because it leaves 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 discing may be necessary to prepare an adequate seedbed. Where residential lawns or landscaped areas are disturbed, more intensive ground and seedbed preparations may be required including rock collection, grading and soil preparation/amending.

7.8 Fertilization

The NRCS did not make recommendations regarding fertilization for restoration and revegetation of areas disturbed by construction. Prior to construction Northwest will consult with the Cowlitz County agricultural extension office for recommendations for fertilizer and other soil amendments.

7.9 Seed Mixtures and Supplemental Plantings

Reseeding of the ROW will consist of recommended seed mixes, rates, and dates based on the recommendation from the local soil conservation authorities. Table 7.9-1 describes the recommended seed mixtures per the recommendation from NRCS.

TABLE 7.9-1 Recommended Seed Mixtures			
Seed Mixture 1 – Upland ROW Areas			
Minimum percentage of mix for each grouping (by weight)	**Common Name**	**Scientific Name**	**lbs/ac (PLS)**
Perennial Grasses			
50%	Bentgrass, Colonial or Highland	*Agrostic teunuis (capillaris)*	50
	Bluegrass, Canada	*Poa compressa*	50
	Bluegrass, Rough-stalked	*Poa trivialis*	50
	Fescue, Chewing	*Festuca rubra commutate*	50
	Fescue, Creeping Red	*Festuca rubra*	50
	Fescue, Hard	*Festuca trachyphylla (F. brevipila or ovina duriuscula)*	50
Legumes			
10%	Alfalfa	*Medicago sativa*	50
	Clover, Alsike	*Trifolium hybridum*	50
	Clover, Red	*Trifolium pratense*	50
	Clover, White	*Trifolium repens*	50
	Trefoil, Big	*Lotus uliginosus*	50
	Trefoil, Birdsfoot	*Lotus corniculatus*	50
	Lupine	*Lupinus spp.*	50
Annuals or Short-Lived Perennials			
40%	Brome, California	*Bromus carinatus*	50
	Oats or Wheat	*Avena sativa or Triticum spp.*	50
	Ryegrass, Annual or Italian	*Lolium multiflorum*	50
	Ryegrass, Perennial or English	*Lolium perenne*	50
	Wheatgrass, Slender	*Elymus trachycaulus*	50
	Wildrye, Blue	*Elymus glaucus*	50
Seed Mixture 2 – Seed Mixture for Wetlands			
	Perennial Grasses (Common Name)	***Scientific Name***	**lbs/ac**
To be determined in consultation with Cowlitz County and NRCS prior to construction.			

7.10 Seeding Timing

Disturbed areas will be seeded within six working days of final grading, weather and soil conditions permitting. It is expected that seeding of restored ROW areas will begin by mid-September and proceed until all areas have been reseeded. If seeding is not completed during the seeding window (weather dependent), a temporary winter cover, consisting of cereal rye or winter wheat at a bulk rate of 120 lbs/ac, will be considered by the EI or Northwest's authorized representative to ensure adequate erosion control. Where a temporary winter cover is planted, it will be planted by mid-October and would be included with the permanent seed mixture.

7.11 Seeding Methods

Seeding will be conducted using either a seed drill or broadcast and hydroseeding according to the guidelines in FERC's Upland Plan. Where broadcast seeding occurs,

other than hydroseeding, the seeded area will be lightly dragged with chains or other appropriate harrows to lightly cover the seed. Fertilizer and mulch will not be used in wetlands.

7.12 Supplemental Wetland and Riparian Plantings

To mitigate impacts to riparian areas, Northwest will plant native shrubs and trees in areas where these species existed prior to construction or to enhance existing conditions where landowners allow. Table 7.12-1 provides a list of suggested native trees and shrubs that are common in the Project area in these habitats and which would be planted after final restoration and cleanup during appropriate planting periods (during the winter and early spring). To complete these restoration plantings, Northwest will select a local restoration contractor who is knowledgeable about wetland and riparian ecosystems as well as with the species' characteristics and site growth requirements listed in Table 7.12-1. 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 7.12-1. Disturbed riparian areas will be replanted with tree and shrubs according to FERC's Procedures (Section V.C.6. and V.D.1). Shrubs will be planted and allowed to grow within 5 feet of the pipeline centerline and trees will not be planted within 15 feet of either side of the pipeline centerline to facilitate corrosion and leak surveys and to prevent roots from damaging pipe coatings. In riparian areas, shrubs and trees will be planted across the ROW for a width of 25 feet from the waterbody banks subject to the existing land uses and landowner approval.

7.13 Mulch

Mulch will be applied on slopes where necessary to stabilize the soil. The mulch will be uniformly applied at a rate of 2 tons/acre to cover at least 75 percent of the ground surface. Mulching will occur during seeding (where hydroseeded) or immediately after seeding where broadcast or drill seeding occurs. All straw utilized for mulch will be certified weed-free. 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.

7.14 Residential Landscaping

In residential areas Northwest would initiate cleanup operations immediately following backfill operations in all lawn and landscaped areas within 10 days after backfilling the trench, consistent with FERC's Upland Plan (Section V.A.1). This includes final grading, topsoil replacement and installation of permanent erosion control structures. Residential landscaping will be restored by a local landscaping contactor familiar with local conditions. Landscaping may include lawns, shrubs, trees, fences, irrigation systems and other landscape features as negotiated during Northwest's easement agreements.

TABLE 7.12-1

Native Shrub and Tree Plantings for Restoring Riparian Areas

Common Name	Scientific Name	Planting Size	Plant Spacing
SHRUBS			
Wet Sites			
Salmonberry	Rebus spectablilis	Cutting	No recommendation
Red-Osier Dogwood	Cornus stolonifera	Cuttings	No recommendation
Douglas spirea	Spiraea douglasii	Divisions, cuttings	No recommendation
Moist Sites			
Black Twinberry	*Lonicera involucrate*	Cutting	No recommendation
Cascara	*Rhamnus purshiana*	Cutting	No recommendation
Hazelnut	*Corylus cornuta*	Seeds	No recommendation
Indian Plum	*Oemleria cerasiformis*	Seeds	No recommendation
Mock Orange	*Philadelphus lewisii*	Cuttings	No recommendation
Oceanspray	*Holodiscus discolor*	Seed	No recommendation
Pacific Ninebark	*Physocarpus captitatus*	Cuttings	No recommendation
Red Elderberry	*Sambucus recemosa*	Cuttings	No recommendation
Sitka Alder	*Alnus sinuate*	Seedlings	No recommendation
Bigleaf Maple	*Acer macropyllum*	Seedlings	No recommendation
Douglas-fir	*Pseudotuga menziesii*	Seedlings	No recommendation
Red Alder	*Alnus rubra*	Seedlings, cuttings	No recommendation
Dry Sites			
Tall Oregon Grape	Berberis aquifolium	Cuttings	No recommendation
TREES			
Wet Sites			
Western Redcedar	*Thuja plicata*	Seedlings	No recommendation
Black Cottonwood	*Populus trichocarpa*	Cuttings	No recommendation
Douglas spirea	*Spiraea douglasii*	Divisions, cuttings	No recommendation
Willows	*Salix spp.*	Cuttings	No recommendation
Red-Osier Dogwood	*Cornus stolonifera*	Cuttings, layers	No recommendation
Moist Sites			
Red Alder	*Alnus rubra*	Seedling	No recommendation
Douglas-fir	*Psuedotsuga menziesii*	Seedling	No recommendation
Bigleaf Maple	*Acer macropyllum*	Seedling	No recommendation
Western Hemlock	*Thuja plicata*	Seedling	No recommendation
Oceanspray	*Holodiscus discolor*	Seed	No recommendation
Indian Plum	*Oemleria cerasiformis*	Seed, cuttings	No recommendation
Dry Sites			
None recommended			

7.15 Noxious Weeds

Based on consultations with the NRCS in Washington the best way to control the establishment of invasive species is to plant desirable vegetation at relatively high rates so they provide vigorous completion. In addition, Northwest would include the following measures to ensure that the potential spread of noxious weeds is minimized.

- Prior to transporting to the construction ROW, all equipment will be inspected to ensure it is clean and free of potential weed seed or sources (i.e., soil roots or rhizomes). All equipment hauled into Cowlitz County should be cleaned before entering the County. Inspection of all equipment and trucks used on the Project to ensure they are clean will be the responsibility of the EI or Northwest's authorized representative.

- Certified weed-free straw will be used for mulch and sediment barriers, dewatering structures, or other uses along the ROW. The EI or Northwest's authorized representative will be responsible to ensure that all straw hauled to the construction yard will be certified weed-free. The State of Washington Noxious Weed Control Board [1] has a Weed Free Hay and Mulch Program and producers of certified hay and mulch are listed at the following web site http://agr.wa.gov/PlantsInsects/WWHAM/docs/WWHAMCertifiedGrowers.pdf.

- Prior to clearing, the Project will be surveyed for areas that may be infested with priority noxious weeds that are listed on the County's priority noxious weed list. These are weeds listed on the County's current noxious weed list as Class A weeds. Class A weeds are non-native species that have limited distribution in Washington. Preventing new infestations and eradicating existing infestations are the highest priority for the state and eradication is required by law (17.10 Revised Code of Washington). Surveys will be conducted by Northwest's EI or authorized representative. Infested areas would 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 ROW.

- In areas where infestations have been identified or noted in the field, the Contractor will stockpile cleared vegetation and salvage topsoil adjacent to the area from which they are stripped to eliminate the transport of soil-born noxious weed seeds, roots, or rhizomes. During reclamation, the Contractor will return topsoil and vegetative material from infestation sites to the areas from which they were stripped. Any clearing equipment used in areas of Class A weeds would be cleaned by hand or blown down with air prior to leaving the site. Infested areas would be mapped to ensure that these areas would be monitored during operations so that the weeds would be controlled and would not spread.

- Where weed control is necessary, Northwest will employ mechanical methods (mowing, discing, etc.,) to prevent the spread of these weeds or will employ a licensed contractor to ensure that the appropriate herbicides are utilized for the targeted weed species during the proper phenological period at the specified rate. The contractor will ensure that the herbicides are used according to the labeling restrictions and according to all applicable laws and restrictions. The contractor will confirm that the herbicides are used under the proper seasonal and weather conditions to ensure the herbicides' 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. Herbicides will not be used within 100 feet of a wetland or waterbody, unless allowed by the appropriate agency. Prior to herbicide application, Northwest and/or their contractor will obtain all required permits from the local jurisdictions/authorities.

7.16 Maintenance

Northwest will conduct follow-up inspections of all disturbed areas after the first and second growing seasons to determine the success of revegetation. Revegetation shall 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

[1] http://www.nwcb.wa.gov/nwcb_nox.htm

growing seasons, a professional agronomist shall determine the need for additional restoration measures. Northwest will continue revegetation efforts until revegetation is successful. Repair of erosion control structures will occur until the ROW 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 cover of herbaceous and/or woody species is at least 80 percent of the type, density and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction. If revegetation is not successful at the end of 3 years, Northwest 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.

Routine vegetation maintenance clearing shall 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 maintained annually in an herbaceous state.

Northwest will not conduct vegetation maintenance over the full width of the permanent ROW in wetland and waterbody riparian areas. Where necessary to facilitate periodic corrosion and leak surveys, a corridor not exceeding 10 feet in width centered over the pipeline may be maintained annually in an herbaceous state. Vegetation maintenance adjacent to waterbodies will 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 ROW.

Northwest will test, operate and maintain the proposed Project facilities in accordance with 49 CFR Part 192 and other applicable federal and state regulations. The pipeline ROW 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.

8.0 REFERENCES

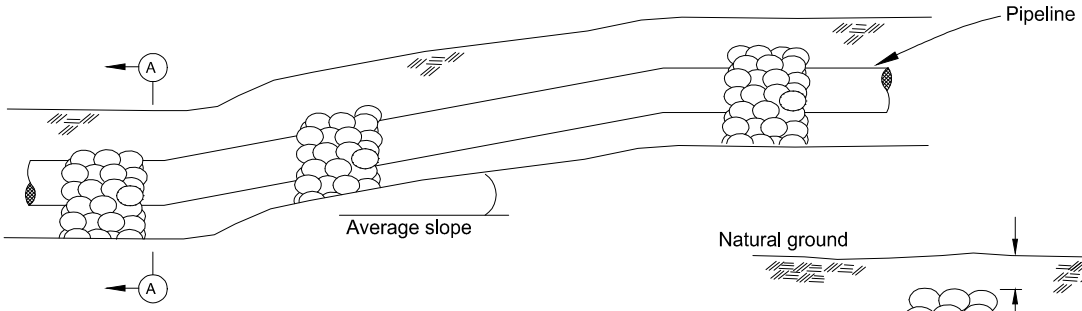
U.S. Department of Agriculture, Natural Resources Conservation Service. 2006a. Agriculture Handbook No. 296, Land Resource Regions and Major Land Resource Areas of the United States. Available online at http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_054242. Accessed September 2014.

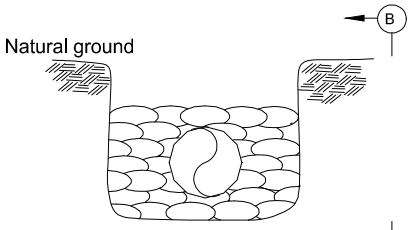
U.S. Department of Agriculture, Natural Resource Conservation Service. 2006b. Soil Survey of Cowlitz County, Washington. Available online at http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/washington/cowlitzWA2006/Cowlitz.pdf. Accessed September 2014.

The Weather Channel. 2014. Monthly Averages for Kalama, WA (98625). Available online at http://www.weather.com/weather/wxclimatology/monthly/graph/98625. Accessed September 2014.

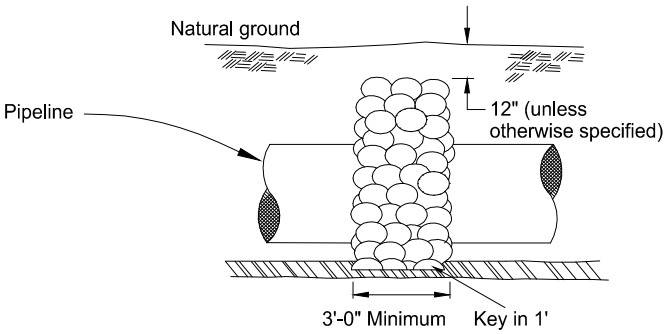
ATTACHMENT A

BMP Typicals





SECTION "A-A"



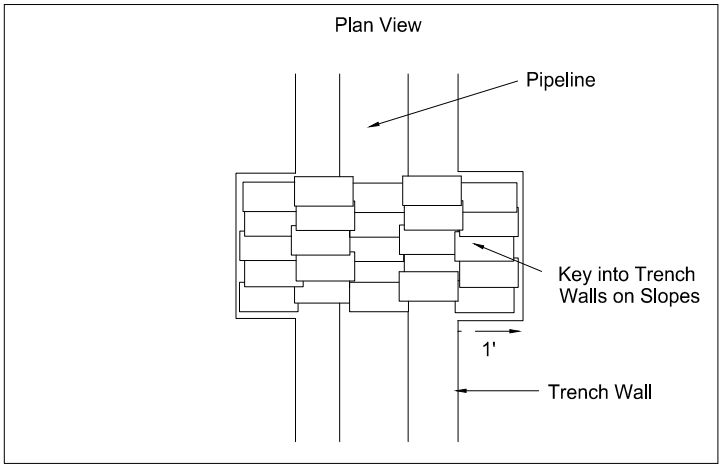
SECTION "B-B"

Notes:

Topsoil shall not be used in trench breakers.

Spacing of trench breakers shall be as shown on the Environmental Construction Alignment sheets or as directed by Northwest Pipeline LLC 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



REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

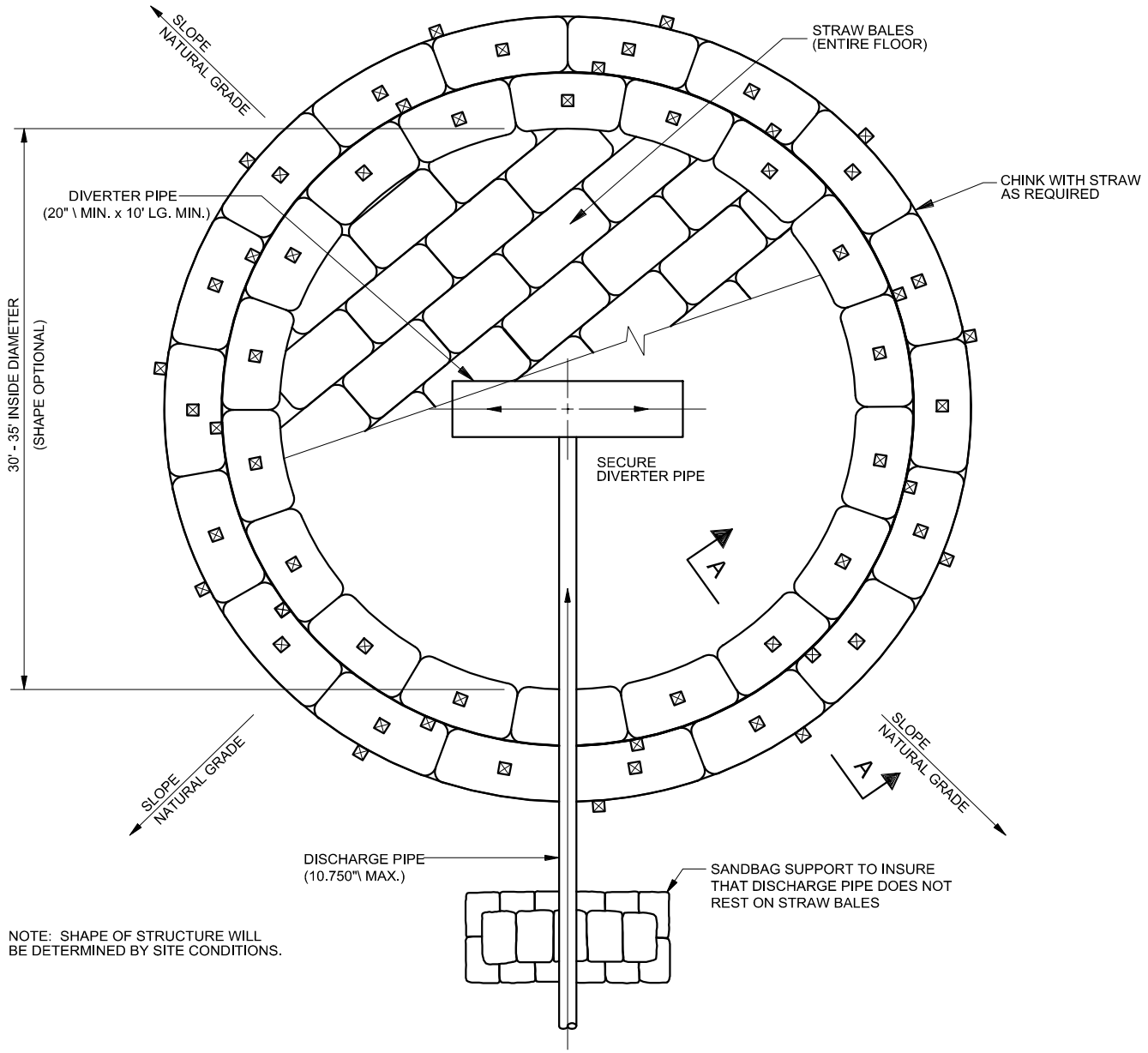
TRENCH BREAKER INSTALLATION

Williams
GAS PIPELINE

REVISIONS

NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

DRAWN BY: NWP	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NONE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0001	SHEET 1 OF 1



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

HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL HYDROSTATIC TEST
DEWATERING STRUCTURE

Williams
GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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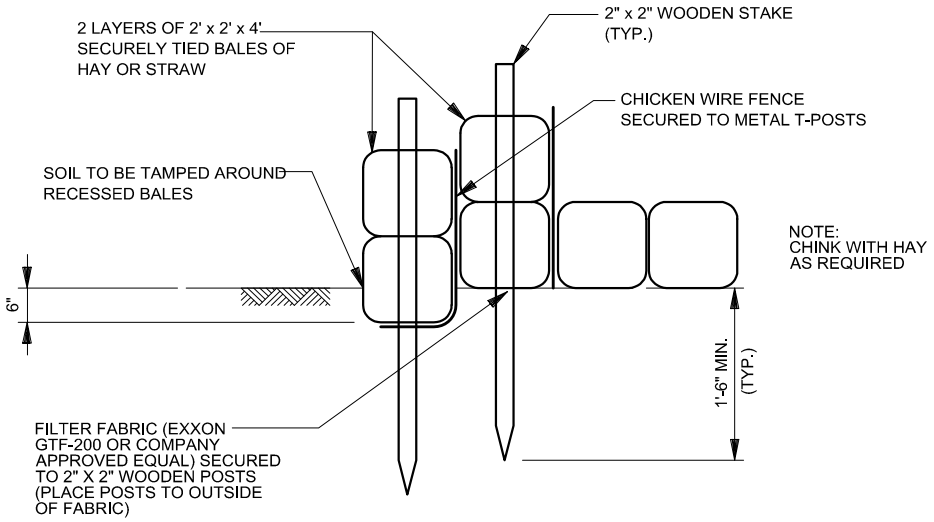

SECTION A-A

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

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL HYDROSTATIC TEST DEWATERING STRUCTURE

Williams GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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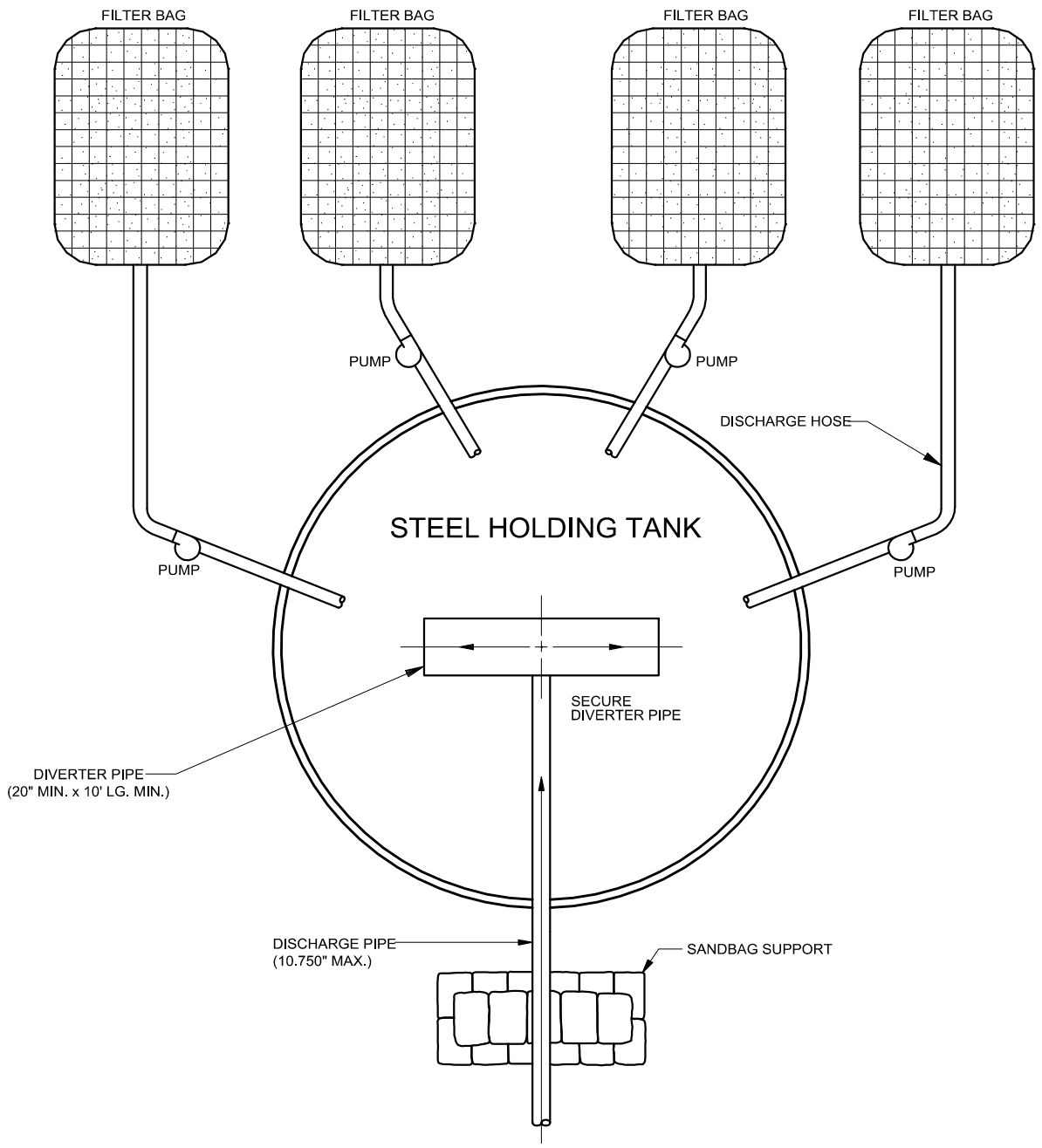
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0002	SHEET 2 OF 3



HYDROSTATIC TEST DEWATERING STRUCTURE

TEMPORARY EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL HYDROSTATIC TEST
DEWATERING STRUCTURE

Williams
GAS PIPELINE

REVISIONS						
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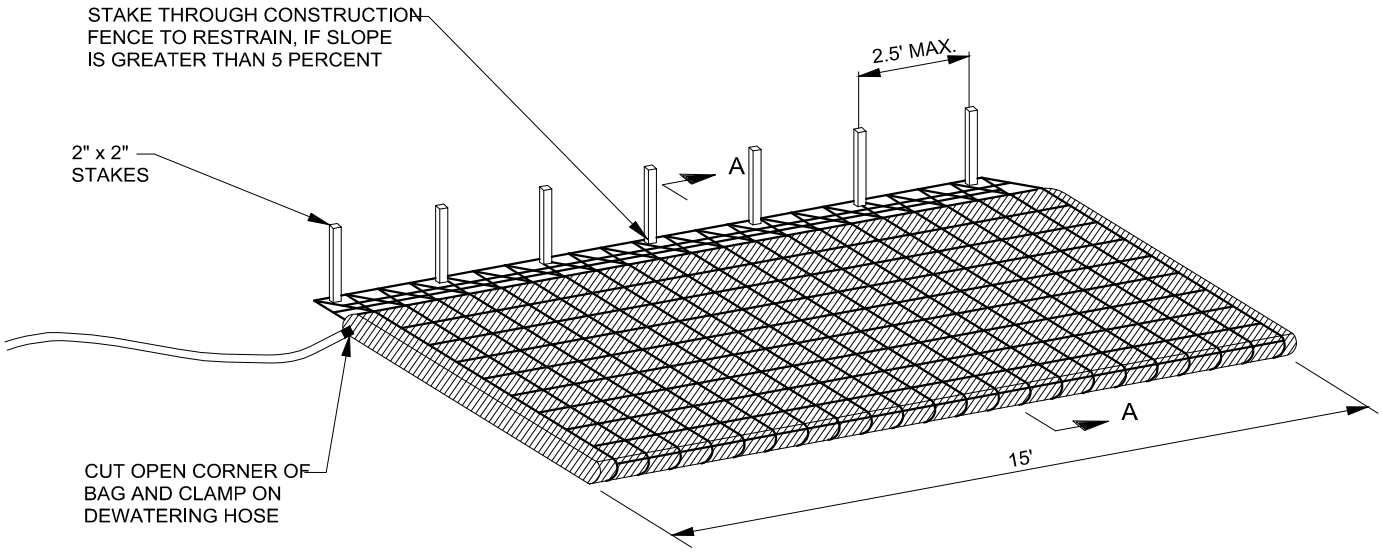
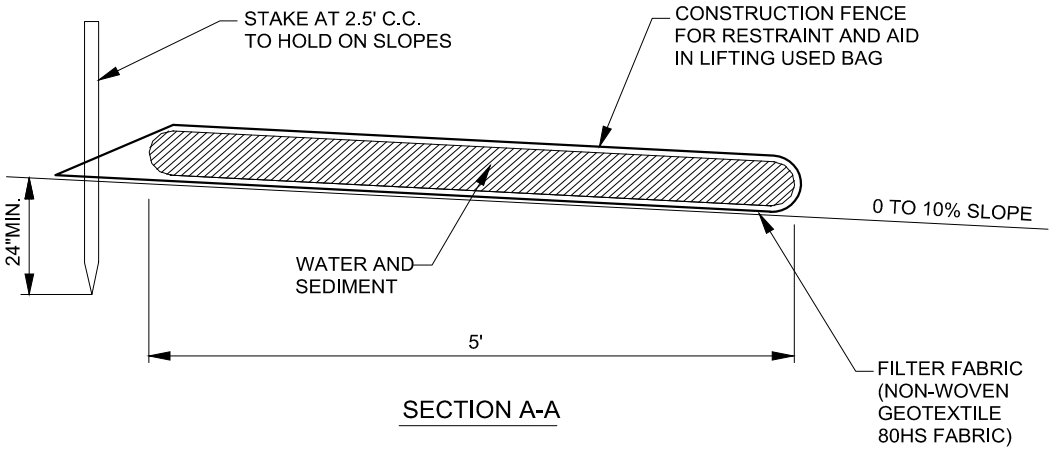
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0002	SHEET 3 OF 3





SECTION A-A

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

TEMPORARY EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL TRENCH DEWATERING

Williams GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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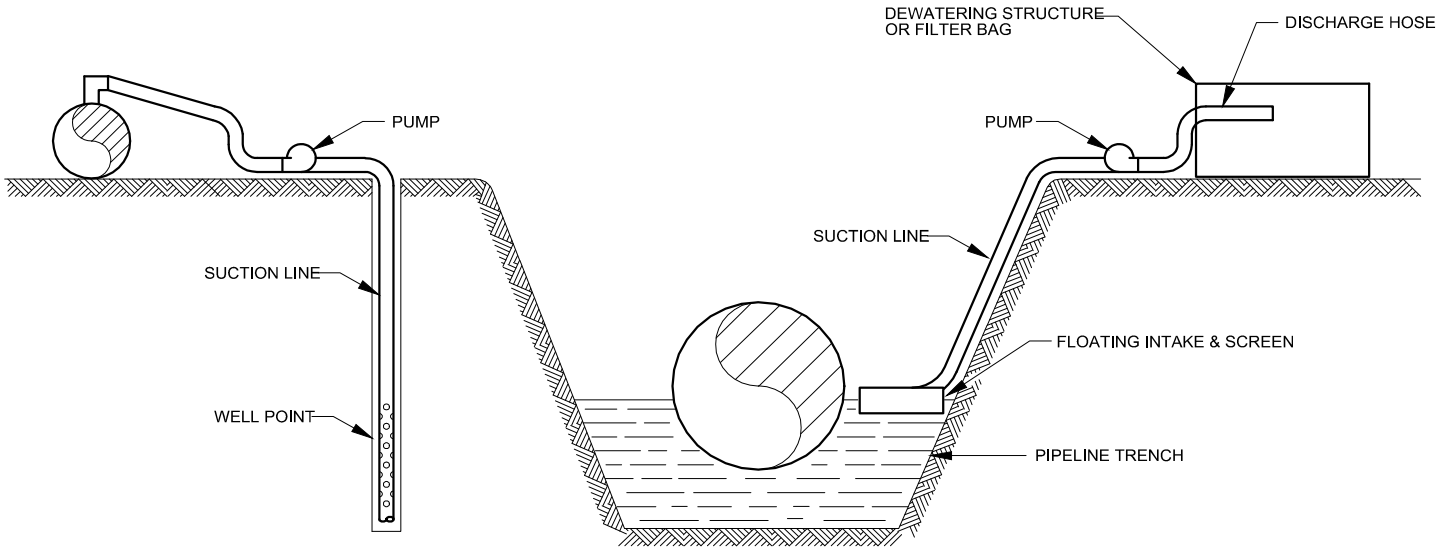
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0003	SHEET 1 OF 3



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.
   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

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL TRENCH DEWATERING

Williams
GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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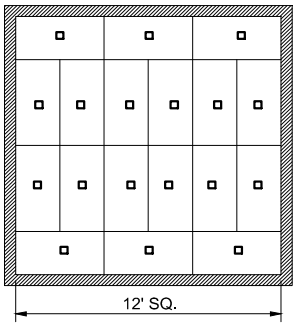
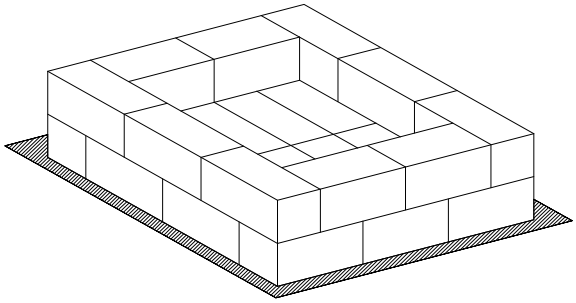
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0003	SHEET 2 OF 3



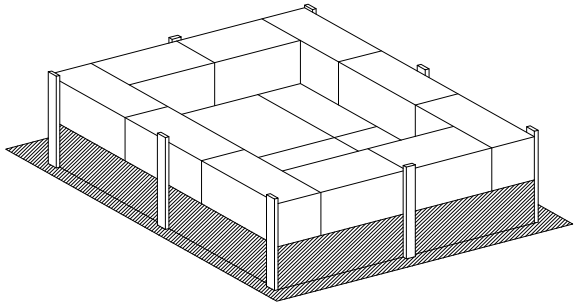
STEP 1

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.



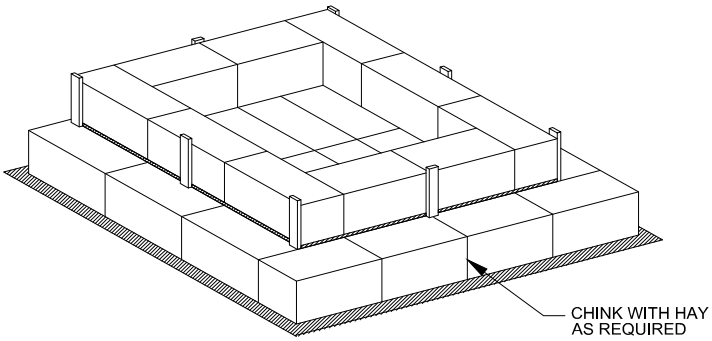
STEP 2

Install another layer of hay bales on the outer edge as shown.y



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

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL TRENCH DEWATERING

Williams GAS PIPELINE

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NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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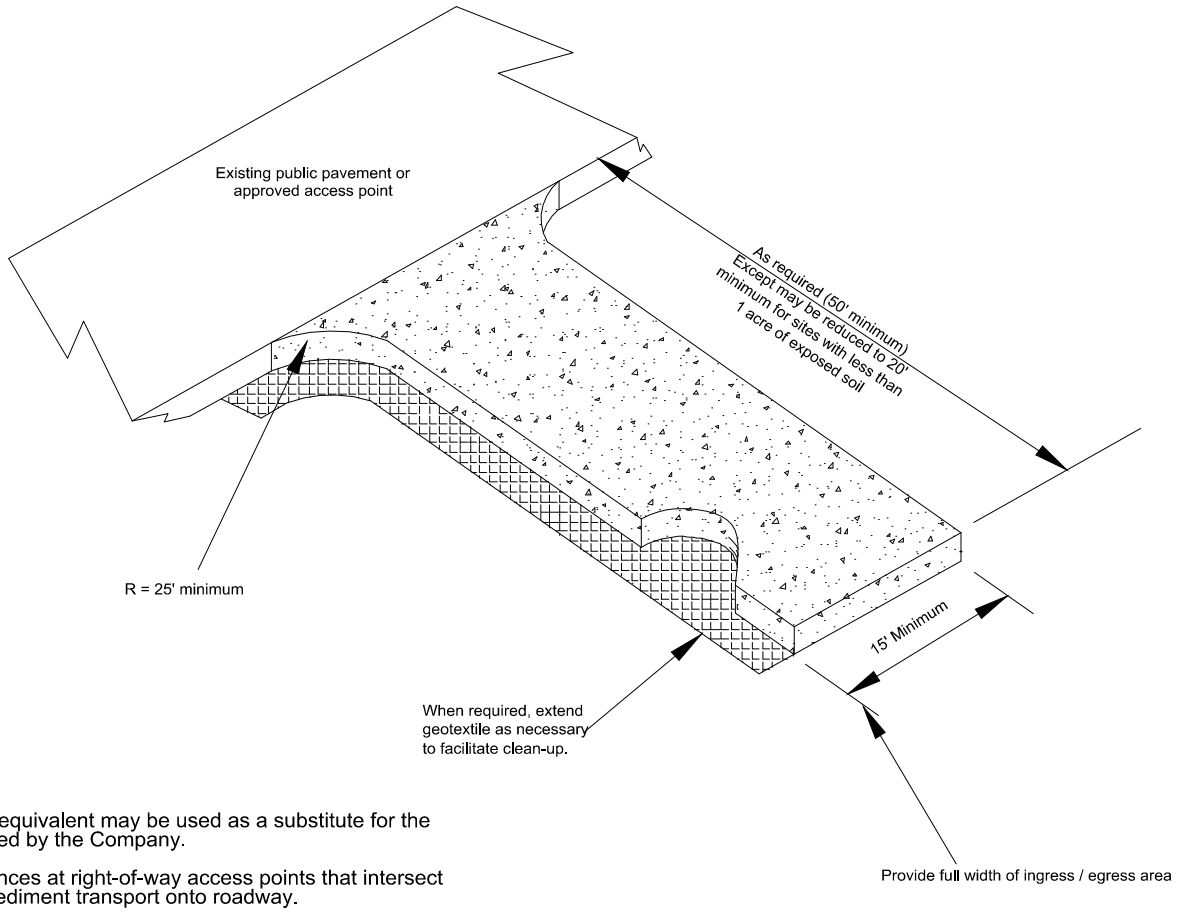
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0003	SHEET 3 OF 3



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 accoriding 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.

RESTORATION: Access pads will be removed as soon as possible following construction activities and the area restored to pre-construction conditions.

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL CONSTRUCTION ACCESS
ENTRANCE PAD

Williams
GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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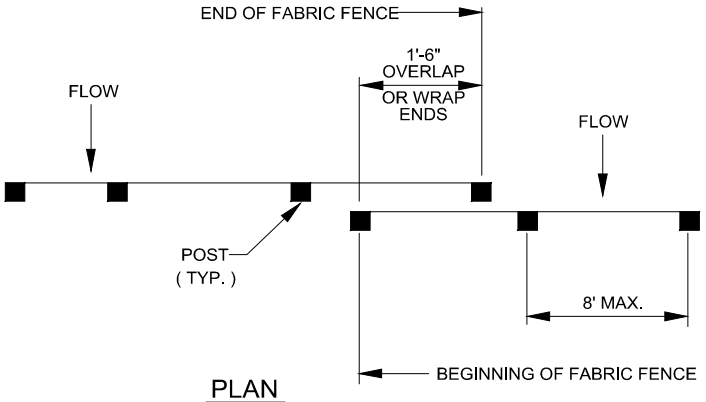
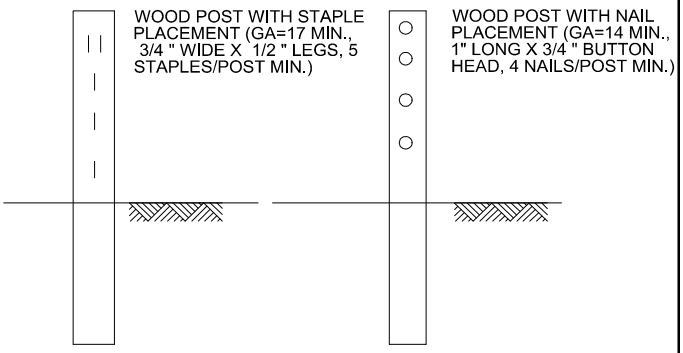
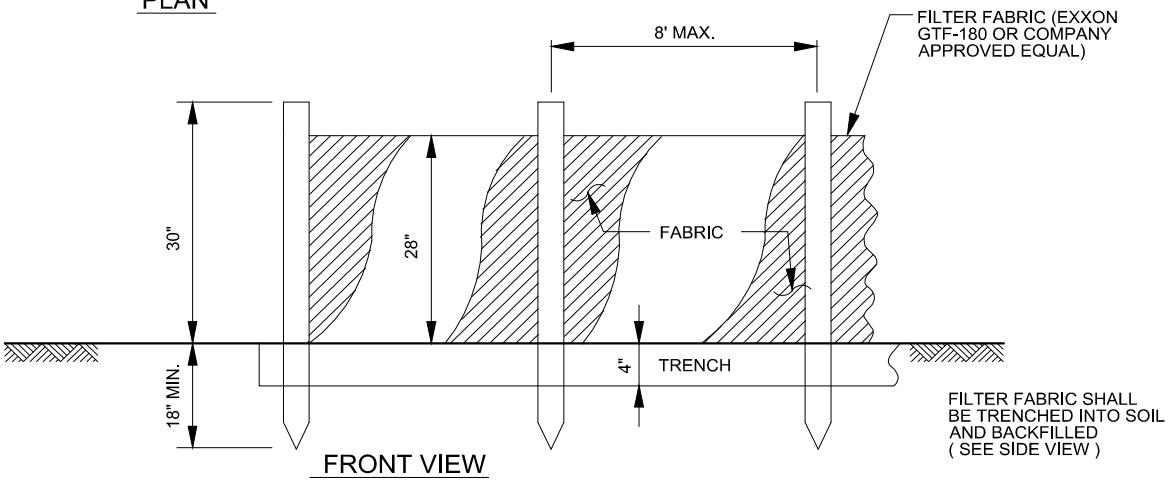
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0004	SHEET 1 OF 1



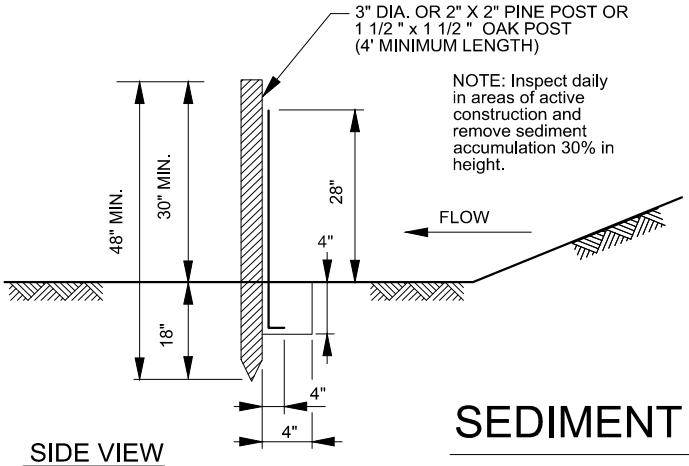
PLAN

FASTENER LOCATION





FRONT VIEW



SIDE VIEW

1. Install filter fabric after revegetation clearing and immediately after soil disturbance:
   - At appropriate locations to prevent siltation into waterbodies, wetlands, roads or other sensitive areas crossed by the construction right-of-way
   - To prevent stockpiled soil or spoil from leaving the work area.
2. Filter fabric shall be installed to filter sediment from surface runoff.
3. Installations shall be periodically checked according to ferc's plan and procedures, and if flow is obstructed, build-up of sediment shall be removed.
4. Filter fabric shall be left in place until permanent vegetative cover is established unless removal is authorized by company representative.
5. Filter fabric shall be replaced whenever it has deteriorated to such an extent that it reduces the effectiveness of the filter fabric.
6. Filter fabric shall be placed to follow (run parallel to) the contours.
7. On upslope installations, both ends of the filter fabric shall be turned and extended upslope.
8. Filter fabric shall be constructed of exxon gtf-180 fabric or a similar fabric with a tensile strength at 20% (max.) elongation of 50 lb./linear inch or greater.
9. Area disturbed as a result of removing the filter fabric shall be restabilized by seeding in accordance with the revegetation plan.

SEDIMENT BARRIER - SILT FENCE OPTION

TEMPORARY EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL SEDIMENT BARRIER - SILT FENCE
FILTER FABRIC OPTION

Williams GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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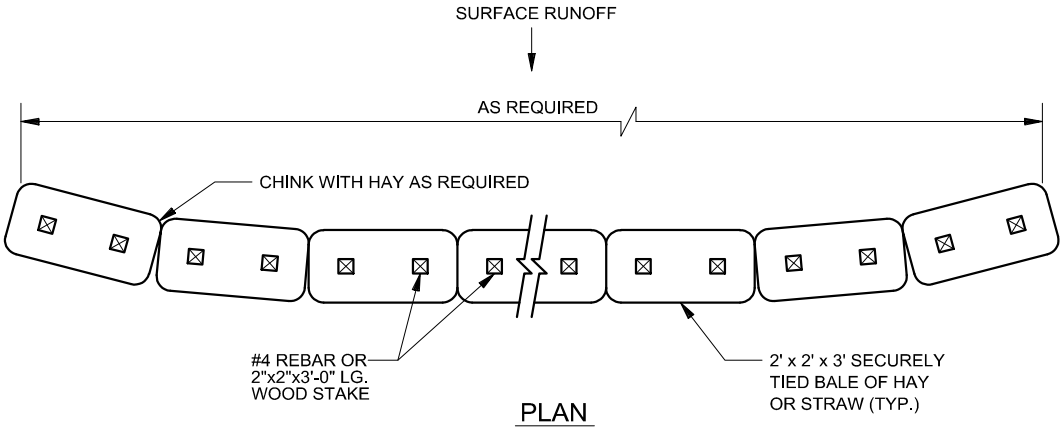
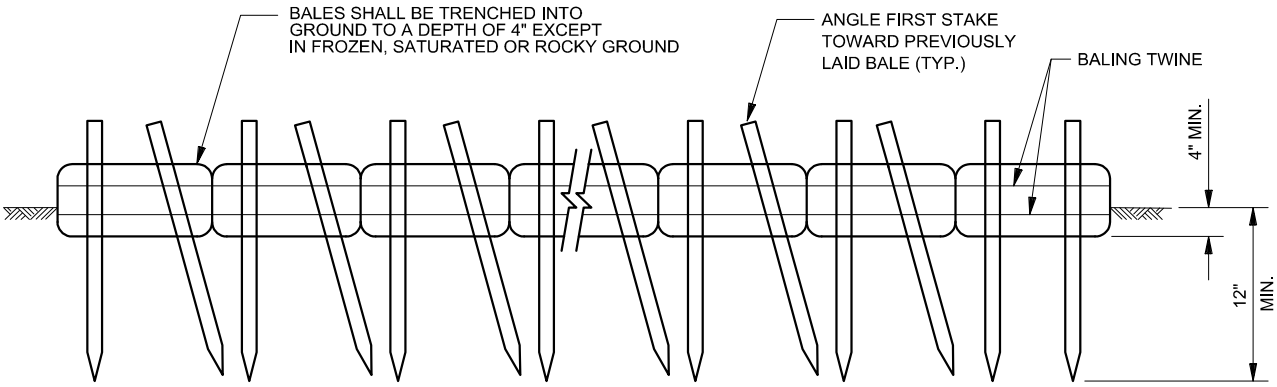
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0005	SHEET 1 OF 2



PLAN



NOT TO SCALE

ELEVATION

NOTES:

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 - SILT FENCE OPTION

TEMPORARY EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL SEDIMENT BARRIER - SILT FENCE
STRAW BAIL OPTION

Williams
GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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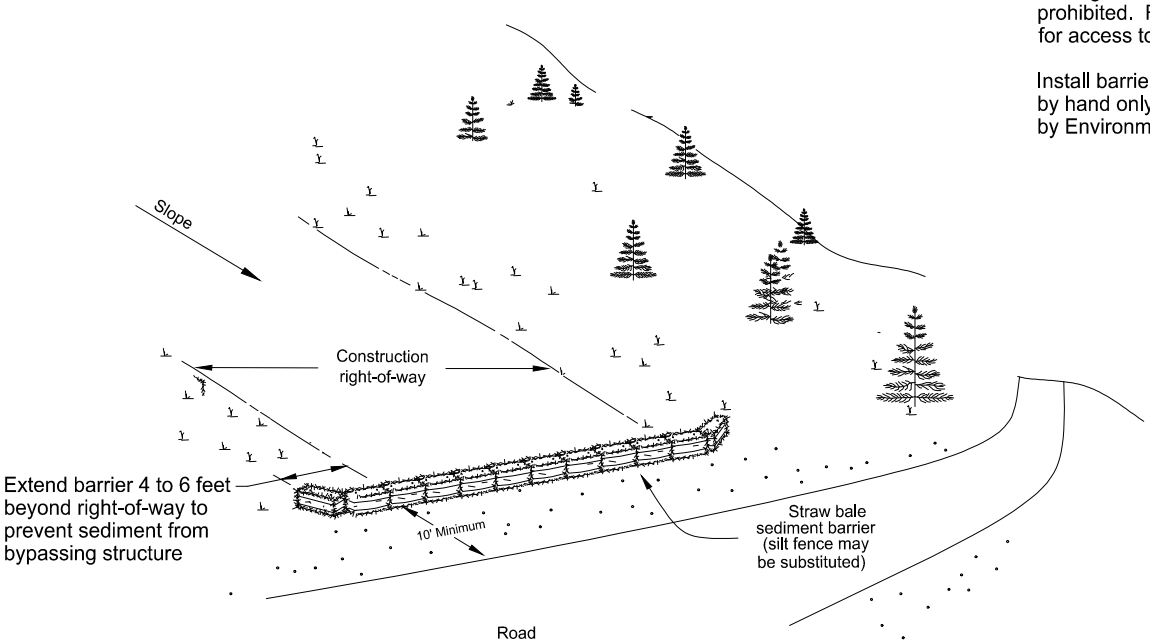
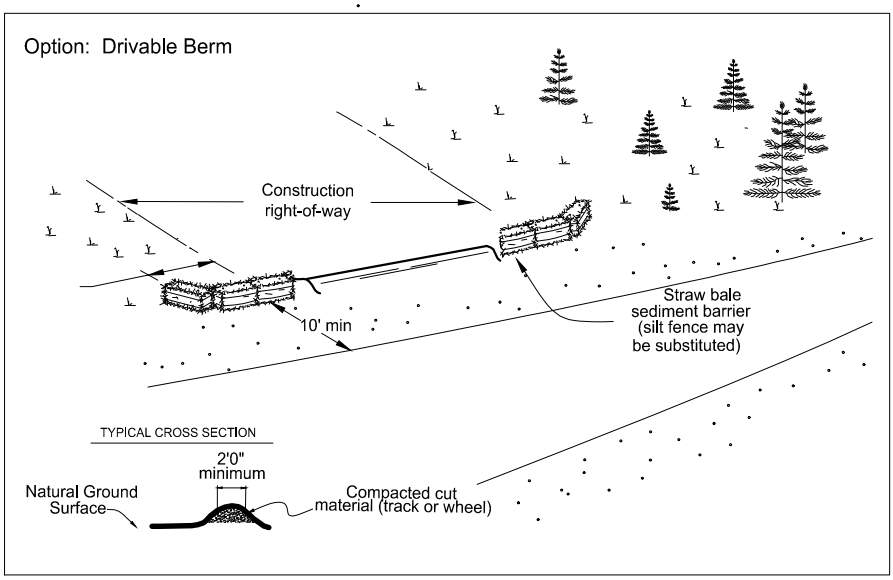
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0005	SHEET 2 OF 2

Notes:

Driving around sediment barriers is prohibited. Remove and replace barrier for access to right-of-way.

Install barriers off the right-of-way by hand only at location approved by Environmental Inspector.





REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TEMPORARY SEDIMENT BARRIERS
DRIVEABLE BERMS
ADJACENT TO ROAD CROSSINGS

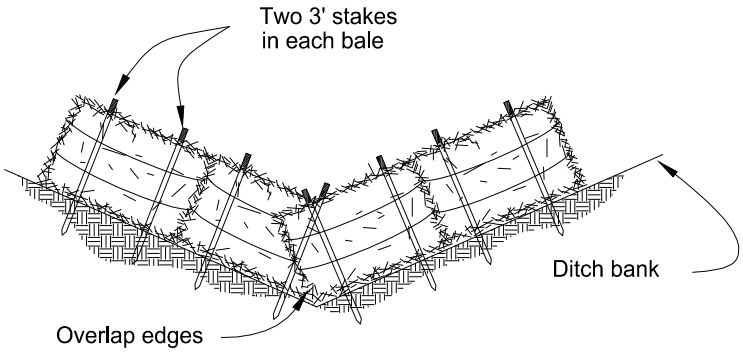
Williams GAS PIPELINE

REVISIONS

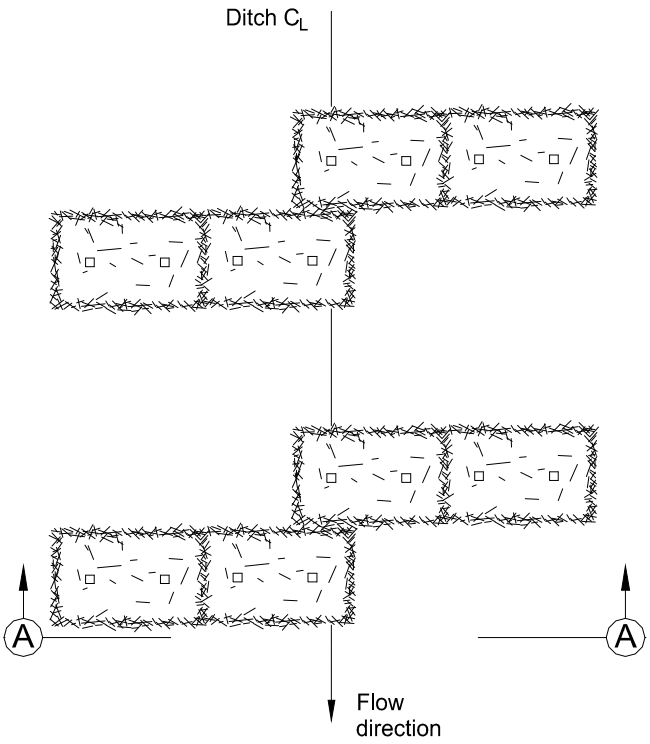
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

DRAWN BY: NWP	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NONE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0006	SHEET 1 OF 1

SECTION A-A



PLAN VIEW



Notes:

Place straw bale sediment barriers in small intermittent drainages or road ditches that may convey sediment laden runoff from the right-of-way during storm events.

Drive stakes a minimum of 12 inches into the ground.

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

Silt fence fabric 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.

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

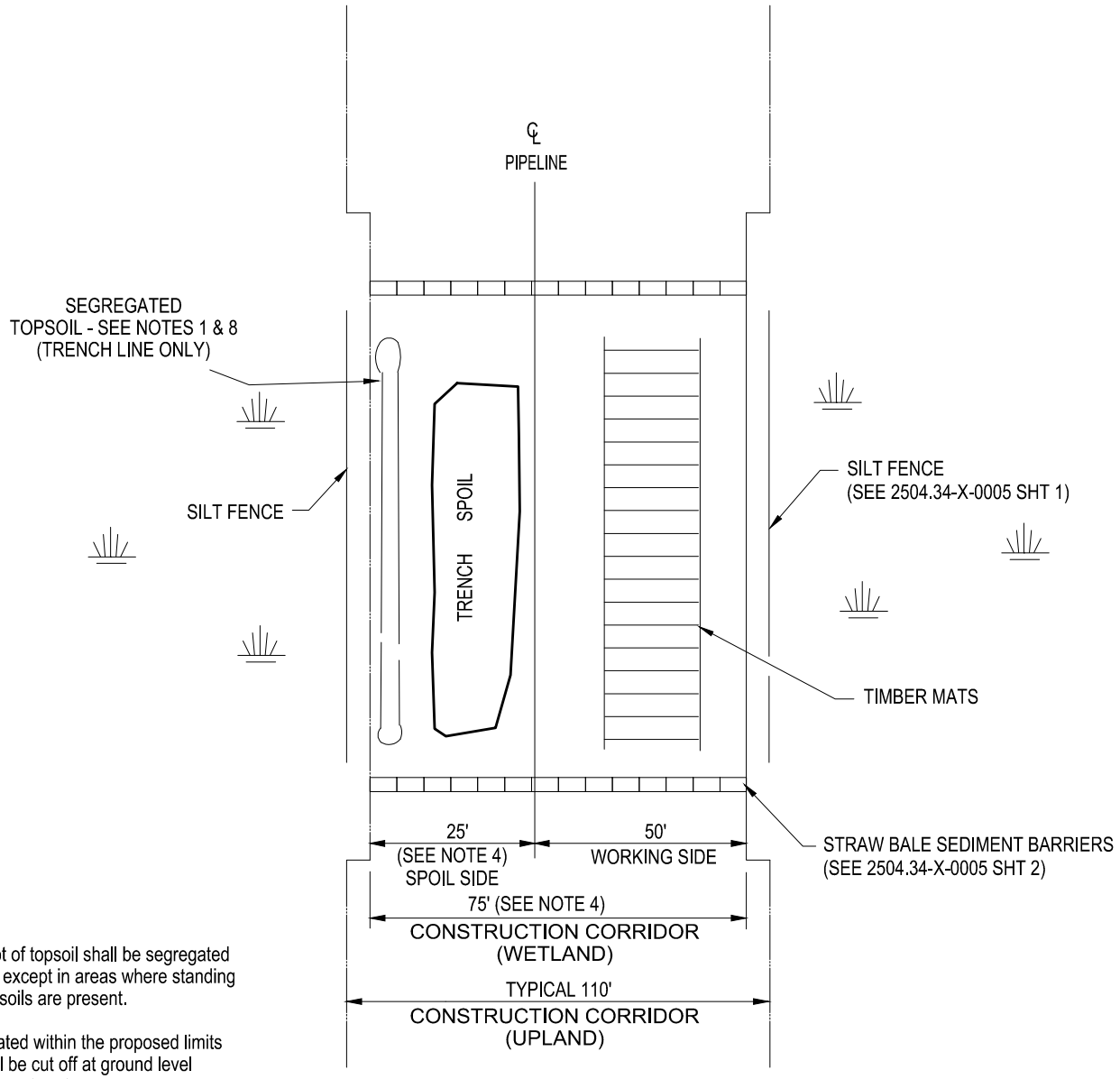
NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

SEDIMENT CONTROL IN DITCHES AND SWALES

Williams
GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

DRAWN BY: NWP	DATE: 9-02-2014	ISSUED FOR BID:	SCALE: NONE
CHECKED BY:	DATE:	ISSUED FOR CONSTRUCTION:	
APPROVED BY:	DATE:	DRAWING NUMBER: 2504.34-X-0007	SHEET 1 OF 1



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
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 variance is granted. Configuration of right-of-way may vary.

PLAN VIEW

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

CROSSING DETAIL FOR WETLANDS

Williams
GAS PIPELINE

REVISIONS						
NO.	DATE	BY	DESCRIPTION	W.O. NO.	CHK.	APP.

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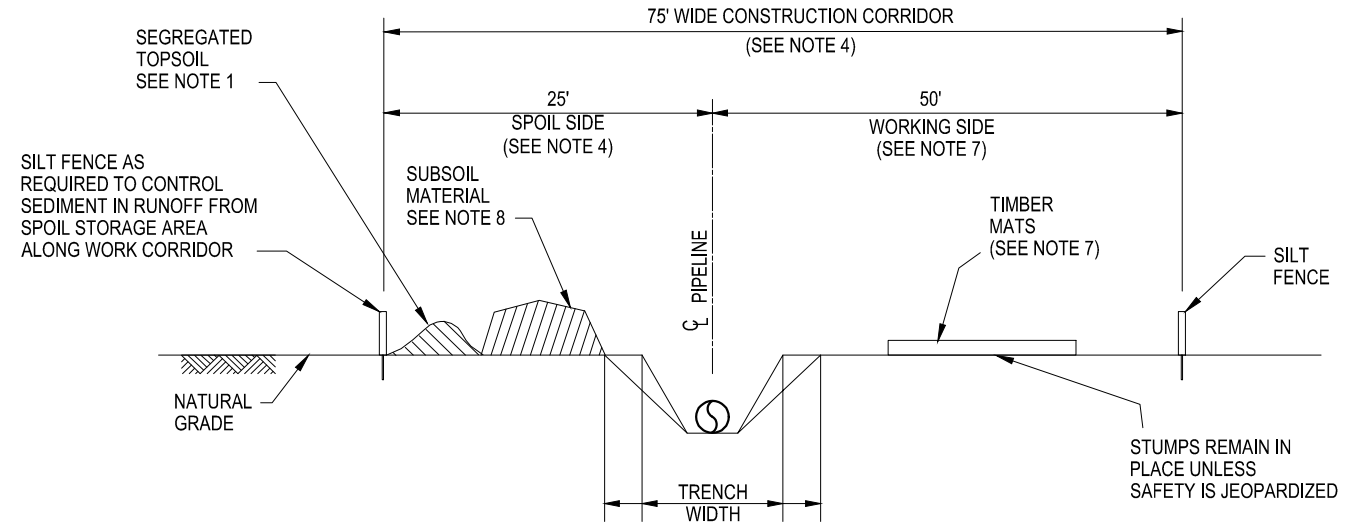


TRENCH WIDTH VARIES DEPENDING ON SOILS ENCOUNTERED DURING CONSTRUCTION

CROSS SECTION

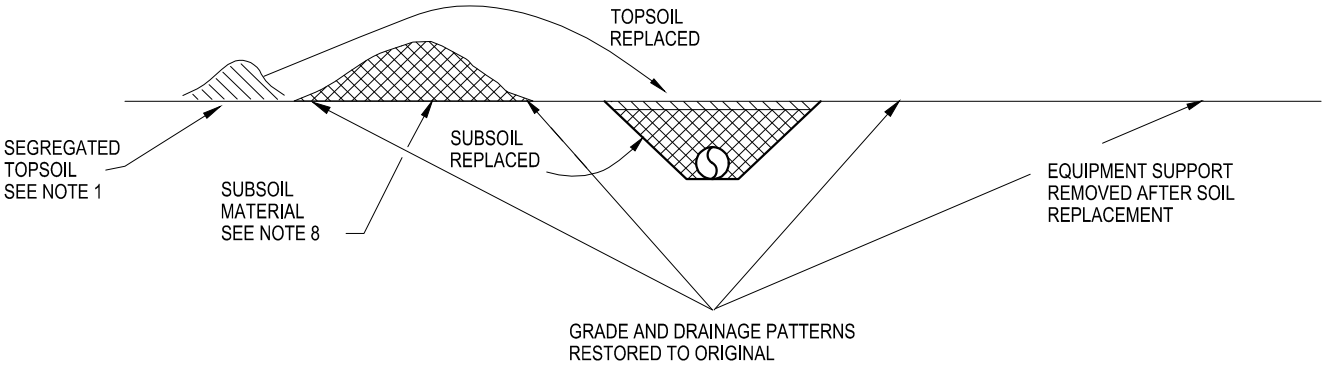
NOTES Continued:

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.



WETLAND RESTORATION

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

CROSSING DETAIL FOR WETLANDS

Williams GAS PIPELINE

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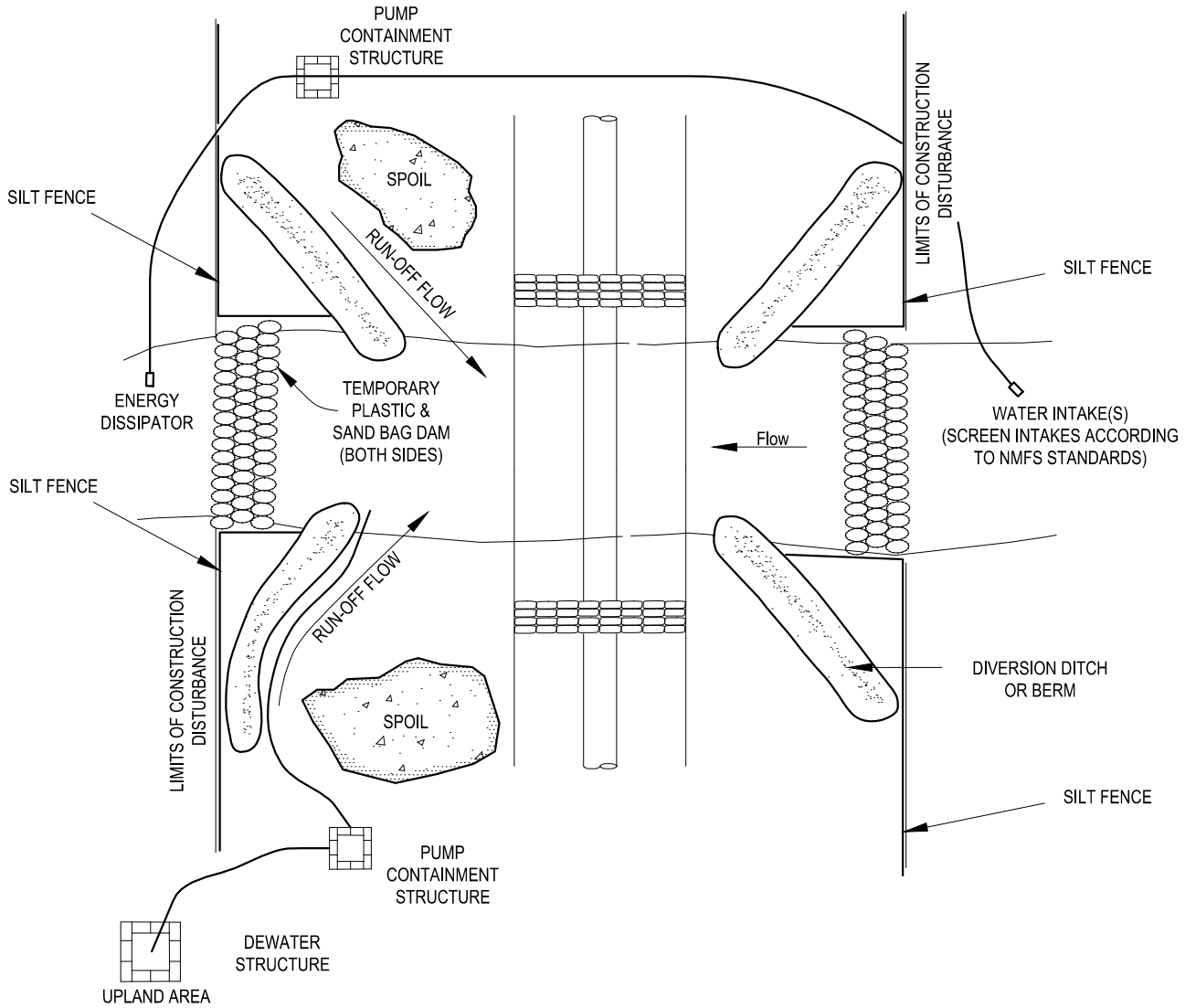
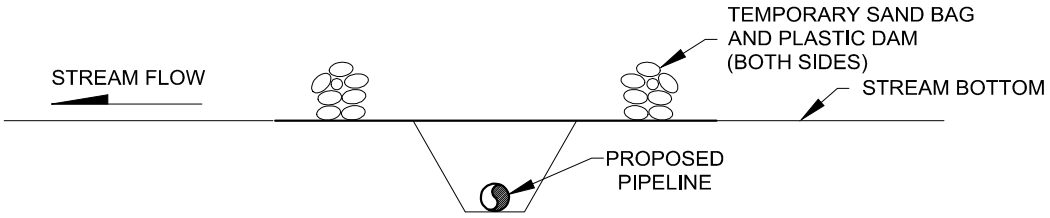
CONFIGURATION THROUGH WATERBODIES WITH ASSOCIATED WETLANDS IS VARIABLE
BUT WILL NOT EXCEED 75 FEET IN WIDTH UNLESS A VARIANCE IS GRANTED



PLAN VIEW OF DAM & PUMP CROSSING METHOD

NOTES:

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 variance 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.



CROSS-SECTION OF DAM & PUMP CROSSING METHOD

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

WATERBODY CROSSING DETAIL
DAM & PUMP CROSSING METHOD

Williams GAS PIPELINE

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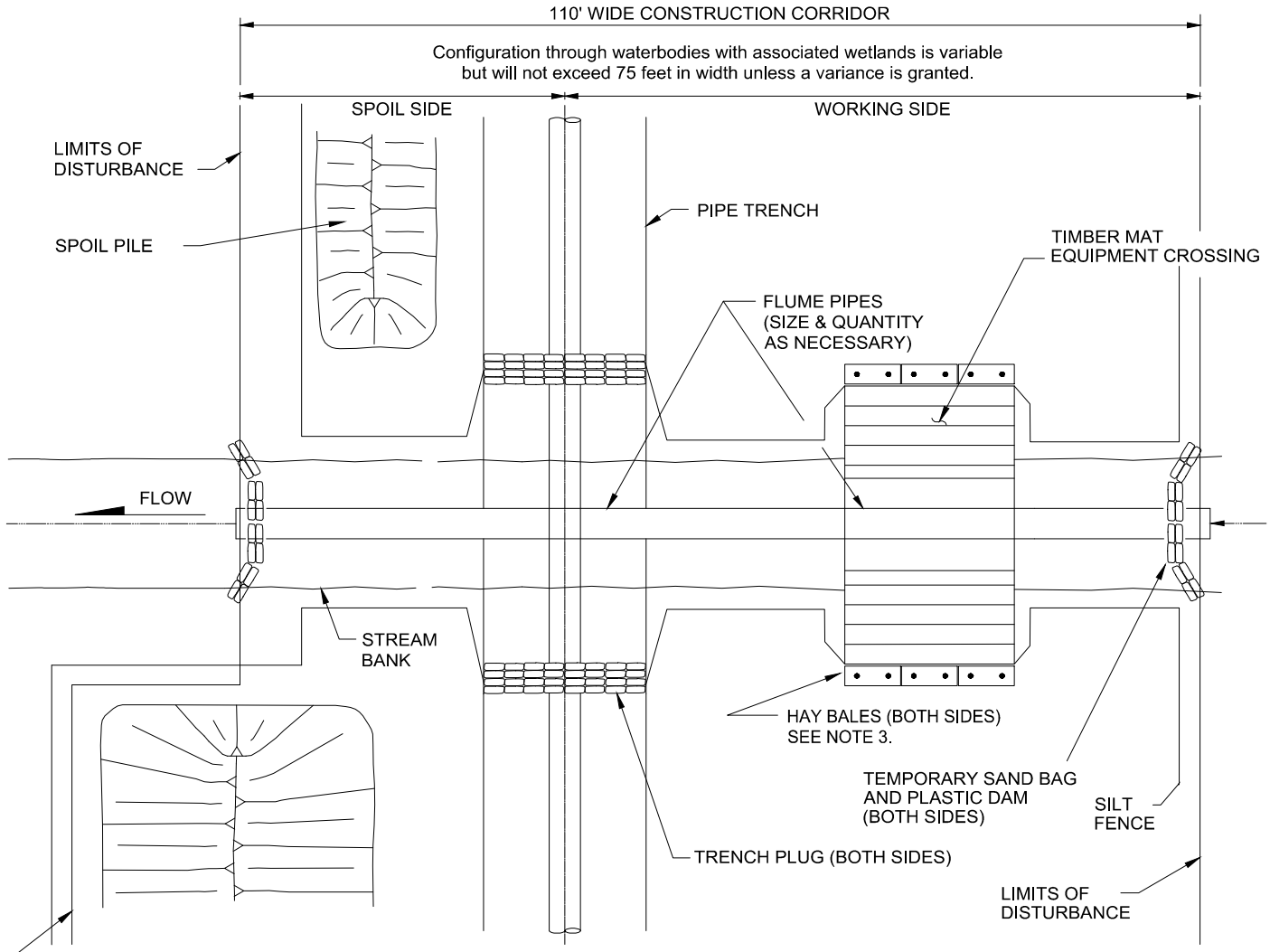
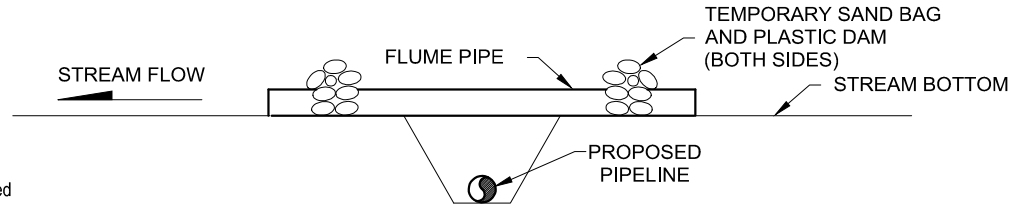


PLAN VIEW OF FLUMED CROSSING METHOD

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 variance is granted or the adjacent vegetation is actively cultivated as a rotated croplands. 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.



CROSS-SECTION OF FLUMED CROSSING METHOD

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

WATERBODY CROSSING DETAIL
FLUMED CROSSING METHOD

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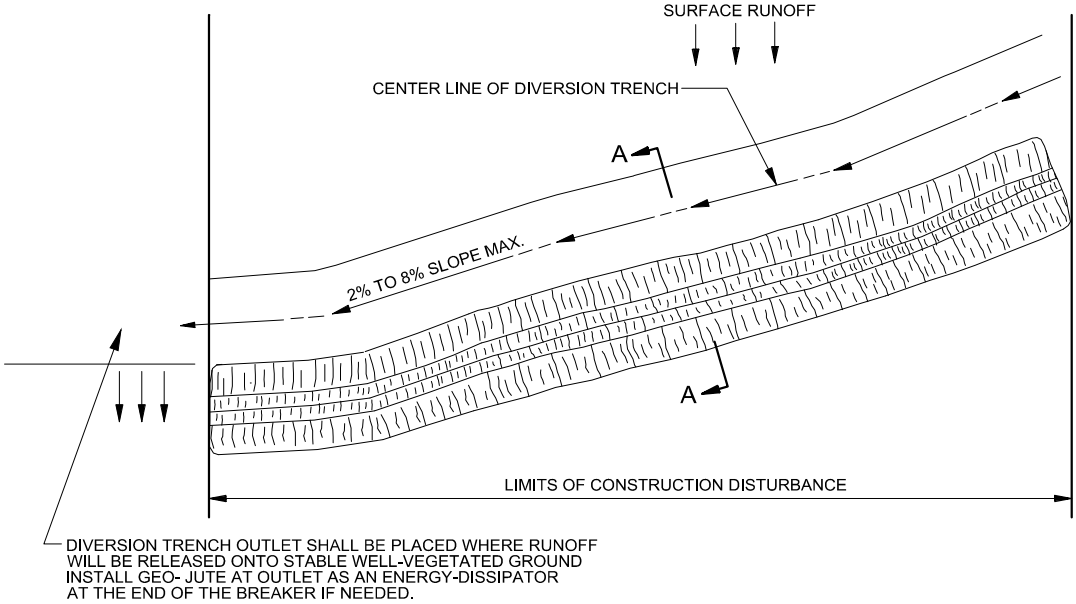
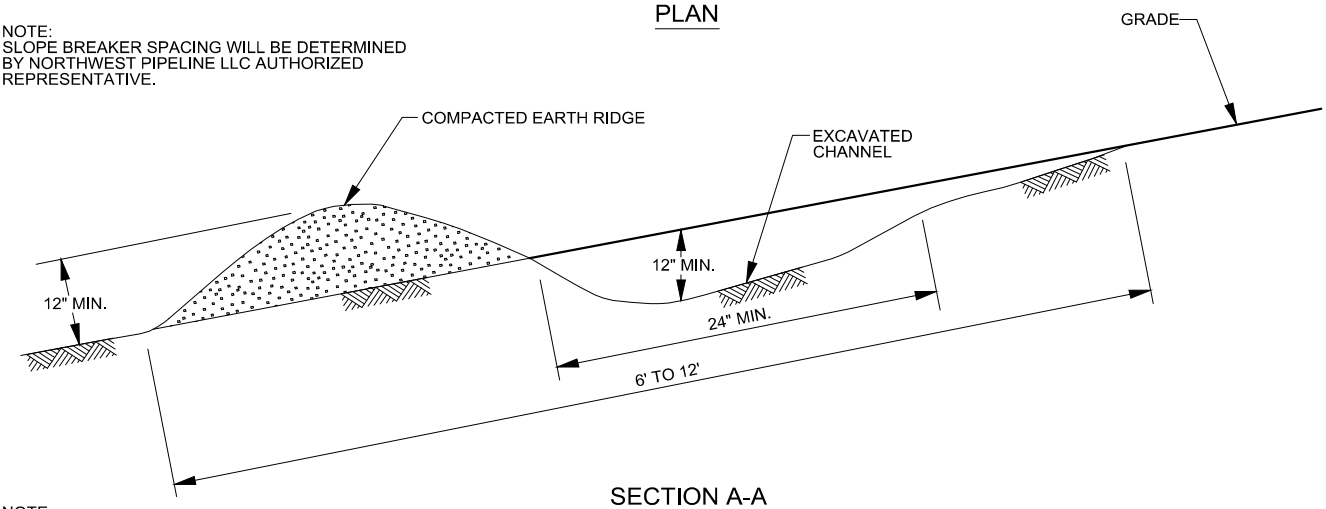


PLAN

NOTE:
SLOPE BREAKER SPACING WILL BE DETERMINED BY NORTHWEST PIPELINE LLC AUTHORIZED REPRESENTATIVE.



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

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL TEMPORARY AND PERMANENT SLOPE BREAKERS

Williams GAS PIPELINE

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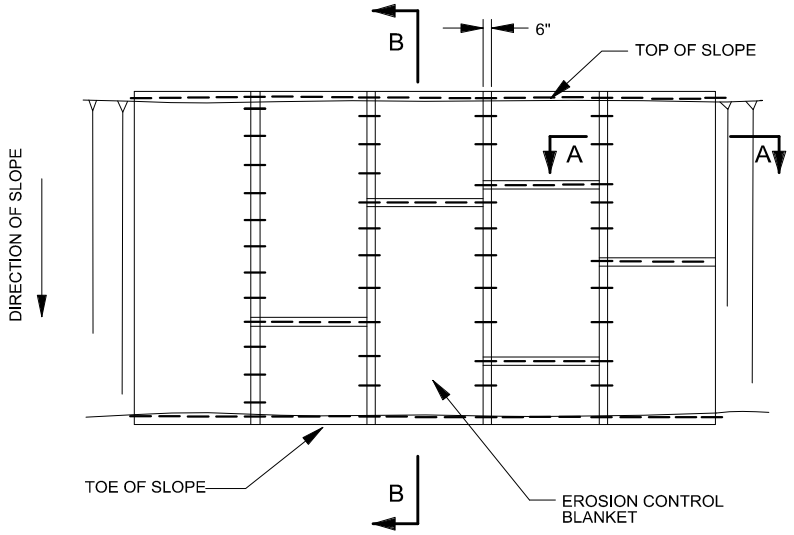

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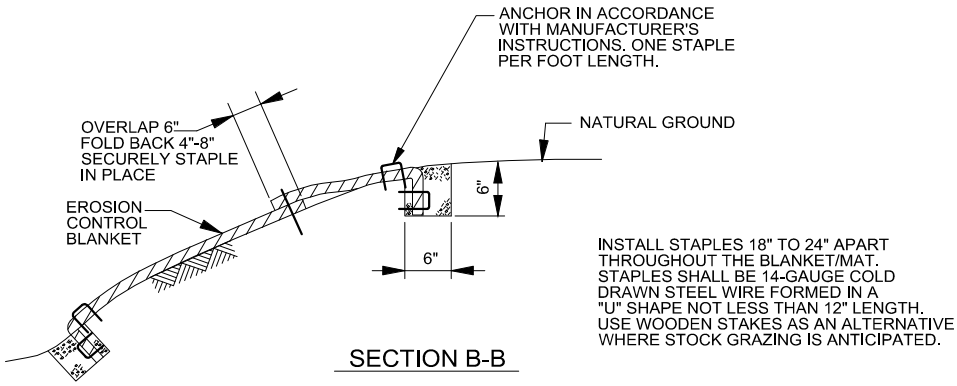
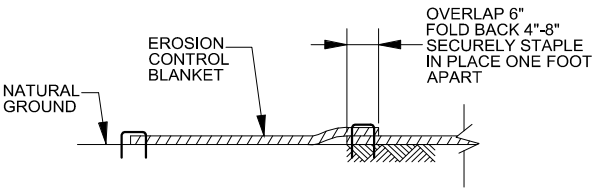


SECTION B-B



SECTION A-A

EMBANKMENT INSTALLATION

EROSION CONTROL MATTING

PERMANENT EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL EROSION CONTROL MATTING

Williams
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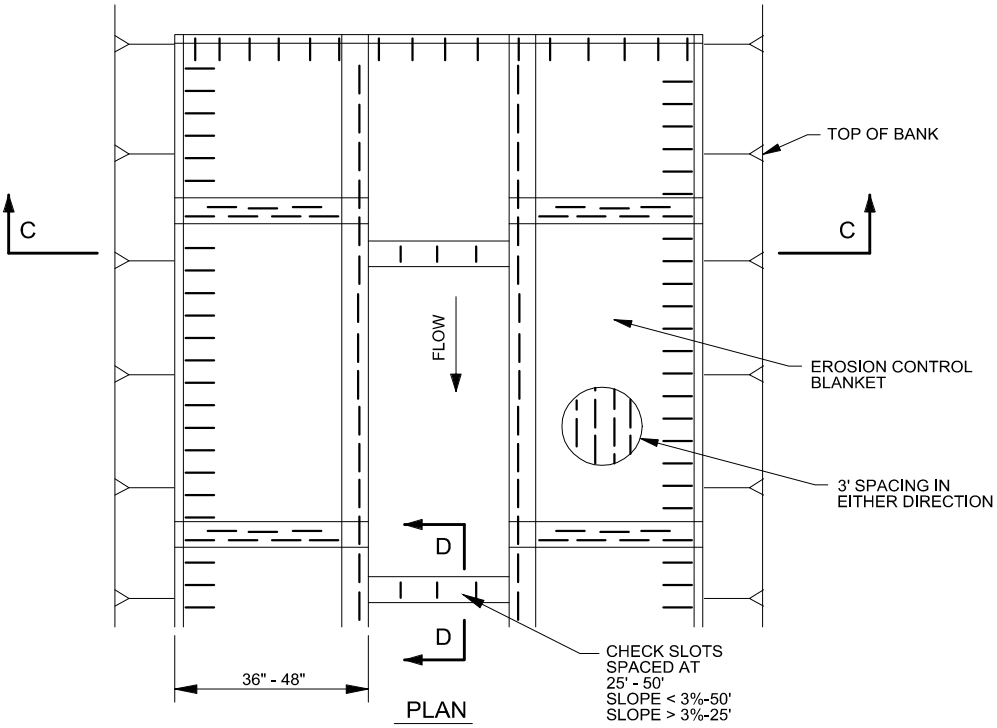

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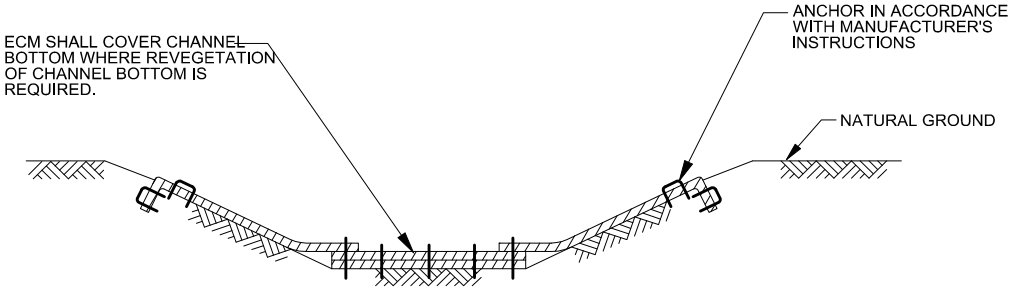

SECTION C-C

CHANNEL INSTALLATION

EROSION CONTROL MATTING

PERMANENT EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL EROSION CONTROL MATTING

Williams GAS PIPELINE

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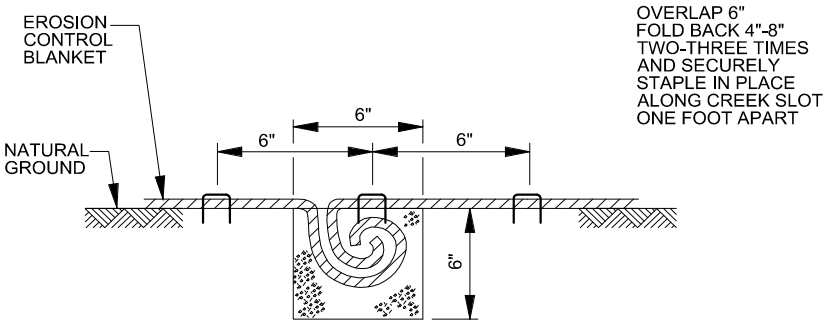

SECTION D-D

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

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL EROSION CONTROL MATTING

Williams GAS PIPELINE

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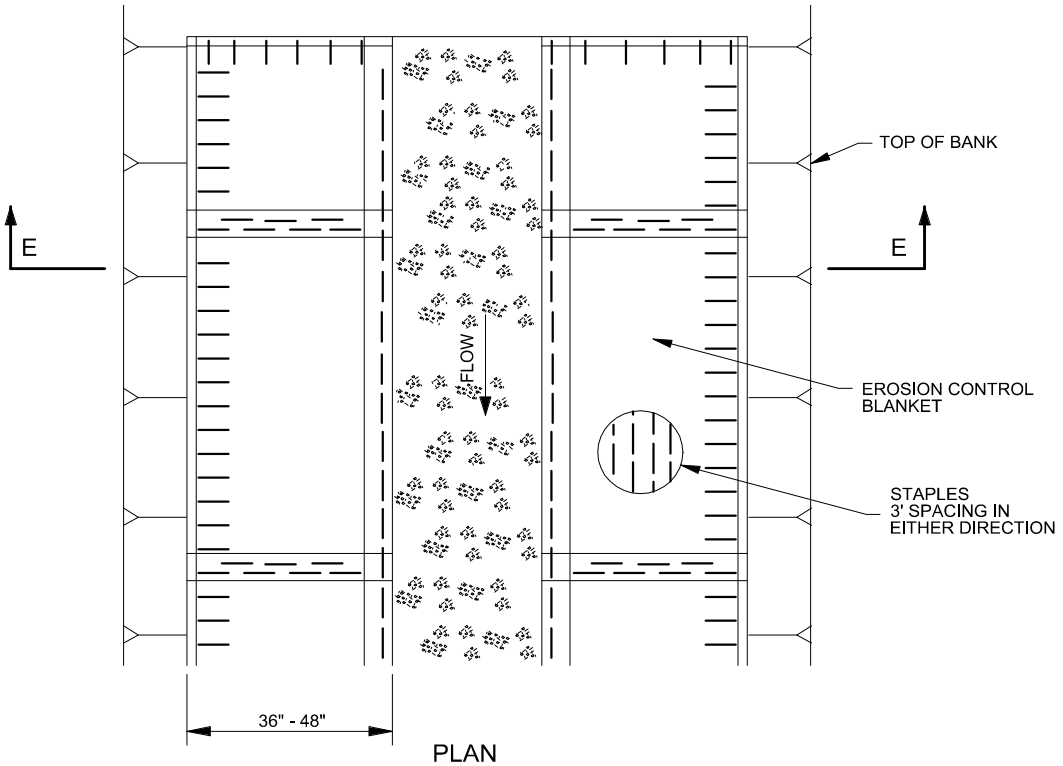

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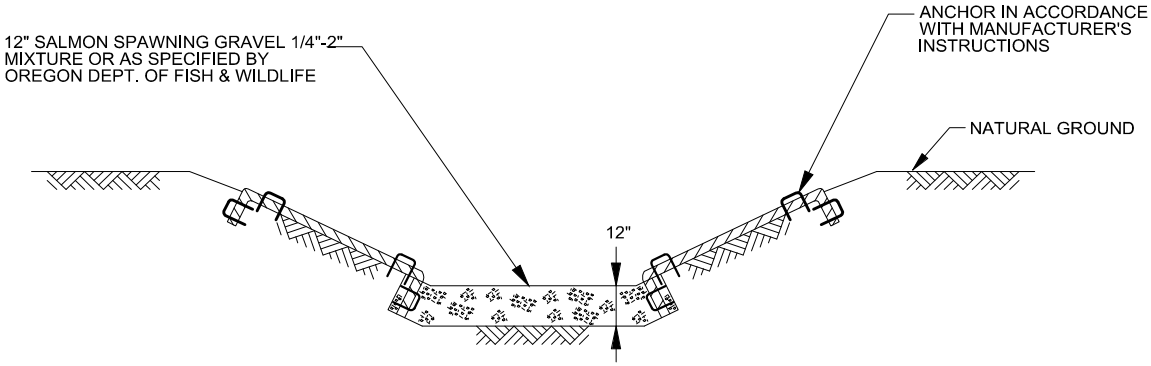

SECTION E-E

SALMON STREAM RESTORATION ALTERNATIVE

EROSION CONTROL MATTING

PERMANENT EROSION CONTROL MEASURE

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL EROSION CONTROL MATTING

Williams GAS PIPELINE

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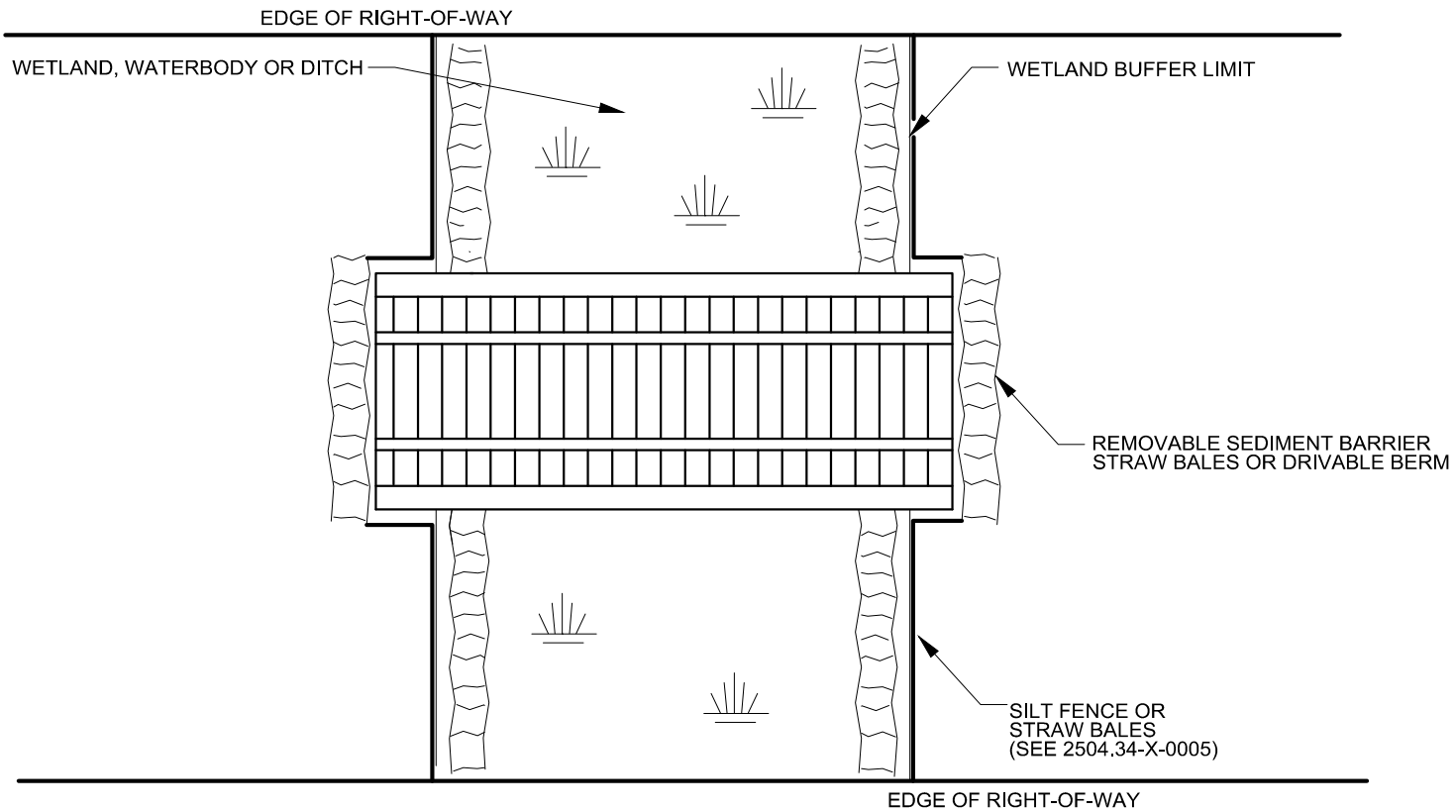

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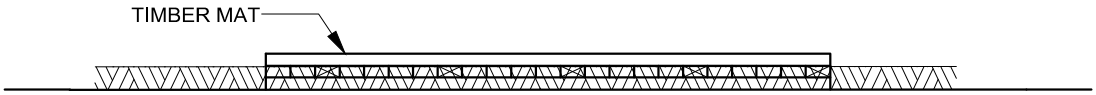

PROFILE

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

REFERENCE DRAWINGS	
DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL PORTABLE BRIDGE CROSSING

Williams GAS PIPELINE

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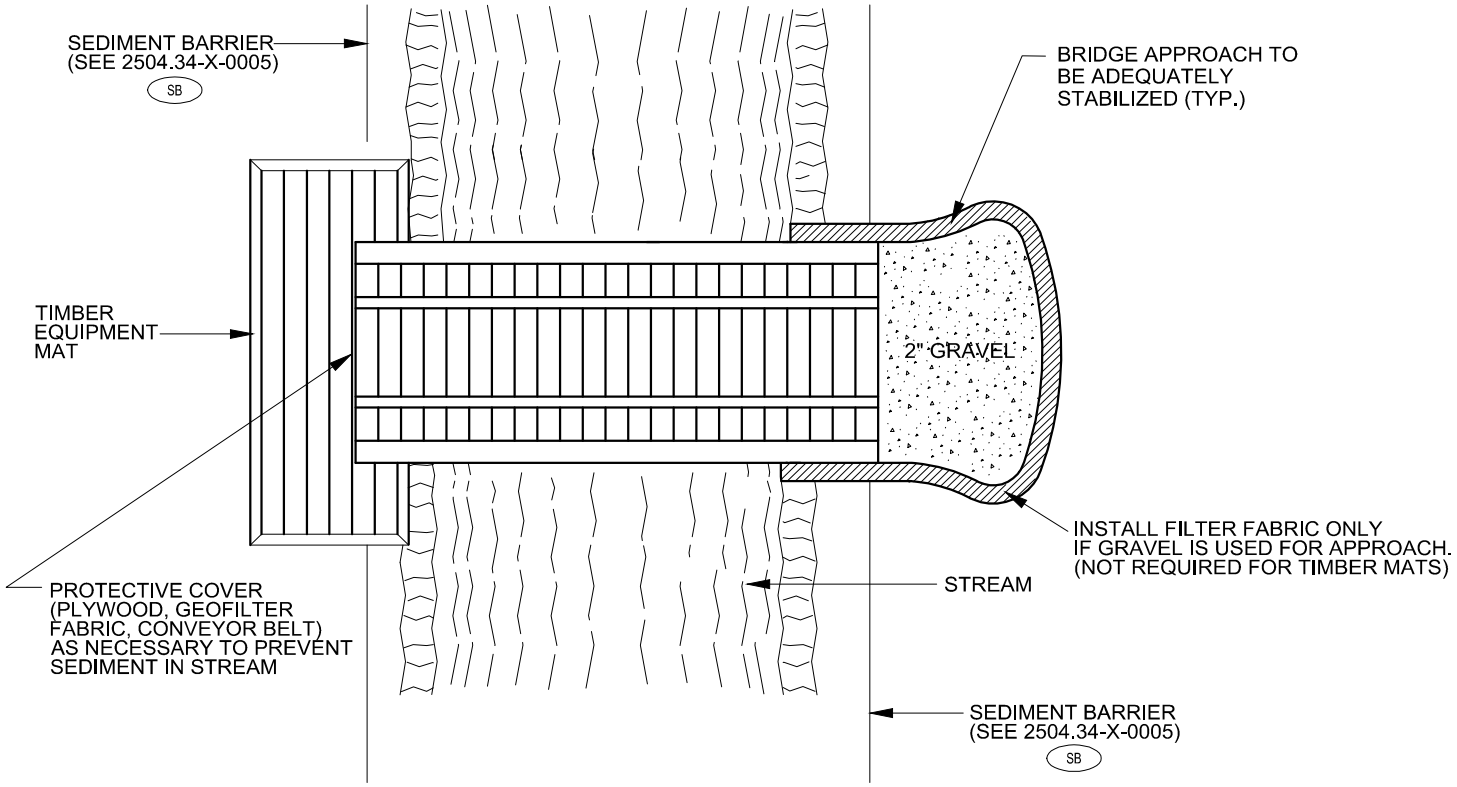

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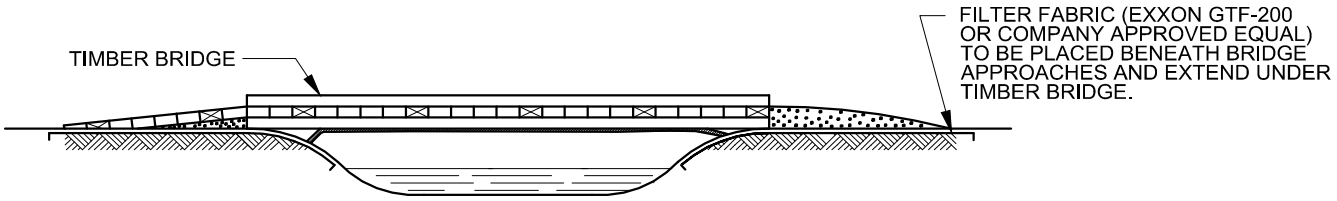

PROFILE

NOTES:

1. Timber bridges shall be adequately anchored at one end.
2. Periodically check bridge installation and remove build-up of sediment or debris on bridge.
3. Bridge approaches shall be either coarse aggregate or timber equipment mats.
4. 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.
5. Culverts shall be used to support the timber bridge to prevent settlement of the bridge if necessary. the timber bridge shall remain above the water surface elevation at all times.
6. Contractor may use manufactured portable bridges or rail car bridges as substitutes for the measures shown, if approved by company representative.
7. Support culverts shall not restrict flow and shall be designed to withstand and pass the highest flow that would occur while the bridge is in place.
8. Sediment and debris shall not enter waterbody.

REFERENCE DRAWINGS

DRAWING NO.	TITLE

NORTHWEST PIPELINE LLC
KALAMA LATERAL PROJECT

TYPICAL PORTABLE BRIDGE CROSSING

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ATTACHMENT B

FERC's Upland Erosion Control, Revegetation, and Maintenance Plan

UPLAND EROSION CONTROL, REVEGETATION, AND MAINTENANCE PLAN

MAY 2013 VERSION

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):

Slope (%)	Spacing (feet)
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) <u>before</u> 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 <u>before</u> 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:

Slope (%)	Spacing (feet)
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 C

FERC's Wetland and Waterbody Construction and Mitigation Procedures

WETLAND AND WATERBODY CONSTRUCTION AND MITIGATION PROCEDURES

MAY 2013 VERSION

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.

KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX D
Stream Fluming Procedures

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1.0 INTRODUCTION

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

2.0 PURPOSE OF FLUMED STREAM CROSSINGS

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

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

3.0 WHERE FLUMES WILL BE INSTALLED

Any minor or intermediate waterbody with water flowing in the streambed at the time of construction can be flumed. A list of streams where dry open cut crossing methods (fluming, dam and pump) may be utilized is provided in Table 2 of Appendix A.

4.0 GENERAL LAYOUT OF A TYPICAL FLUMED STREAM CROSSING

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

- flume pipe or multiple flume pipes;
- sandbag/plastic dams;
- spoil storage and staging areas;
- pumps and pump containment structure(s);
- dewater structure(s);
- erosion control structures; and
- spill containment and cleanup materials.

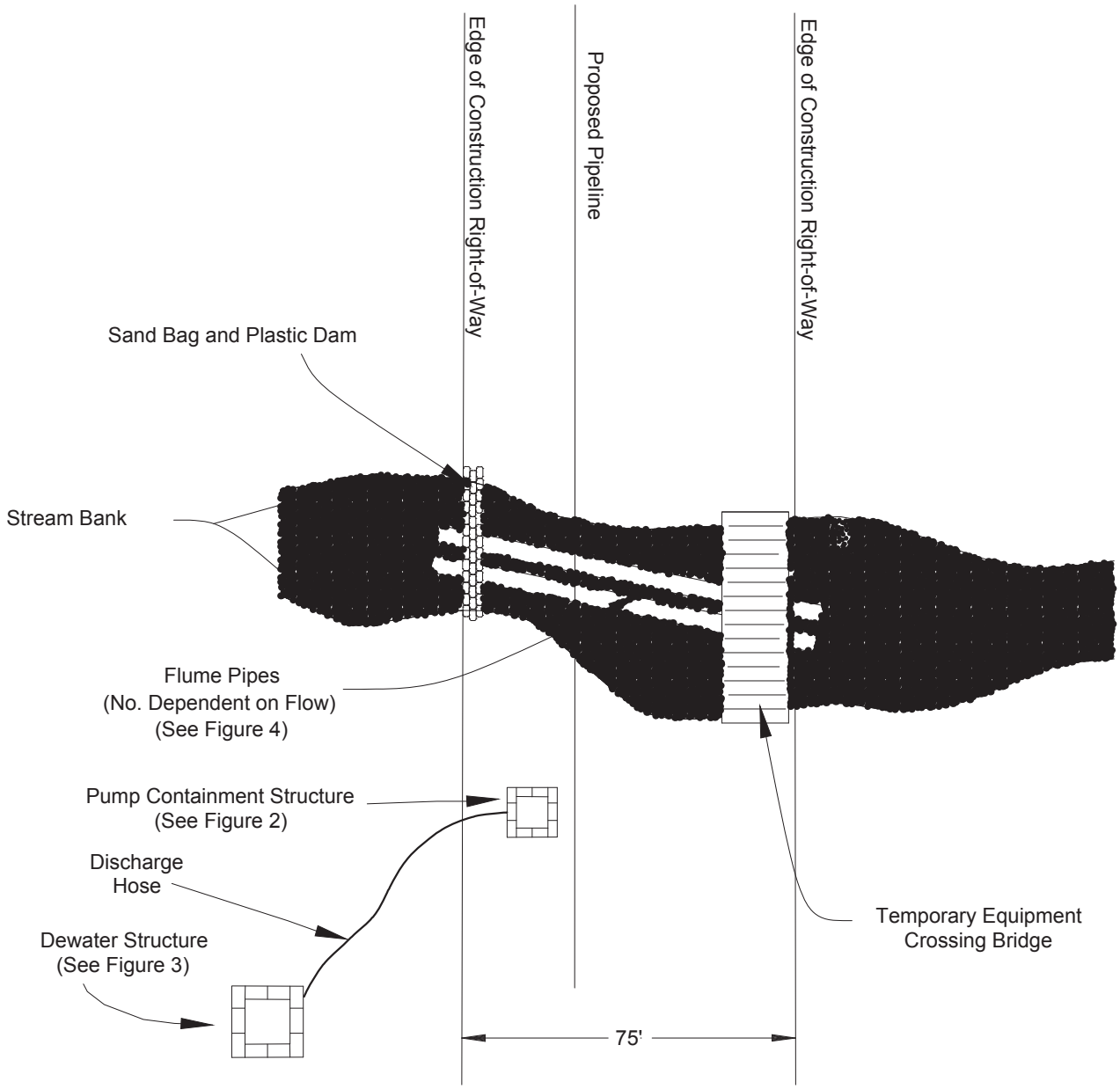


FIGURE 1
PLAN VIEW OF TYPICAL FLUMED STREAM CROSSING

Single or multiple flume pipe(s) are used to temporarily convey the stream flow over the construction area, thereby reducing the introduction of sediments into the water column during ditching and backfilling. The sandbag/plastic dams are used to support and seal the ends of the flume pipe(s) and to direct stream flow into the flume pipe and over the construction area. These structures are also utilized to prevent downstream water from flowing upstream into the construction area. They also serve to contain water that infiltrates into the construction area before it can be removed by the pumps and discharged to an upland area. Finally, the downstream structure serves to contain turbid water, which rises quickly in the construction area during backfilling of the trench.

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

The temporary spoil storage area is where spoil trenched from the streambed will be stored until backfilling is completed. These temporary extra work areas (TEWAs) are identified on the Environmental Alignment Sheets. FERC's Wetland and Waterbody Procedures prohibit the location of staging areas or additional right-of-way within 50 feet of the stream banks or edge of adjacent wetlands unless site-specific conditions such as topography prevent the setback and a variance is approved. Where these conditions will not be met, Northwest has requested variances from the FERC. Trench spoil must be placed at least 10 feet away from stream banks at all flowing stream crossings. In addition, these areas must be enclosed with silt fence and/or certified weed-free straw bales to prevent runoff of the spoil into the stream.

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

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

Runoff control structures are utilized to prevent runoff from the spoil piles or from drainage of water from the trackhoe bucket from flowing around the sandbag/plastic dams or temporary equipment crossing bridges and adding sediment to the stream. Containment and control materials are necessary to respond to any spills of fuel or lubricating oils from operating equipment. A Spill Plan for Oil and Hazardous Materials (Spill Plan, Appendix F) will be implemented by the contractor in accordance with the provisions of that plan. Erosion control structures address the prevention of runoff from the right-of-way into the stream during and after construction is complete.

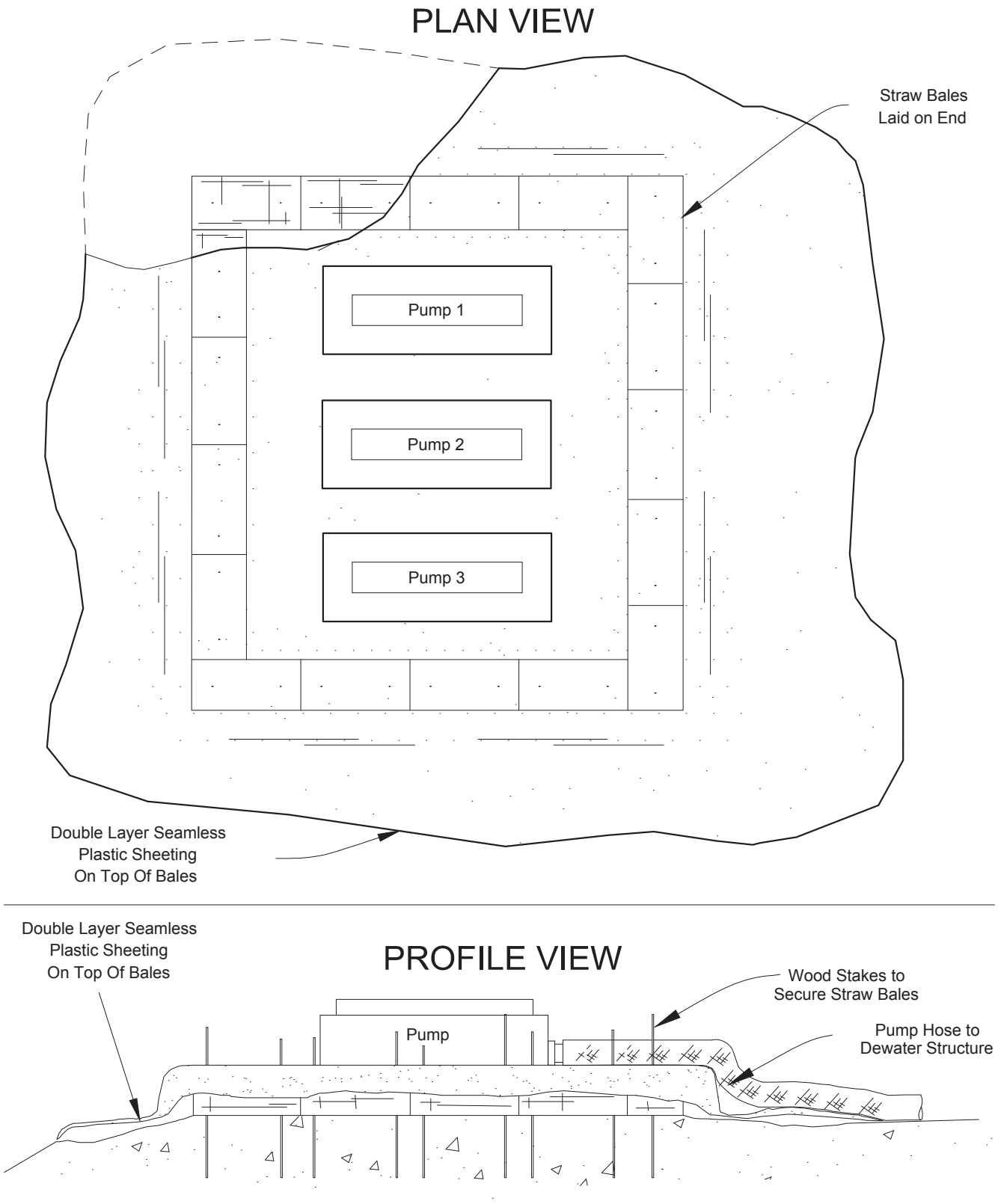
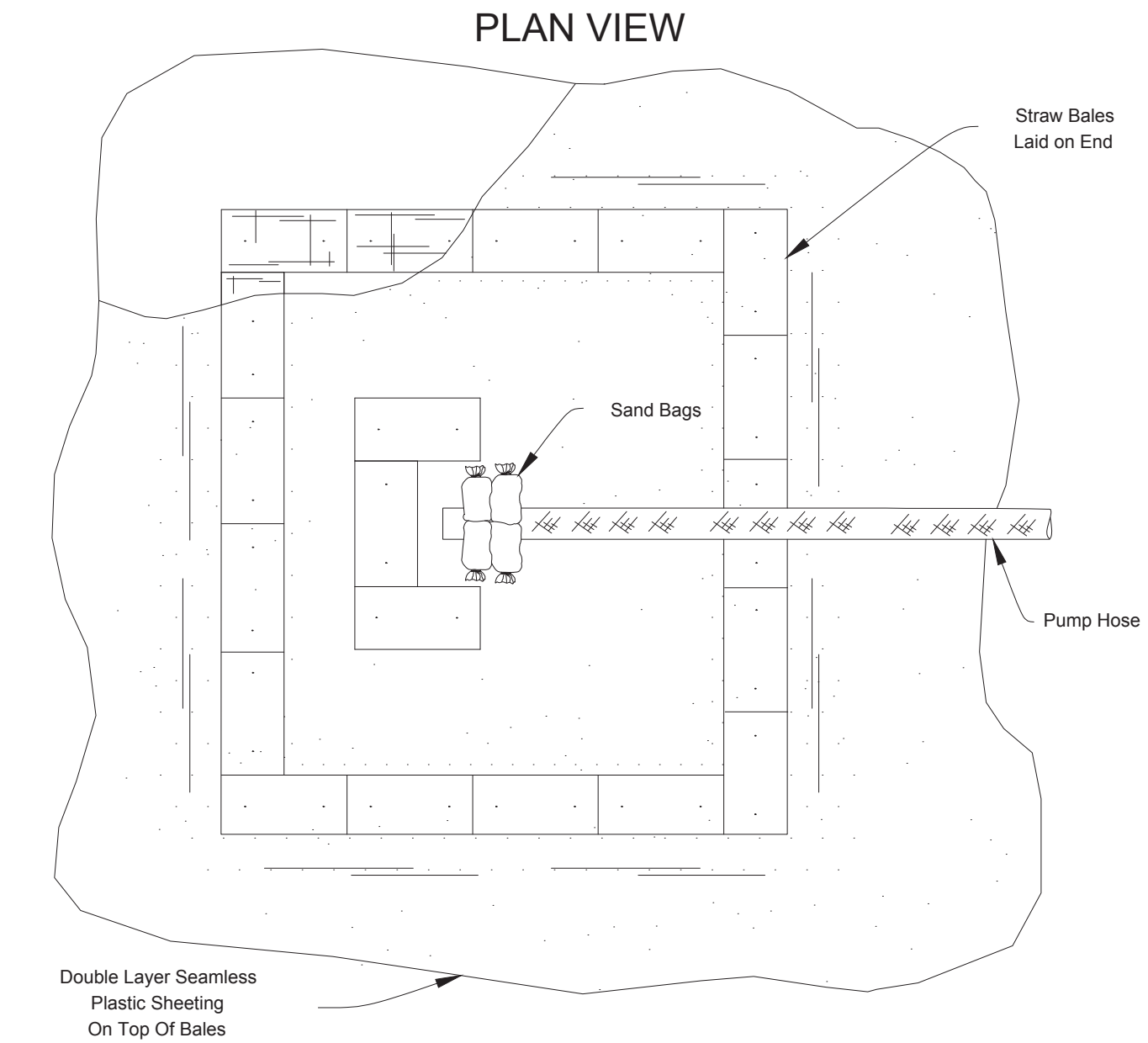


FIGURE 2
TYPICAL PUMP CONTAINMENT STRUCTURE



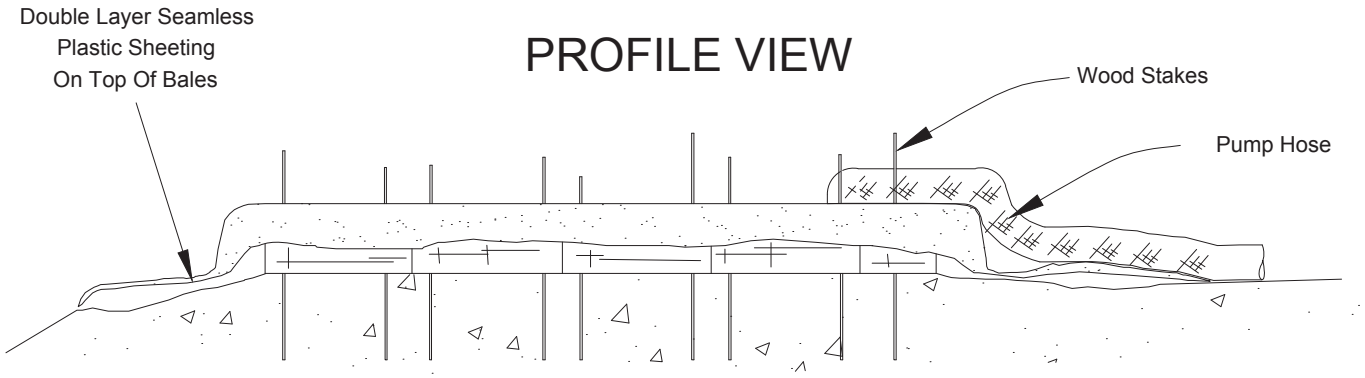


FIGURE 3
TYPICAL DEWATER STRUCTURE

5.0 MATERIALS REQUIRED TO INSTALL AND MAINTAIN A FLUMED STREAM CROSSING

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

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

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

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

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

6.0 FLUME PIPE DESIGN

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

The flume pipe(s) installed at the crossing will be of sufficient length so that the integrity of the upstream and downstream sandbag dams are not jeopardized by excessive top of ditch widths within the stream or adjacent stream banks. It is tempting to restrict the flumed width to an area smaller than the actual construction right-of-way. However, experience has shown that the contractor often needs to utilize the majority of the construction right-of-way to complete the crossing. Therefore, the flume pipes must be long enough to span the entire construction right-of-way through the stream (Figure 4).

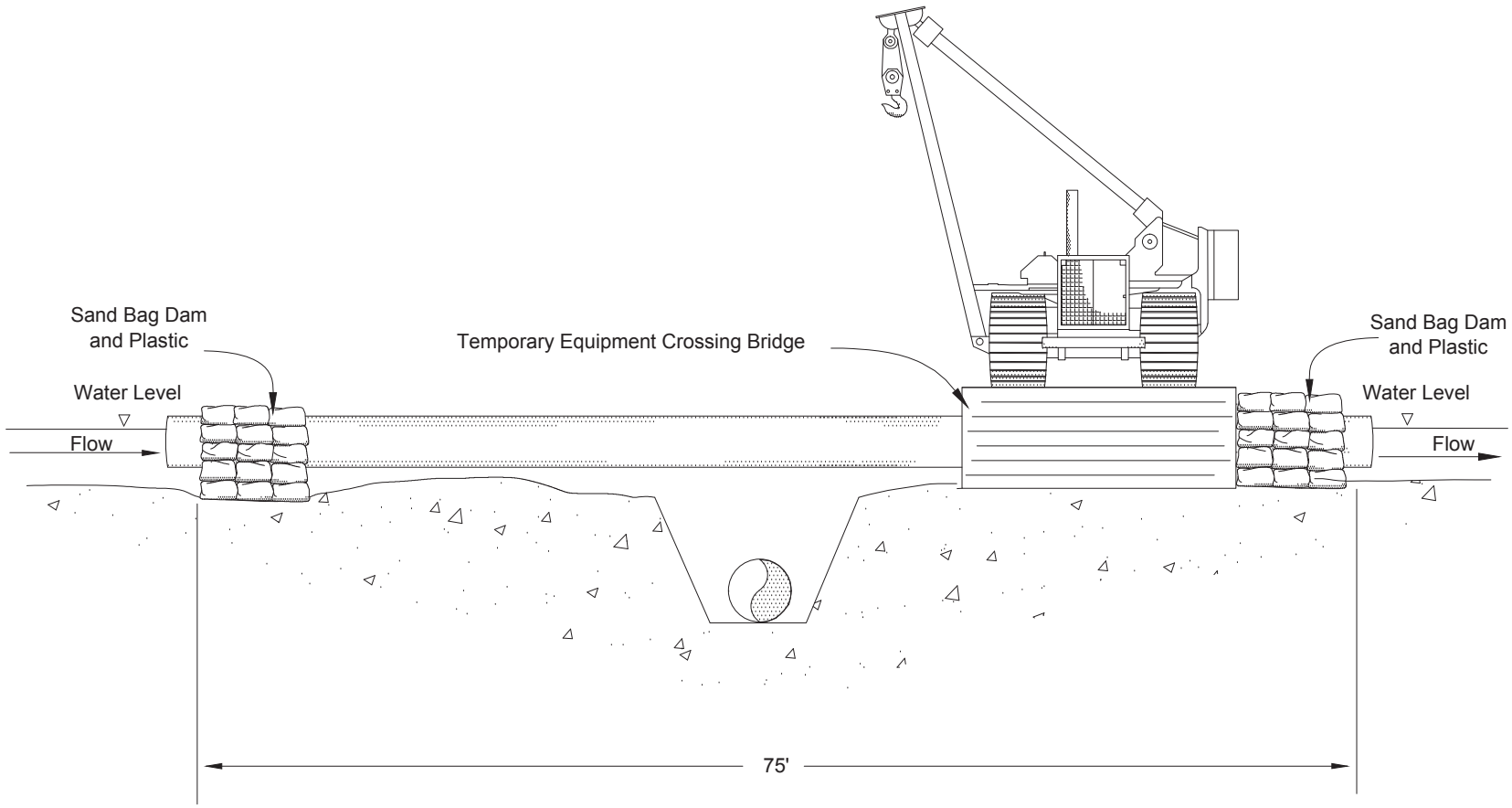


FIGURE 4
FLUME PIPE PLACEMENT ACROSS RIGHT-OF-WAY

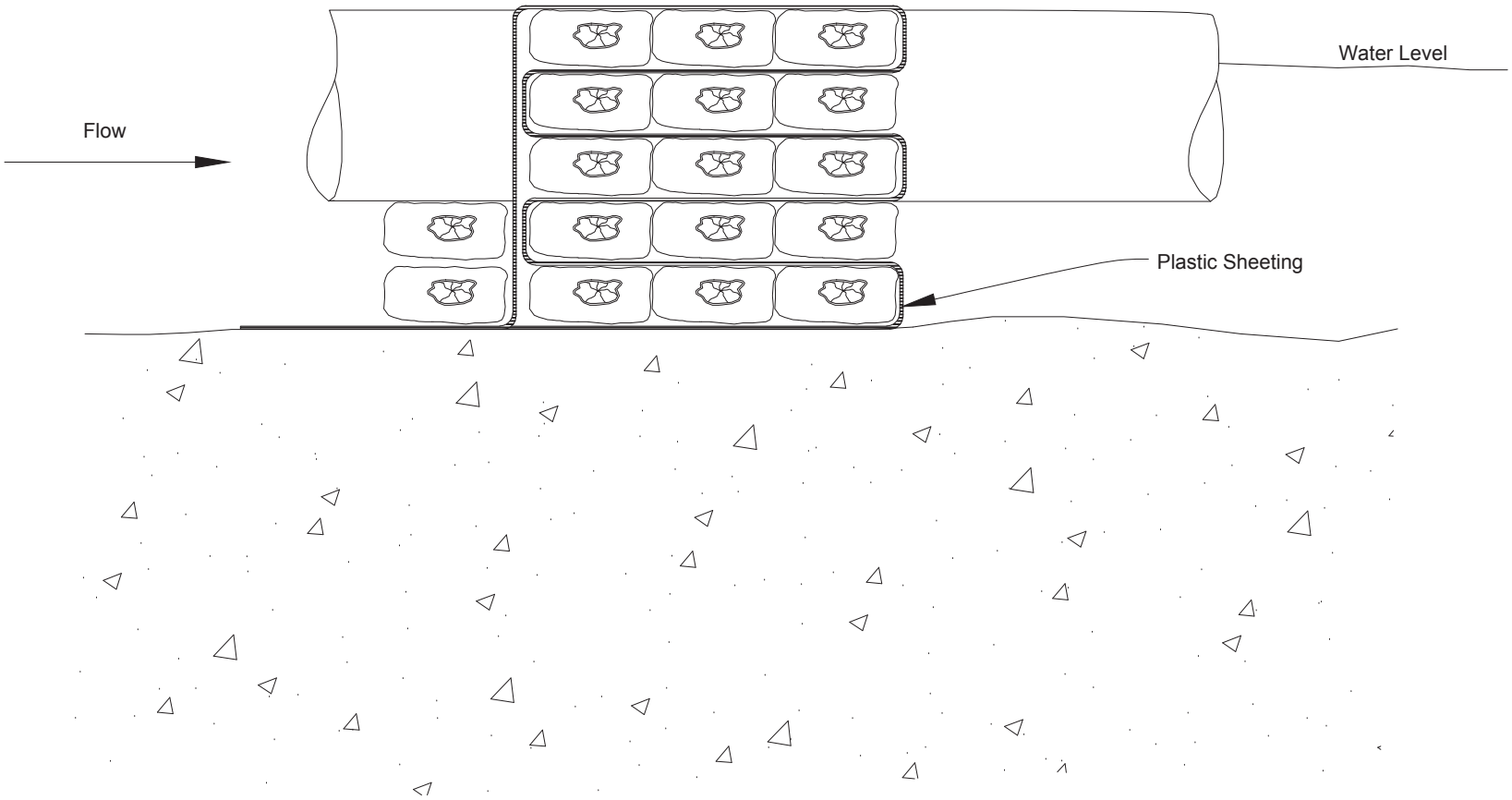
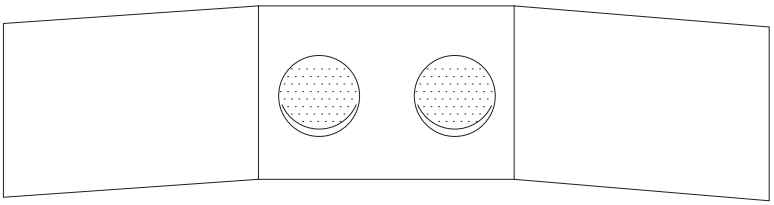


FIGURE 5
PLASTIC SHEETING INTERWOVEN INTO A SAND BAG DAM

FRONT VIEW



TOP VIEW

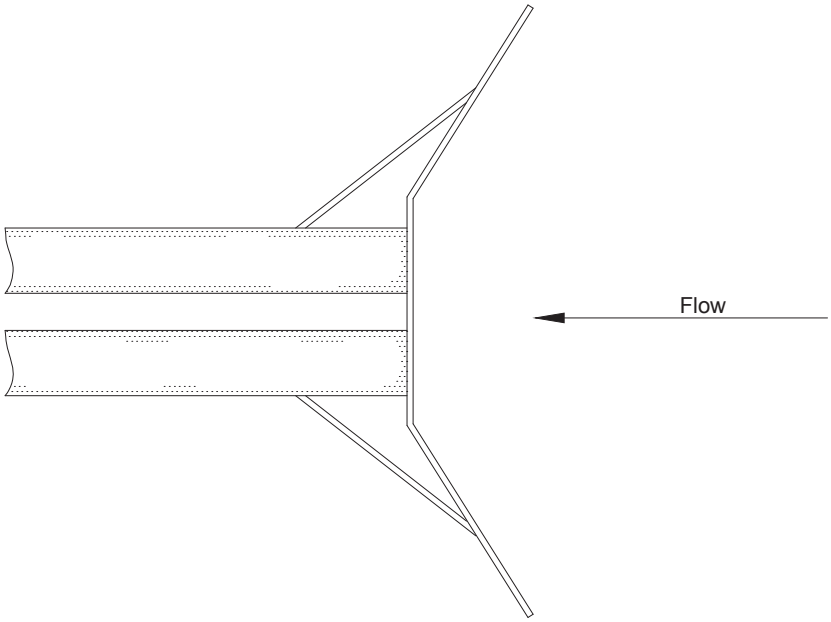


FIGURE 6
UPSTREAM FLUME WINGS

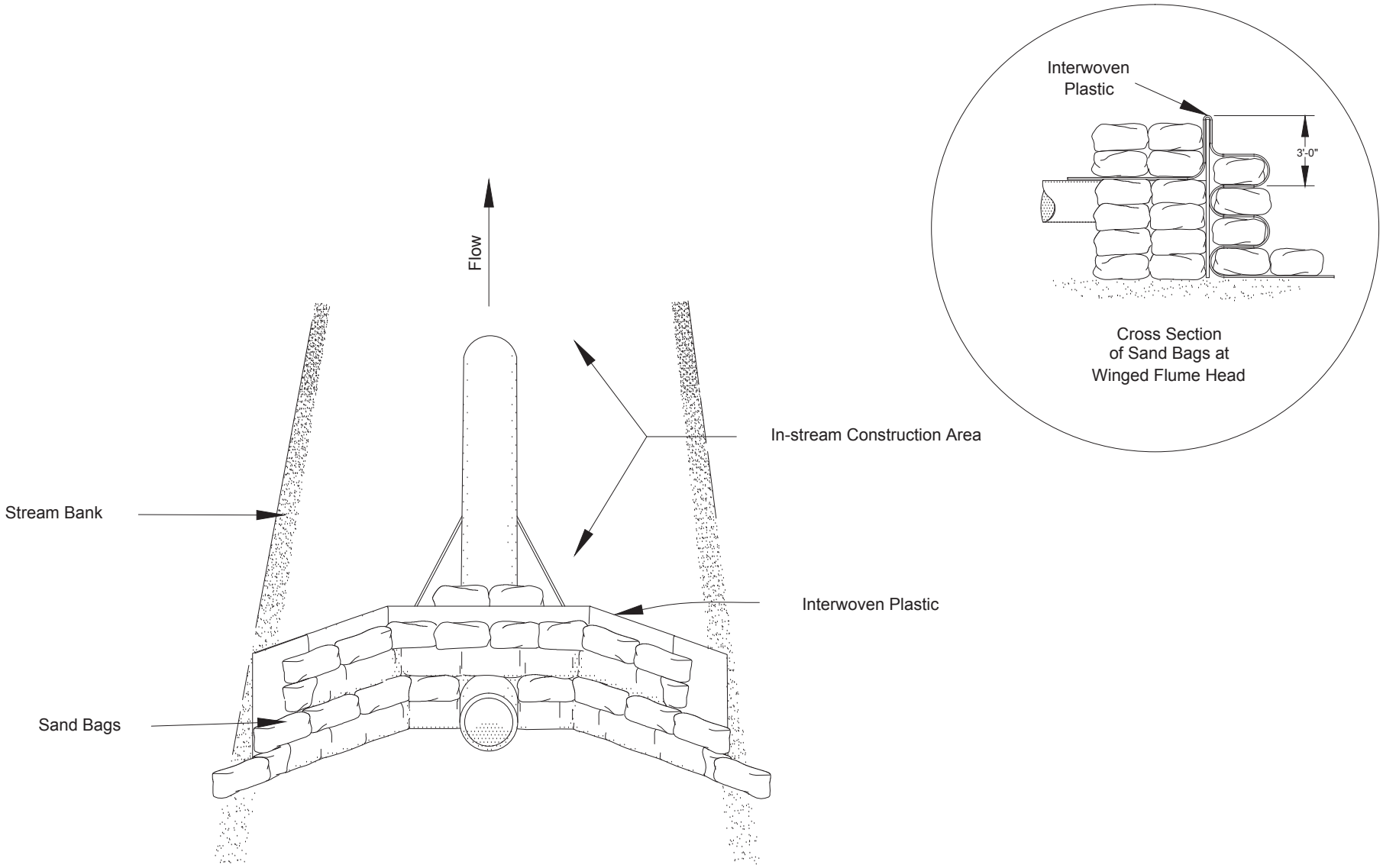


FIGURE 7
SAND BAG AND PLASTIC DAM

As a general rule, a flume pipe of at least 80 feet in length will be utilized for crossings. The diameter of the flume pipe(s) will depend on the stream discharge at the time of the crossing. However, in all cases the flume pipe diameter will be oversized to accommodate any storm events that might occur during the crossing period.

7.0 INSTALLATION OF THE FLUME PIPE

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

Installing the Flume Utilizing Only Sandbag/Plastic Dams

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

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

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

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

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

8.0 MAINTENANCE OF THE FLUME DURING CONSTRUCTION

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

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

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

9.0 LENGTH OF THE DRAG SECTION

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

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

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

10.0 TRENCHING UNDER THE FLUME PIPES

At some point prior to initiating trenching, chains should be hung from the flume pipe over the ditch line. These chains will be utilized to hang the pump heads or intake pipe into the ditch.

Digging the ditch under the flume requires careful preparation and execution. Two trackhoes will begin trenching from each stream bank at the same time. The trackhoes will begin by trenching under the flume pipe(s) and dig back to the stream banks. Finally, the trackhoes will dig the upland portion of the ditch necessary to install the drag section.

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

11.0 SPOIL STORAGE DURING TRENCHING

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

12.0 SPOIL TRANSFER DURING CONSTRUCTION

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

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

13.0 INSTALLING THE PIPE

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

14.0 DEWATERING THE CONSTRUCTION AREA

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

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

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

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

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

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

Each of the pumps (including the backup pump) will be equipped with a minimum of 300 feet of discharge hose. It is important to stretch the hose on the backup pump and install a dewater structure for that pump at the same time the primary pumps are installed. Hoses should be free of leaks and in good operating condition.

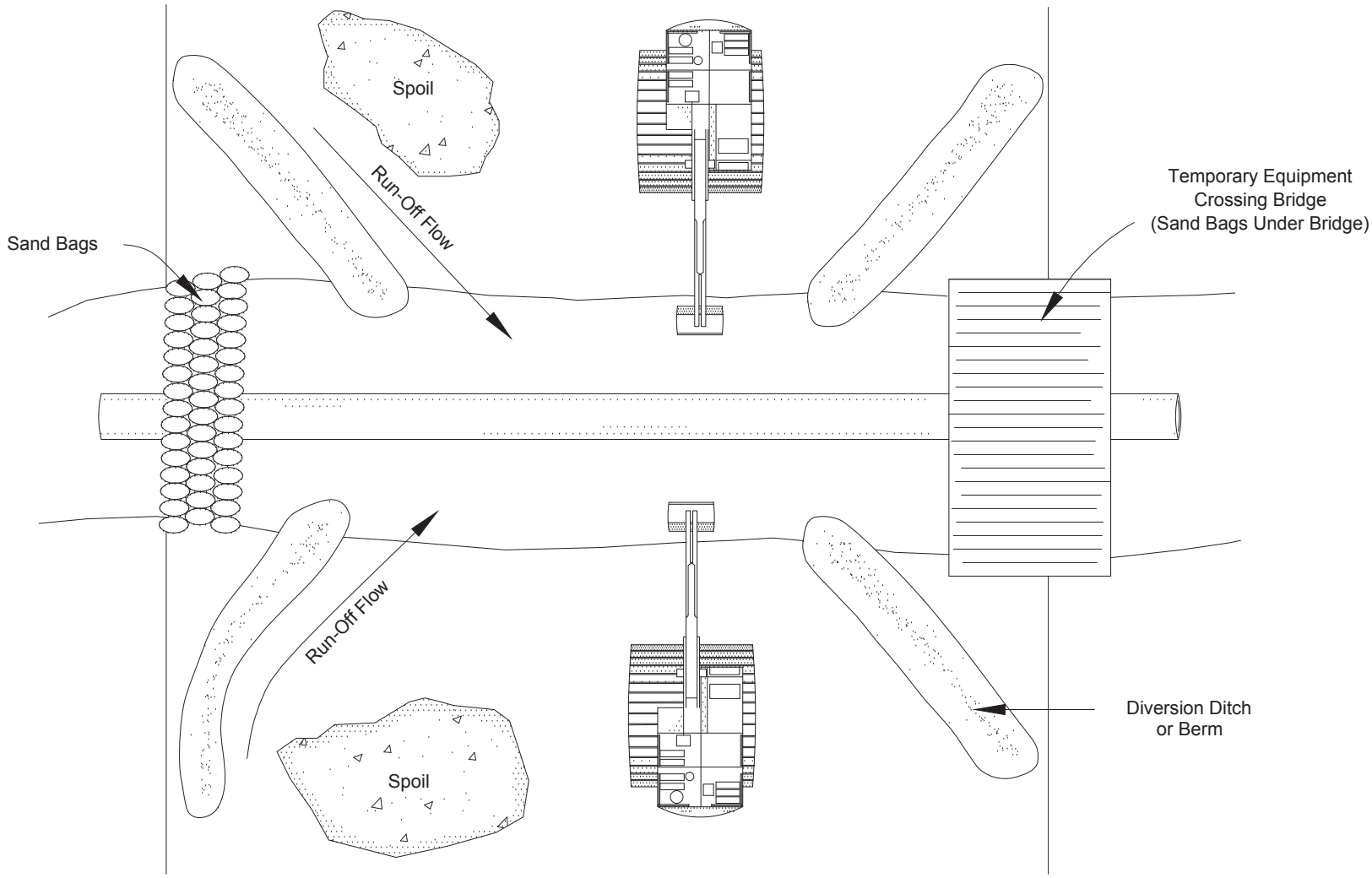


FIGURE 8
DIVERSION DITCH OR BERMS

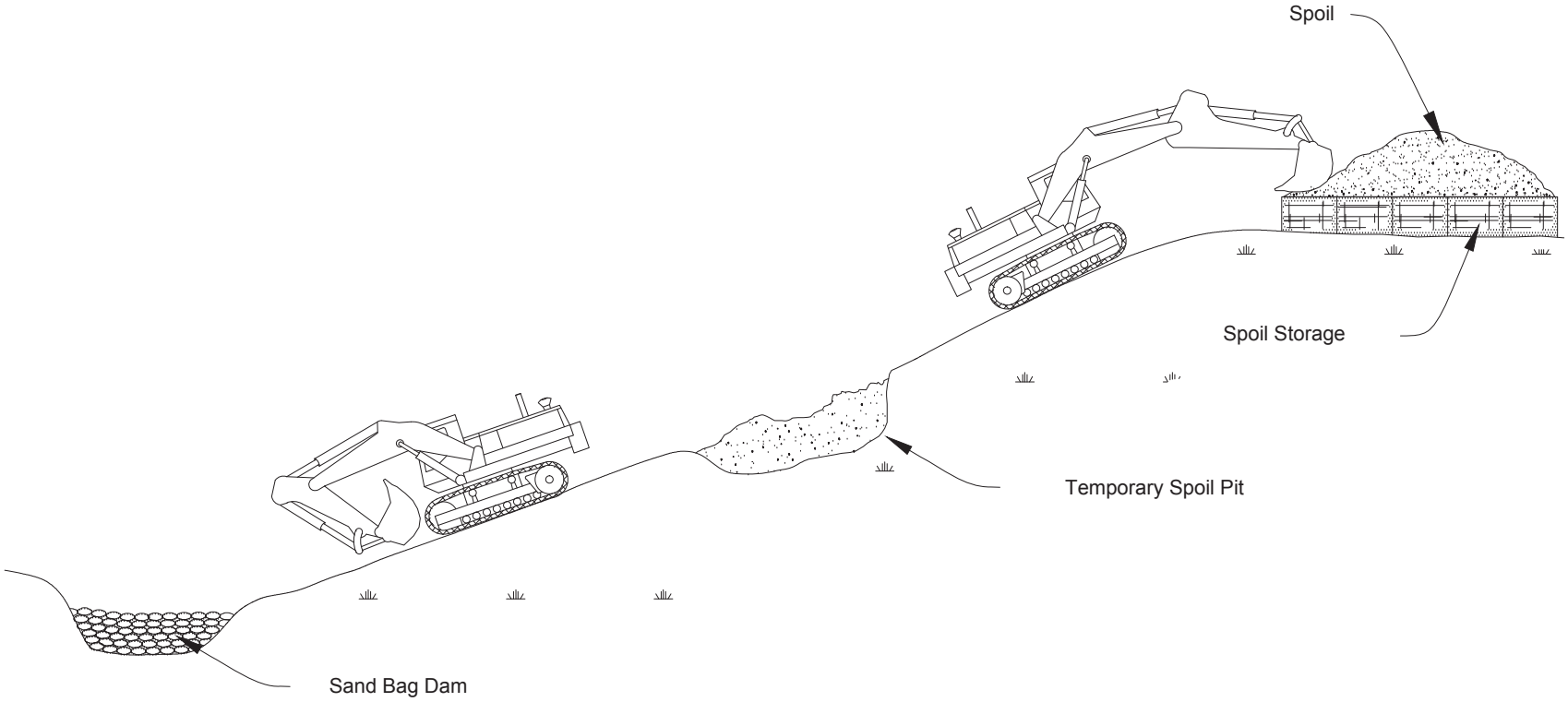


FIGURE 9
UPHILL SPOIL TRANSFER

In many cases, it is difficult to locate dewater sites where water will flows away from wetlands or streams. In these cases, careful attention will be paid to the dewater sites and alternative sites (which require additional discharge hose) selected prior to the start of in-stream construction. Often it is necessary to move the location of the dewater site several times during construction of the stream crossing to avoid dewater from reaching sensitive areas.

Dewater structures will be constructed of certified weed-free straw bales, plastic and wooden stakes as shown on Figure 3. In some rocky areas rebar with caps will be used instead of plastic or wooden stakes. The intent of the design provided on Figure 3 is to allow the water to fill the dewater structure and flow evenly over the tops of the bales. Certified weed-free straw bales will be securely staked to the ground utilizing wooden stakes and/or rebar with caps. Alternative structures are also provided in the Erosion Control and Revegetation Plan (ECRP, Appendix C).

15.0 BACKFILLING THE DITCH

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

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

Once backfilling of the entire stream channel is complete, the contractor will compact the streambed and construct solid plugs on both banks. Water will remain trapped in the ditch outside of the stream channel. This water will be pumped from the ditch at a later time in the manner described for dewatering the construction area (Section 14.0).

16.0 FLUME REMOVAL

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

After the downstream sandbags are completely removed from the streambed (except those few left directly under the flume), the contractor will begin removing the sandbags from the upstream dam. The top rows of sandbags should be removed by hand until the water begins to overflow the top of the dam and flows slowly over the construction area.

For the first 10 to 30 minutes, turbidity downstream of the crossing area could increase considerably. However, the streambed portion of the construction area will be flushed clean of sediments left over from construction and the water will flow clear over the disturbed stream bed area. After the turbidity level has decreased to acceptable levels or that of upstream levels, the contractor will proceed with removing the remainder of the upstream dam sandbags.

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

KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX E
Dam and Pump Procedures

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1.0 INTRODUCTION

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

2.0 PURPOSE OF DAM AND PUMP STREAM CROSSINGS

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

However, simply installing the dams is no guarantee that compliance with water quality standards will occur. Dams require monitoring and occasional repair during the crossing period to ensure the integrity of the structure(s). Adequate pumps play an integral role in a successful dam and pump crossing.

3.0 WHERE DAMS AND PUMPS WILL BE INSTALLED

Any minor or intermediate waterbody with water flowing in the streambed at the time of construction can be dammed and pumped. A list of streams where dry open cut crossing methods (fluming, dam and pump) may be utilized is provided as part of Resource Report 2.

4.0 GENERAL LAYOUT OF A TYPICAL DAM AND PUMP STREAM CROSSING

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

- sandbag/plastic dams or other functional designs (e.g., metal plates, water bladders, etc.);
- spoil storage and staging areas;
- pumps and pump containment structure(s);
- dewater structure(s);
- erosion control structures; and
- spill containment and cleanup materials.

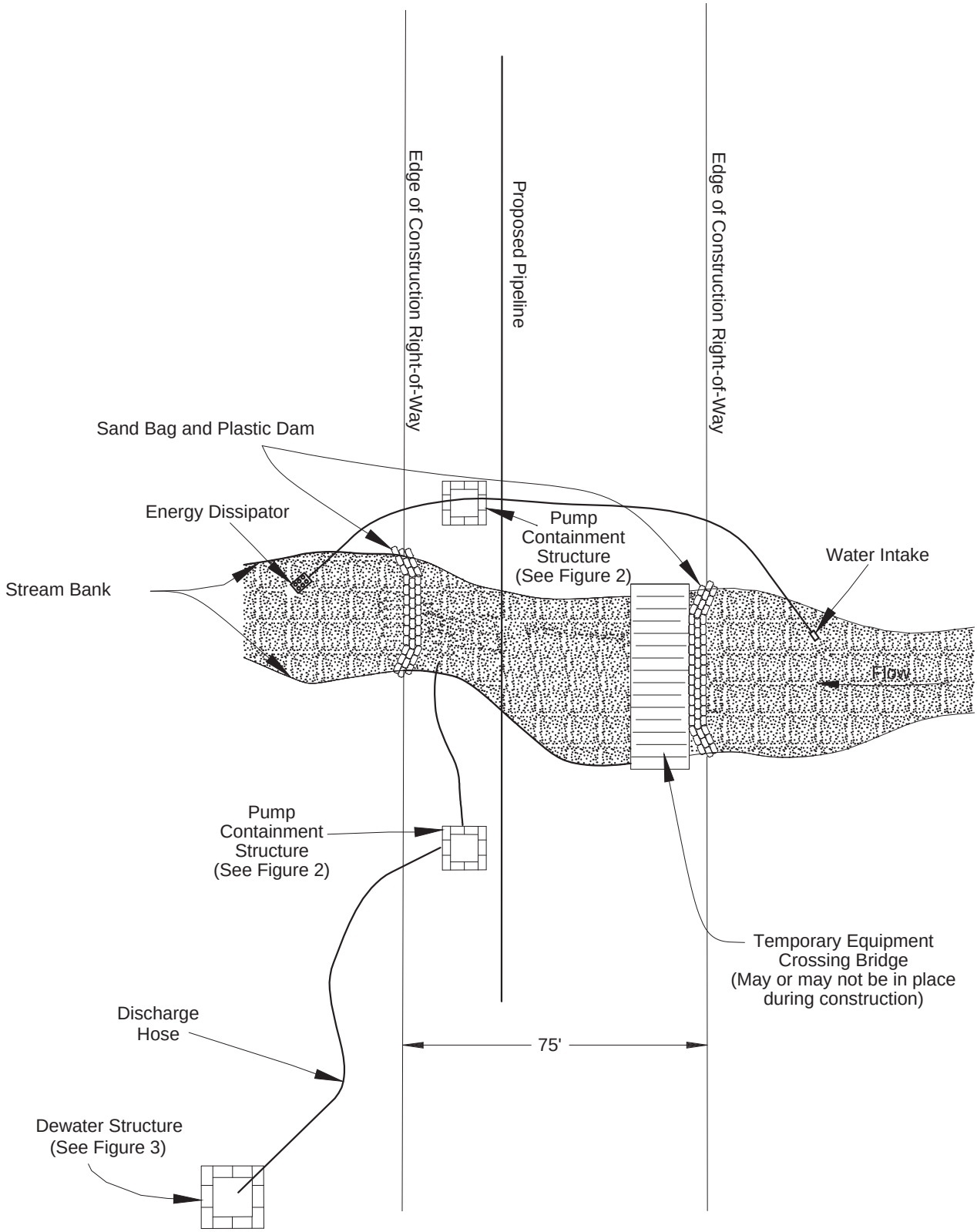


FIGURE 1
PLAN VIEW OF TYPICAL DAM & PUMP STREAM CROSSING

The sandbag/plastic dams (or other functional designs such as metal plates or water bladders) are used to isolate the stream flow from the area of construction. Single pump or multiple pumps are used to temporarily convey the stream flow around the construction area, thereby reducing the introduction of sediments into the water column during ditching and backfilling. These structures are also utilized to prevent downstream water from flowing upstream into the construction area. They also serve to contain water that infiltrates into the construction area before it can be removed by pumps and discharged to an upland area. Finally, the downstream structure serves to contain turbid water, which rises quickly in the construction area during backfilling of the trench.

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

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

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

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

Runoff control structures are utilized to prevent runoff from the spoil piles or from drainage of water from the trackhoe bucket from flowing around the sandbag/plastic dams or temporary equipment crossing bridges and adding sediment to the stream. Containment and control materials are necessary to respond to any spills of fuel or lubricating oils from operating equipment. A Spill Plan for Oil and Hazardous Materials (Spill Plan) will be implemented by the contractor in accordance with the provisions of that plan. Erosion control structures address the prevention of runoff from the right-of-way into the stream during and after construction is complete.

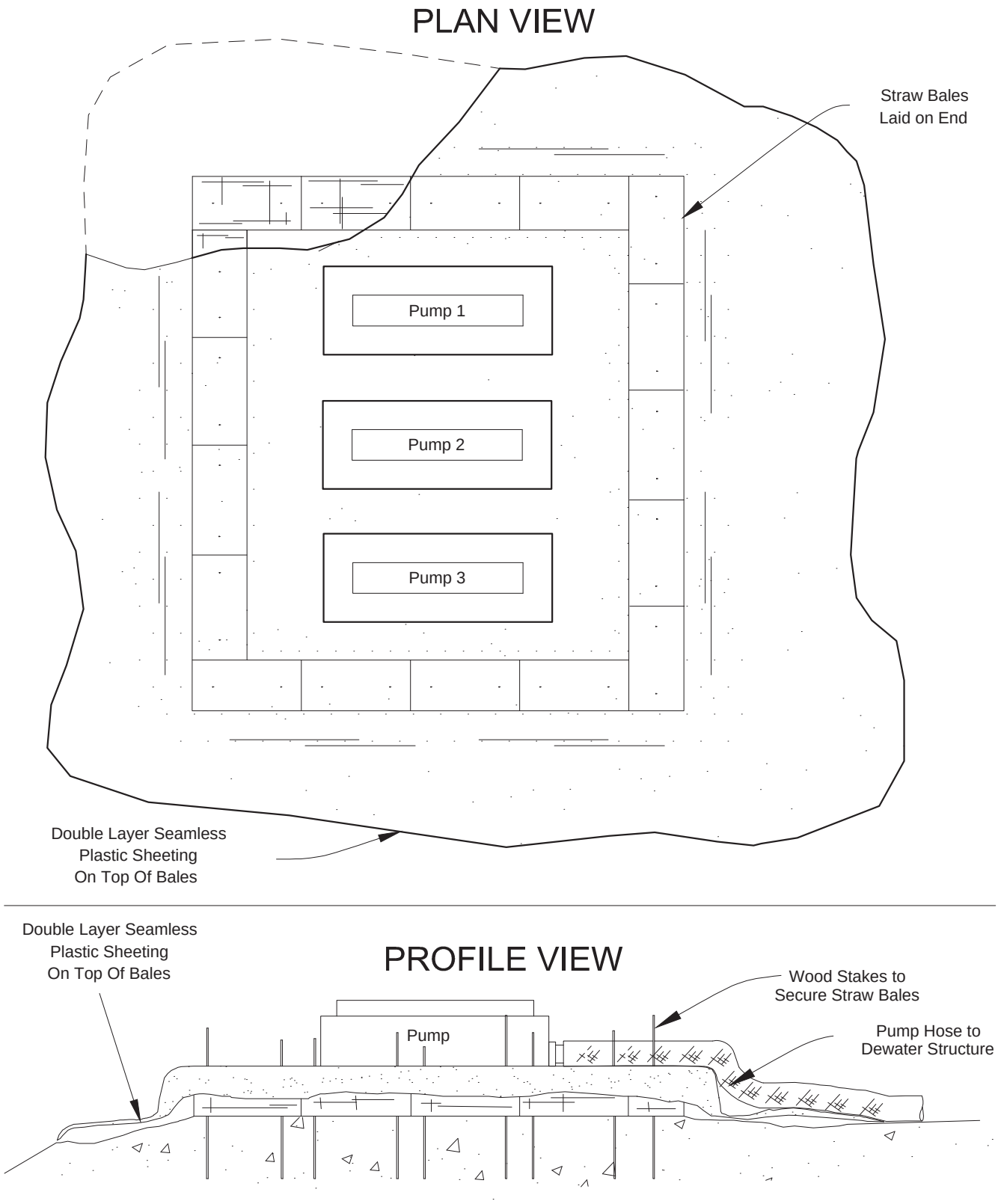


FIGURE 2
TYPICAL PUMP CONTAINMENT STRUCTURE

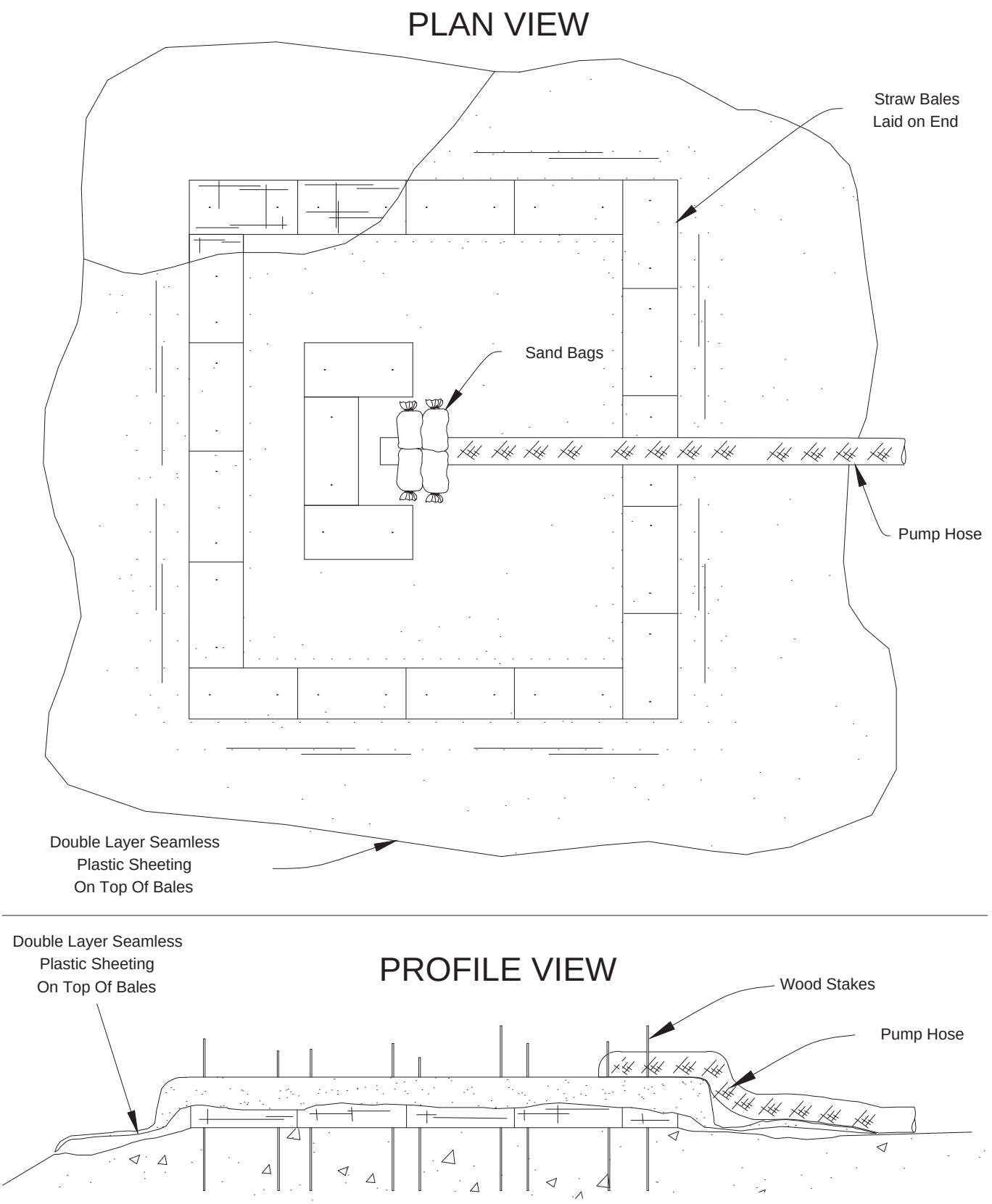


FIGURE 3
TYPICAL DEWATER STRUCTURE

5.0 MATERIALS REQUIRED TO INSTALL AND MAINTAIN A DAM AND PUMP STREAM CROSSING

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

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

Sandbags alone may not completely seal the upstream and downstream ends of the construction area. The dams are typically more effective when sheets of thick plastic are interwoven within the sandbags (Figures 4 and 5). The plastic, when applied as shown on Figure 4, will effectively seal the dams and will greatly reduce the amount of water leaking into the construction area from behind the upstream and downstream sandbag dams.

6.0 INSTALLATION OF THE DAMS

Short-term elevated levels of turbidity are expected to occur during installation of the dams. However, several measures will be taken to minimize the increased turbidity. Before the contractor attempts to install the dams, all materials necessary to complete the installation process will be located on-site. Installation of the dams will not begin until all of the precautions outlined in the Spill Plan have been undertaken. Turbidity sampling will be conducted during all dam and pump crossings in accordance with the Stormwater Pollution Prevention Plan (SWPPP).

Installing the Sandbag/Plastic Dams

The first step in installing the dams is to clear away any large rocks and boulders from the sandbag/plastic dam area that may affect the integrity of the sandbag/plastic dams. It may be necessary to utilize a trackhoe to assist in removing these rocks. However, the bucket will not dig into the streambed to remove rocks. Rather, the edge of the bucket will be utilized to roll the rocks to the side or a thumb on the bucket will be used to pick up and move rock obstacles.

The sandbags may be laid on top of the plastic sheeting that will be used to help seal the sandbag dam. The plastic will be laid such that when it is wrapped around the sandbag dam, the plastic sheeting lays on the upstream face of the dam so that water pressure holds the plastic firmly against the sandbag dam face. The sandbags will be properly seated over the plastic and onto the stream bottom and packed as tightly together as possible.

Sandbags will be installed upstream and downstream and interwoven with plastic sheeting to form a tight seal. Typically, the sandbag/plastic dams will extend at least three feet above the water level of the stream to accommodate increased stream discharge during the crossing period (Figures 4 and 5).

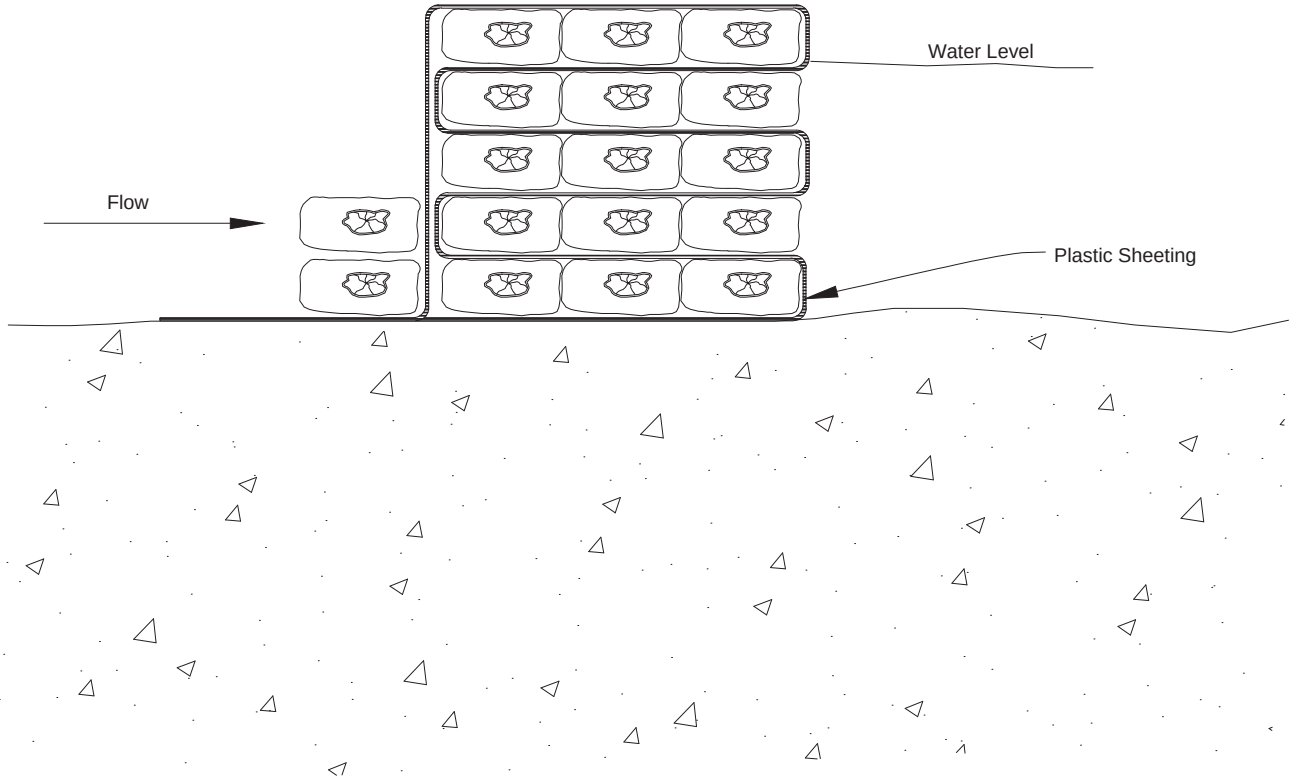


FIGURE 4
PLASTIC SHEETING INTERWOVEN INTO A SAND BAG DAM

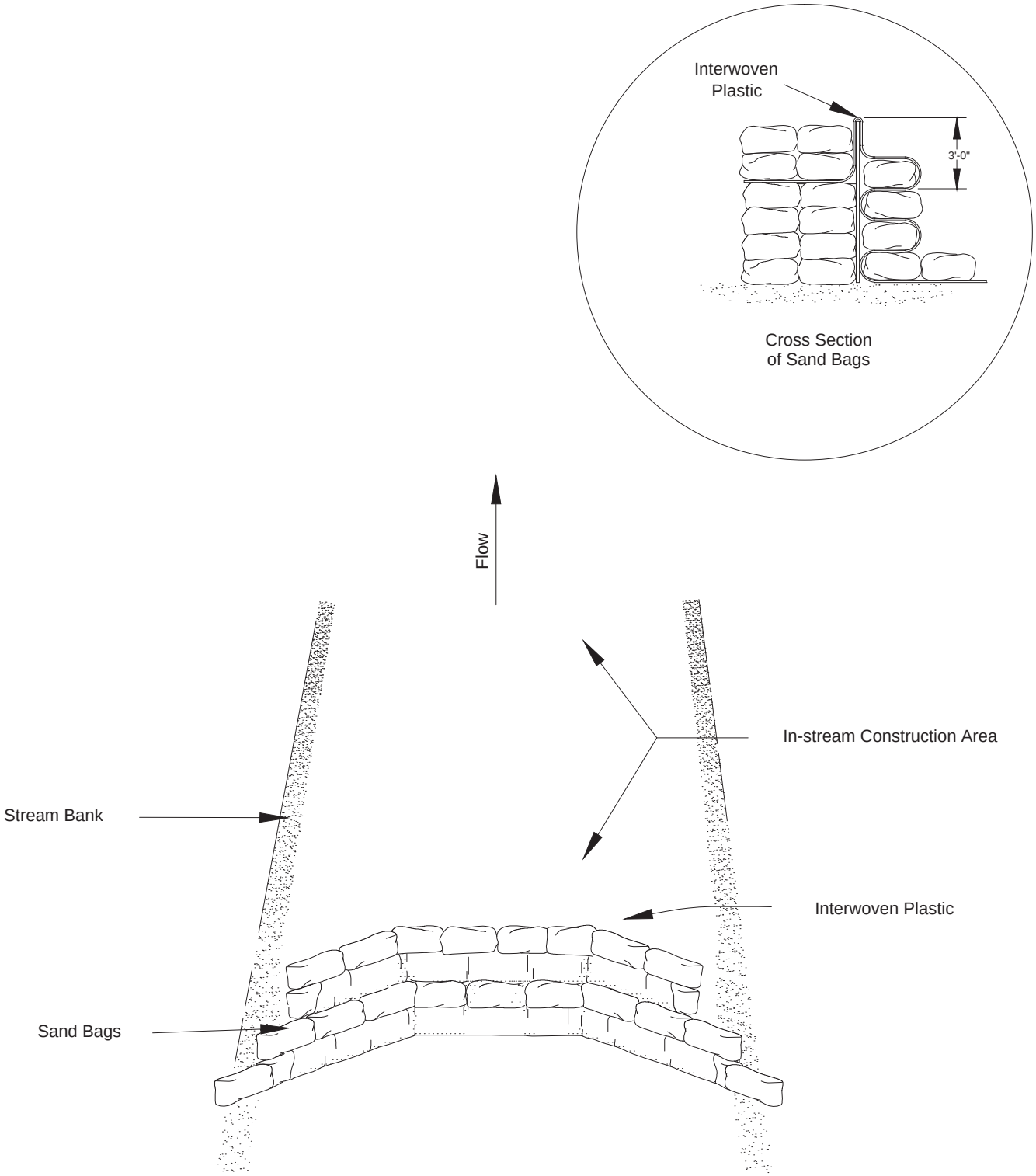


FIGURE 5
SAND BAG AND PLASTIC DAM

While the upstream dam is being installed a properly sized pump(s) will be operating to move stream flow around the dam to prevent stream erosion or bank scour. After the upstream sandbag/plastic dam is complete, the contractor will immediately begin installation of the downstream dam. The pump(s) will continue operating to divert stream flow around the dams throughout installation of the dams and completion of the crossing. The downstream sandbag/plastic dam will be constructed to a height at least three feet above the downstream water level.

7.0 MAINTENANCE OF THE DAMS AND PUMPS DURING CONSTRUCTION

Dam and pump crossings may require constant monitoring and occasional repair during the crossing process. The longer the dams remain in the water, the greater the probability they will begin to leak and that water will invade the construction area in potentially significant quantities. Therefore, it is imperative that once trenching within the stream begins the construction process is carried to completion non-stop. Typically, this involves installing the dams on the day immediately preceding construction of the crossing. Ditching of the stream channel should begin early the following morning and the pipe pulled immediately following completion of the trench. Backfilling should commence immediately following the stringing of the drag section. Most stream crossings typically require approximately 7 - 14 days to install the dams, dig the trench, install the pipe drag section, backfill the trench and restore and stabilize the stream banks depending on site conditions. Smaller streams (less than 10 feet in width) generally require less time to cross using dam and pump procedures.

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

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

8.0 LENGTH OF THE DRAG SECTION

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

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

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

9.0 SPOIL STORAGE DURING TRENCHING

Spoil must be stored in a manner such that runoff from the spoil does not flow into the stream or off the right-of-way. For streams in flat topography, runoff from the spoil storage pile is not typically a problem. However, on steep sloping stream banks water can run back down the right-of-way and enter the stream upstream or downstream of the dams creating a serious water quality problem. The problem can be compounded as the trackhoes working on the stream banks lift water saturated spoil from the stream and lay it on the right-of-way adjacent to the stream bank before it can be conveyed uphill by additional equipment. To accomplish runoff control during trenching, diversion structures or trenches will be dug within the right-of-way to direct the runoff back into the construction area as shown on Figure 6.

10.0 SPOIL TRANSFER DURING CONSTRUCTION

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

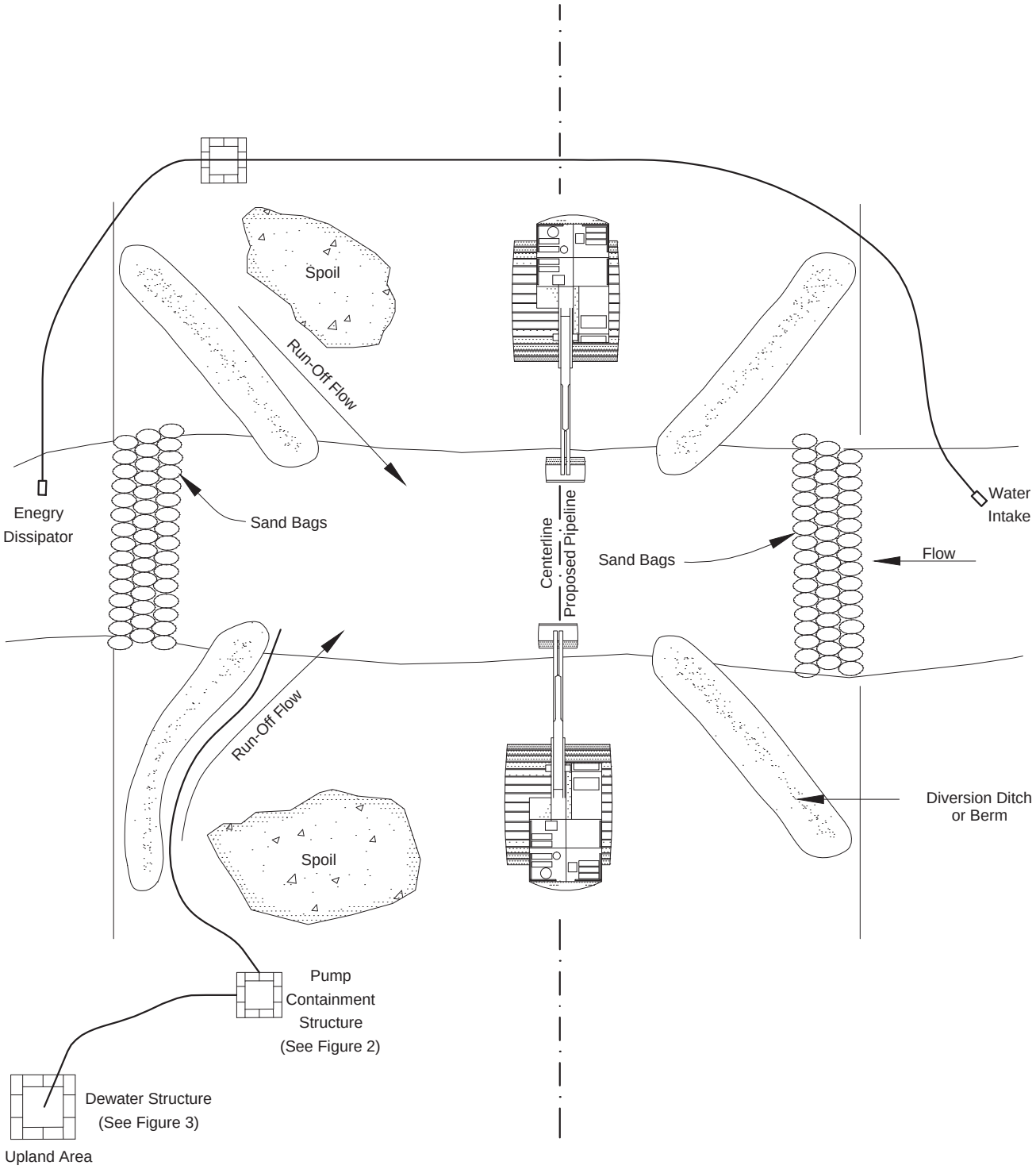
In most cases, the contractor will utilize dozers to push the spoil to the temporary storage area. In other areas, trackhoes will be required to transfer spoil dug by the trackhoe working on the stream bank uphill to a flatter area where it can be moved by dozers. Where two trackhoes are utilized to transfer spoil uphill, it is often desirable to have the trackhoe working on the stream bank place the spoil into a pit (Figure 7). The spoil from the pit is then picked up by the second trackhoe and lifted further uphill. The pit will significantly reduce the amount of water from the spoil that runs downhill. The pit will be maintained and dug by the trackhoe working uphill from the crossing.

11.0 INSTALLING THE PIPE

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

12.0 DEWATERING THE CONSTRUCTION AREA

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



NOTE:

Temporary Bridge may or may not be in place during trenching operations.

FIGURE 6
DIVERSION DITCH OR BERMS

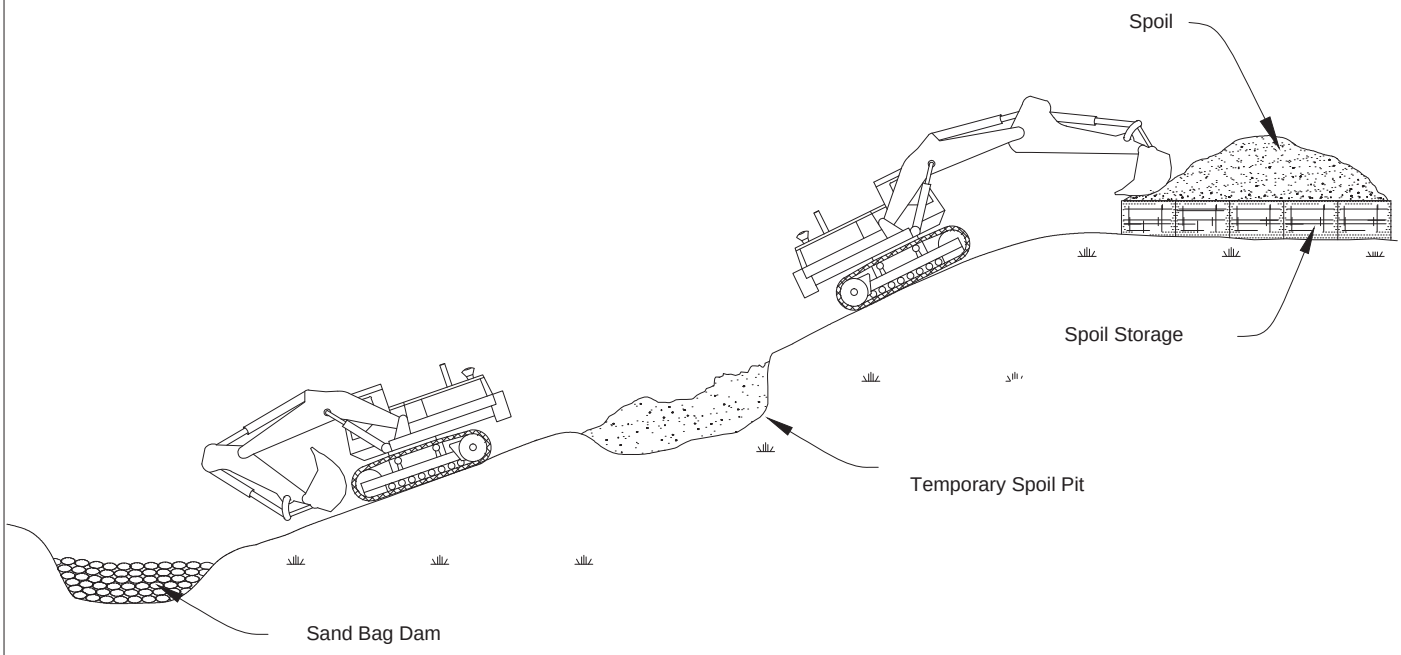


FIGURE 7
UPHILL SPOIL TRANSFER

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

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

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

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

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

Each of the pumps (including the backup pump) will be equipped with a minimum of 300 feet of discharge hose. It is important to stretch the hose on the backup pump and install a dewater structure for that pump at the same time the primary pumps are installed. Hoses should be free of leaks and in good operating condition.

In many cases, it is difficult to locate dewater sites where water will flow away from wetlands or streams. In these cases, careful attention will be paid to the dewater sites and alternative sites (which require additional discharge hose) selected prior to the start of in-stream construction. Often it is necessary to move the location of the dewater site several times during construction of the stream crossing to avoid dewater from reaching sensitive areas.

Dewater structures will be constructed of certified weed-free straw bales, plastic and wooden stakes as shown on Figure 3. In some rocky areas rebar with caps will be used instead of wooden or plastic stakes. The intent of the design provided on Figure 3 is to allow the water to fill the dewater structure and flow evenly over the tops of the bales. Certified weed-free straw bales will be securely staked to the ground utilizing wooden stakes and/or rebar with caps. Alternative structures are also provided in the Erosion Control and Revegetation Plan (ECRP, Appendix C).

13.0 BACKFILLING THE DITCH

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

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

Once backfilling of the entire stream channel is complete, the contractor will compact the streambed and construct solid plugs on both banks. Water will remain trapped in the ditch outside of the stream channel. This water will be pumped from the ditch at a later time in the manner described for dewatering the construction area (Section 12.0).

14.0 REMOVAL OF DAMS

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

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

KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX F
Spill Plan for Oil and Hazardous Materials

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Attachment A List of Emergency Contacts
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1.0 GENERAL INFORMATION

1.1 Project Location and Description

This Spill Plan for Oil & Hazardous Materials was developed for the following construction project: **Kalama Lateral Project, Cowlitz County, WA.**

Northwest Pipeline LLC (Northwest), a wholly owned subsidiary of Williams Partners L.P., proposes to construct and operate the Kalama Lateral Project (Project), a 3.1- mile long, 24-inch diameter natural gas pipeline and related facilities extending from Northwest's mainline to Northwest Innovation Works' (NWIW) proposed methanol production facility (Methanol Plant) located within the north industrial area of the Port of Kalama, in Cowlitz County, Washington.

The Project, which is designed to deliver 320,000 decatherms per day of natural gas, will begin at the interconnection of Northwest's existing Ignacio to Sumas 30-inch diameter mainline at approximate milepost (MP) 1254.1 in Section 33, Township 7 North, Range 1 West in Cowlitz County, Washington and will be located within a new 50-foot wide permanent pipeline right-of-way (ROW). The Project will require new appurtenances to tie the proposed 24-inch diameter lateral pipeline into the existing 30-inch mainline including a new tap and isolation valve. Additionally, pigging facilities will be installed at the beginning of the Project (MP 0.0) and at the new delivery meter station (NWIW Meter Station) (MP 3.07) which is proposed to be constructed within the property boundary of the Methanol Plant. The NWIW Meter Station will include standard appurtenances, piping, and buildings within an approximate 150 feet by 200 feet fenced area.

The Contractor shall be familiar with this Spill Plan for Oil and Hazardous Materials (Plan) and its contents prior to commencing any construction-related activities. The Plan will be followed to prevent any spills that may occur during the Project from entering any waterway and to mitigate any spills that do occur.

Northwest representatives assigned to this Project include:

Chief Inspector (CI):	*TBD*
District Manager (DM):	Troy Robey
Maintenance Coordinator (MC):	Larry West
Environmental Inspector (EI):	*TBD*
Environmental Compliance:	Mitch Singer
Environmental Permitting:	Kris Thorne

2.0 DRAINAGE PATTERNS AND SPILL PREVENTION PRACTICES

2.1 Drainage Patterns

The numerous drainage patterns along the ROW's work corridor vary due to site-specific terrain conditions. As a result, the Contractor shall always implement best management practices (BMP) based on site-specific observations that are continuously made during construction. These measures shall minimize off-site impacts should a spill and/or release occur.

2.2 Spill Prevention Practices

The Contractor shall take the following precautions to ensure that an oil or hazardous materials spill does not occur or if one does, it does not enter any waterway:

2.2.1 Containers

- Any containers shall be stored on level ground at least 100 feet from the nearest waterway or wetland boundary. Additionally, all containers should be located within temporary containment.
- Temporary containment will include, but not be limited to, temporary certified weed-free hay bale berms with plastic sheets underlining the entire contained area.
- Containment areas shall be capable of containing 110% of the volume of hazardous materials being stored.
- All container storage areas shall be routinely inspected for integrity purposes.
- Leaking and/or deteriorated containers shall be replaced as soon as the condition is first detected with clean-up measures immediately taking place.
- No incompatible materials shall be stored in the same containment area.
- No container storage areas shall be left unattended during non-work hours.

2.2.2 Tanks

- The Contractor shall operate only those tanks that meet the requirements and specifications of applicable regulations and that are surrounded with temporary containment as described above.
- Self-supporting tanks shall be constructed materials compatible with its contents.
- All tanks shall be routinely inspected for integrity purposes.
- Vehicle mounted tanks shall be equipped with flame/spark arrestors on vents to ensure that self-ignition does not occur.
- Tanks will not be used to store incompatible materials in sequence unless first thoroughly decontaminated.

- Any tank utilized for storing different products between construction locations will be thoroughly decontaminated prior to refilling.

2.2.3 Unloading/Loading Areas

Re-fueling and transferring of any liquids shall only occur in pre-designated locations that are on level ground and at least 100 feet from any waterway or wetland boundary. Where conditions require construction equipment (e.g., backhoes, trench dewatering pumps or hydrostatic test water discharge pumps) be re-fueled within 100 feet of any waterway or wetland boundary, this activity must be continuously manned to ensure that overfilling, leaks or spills do not occur. In addition, all this equipment must be surrounded by temporary containment as described above.

All service vehicles used to transport fuel must be equipped with an appropriate number of fire extinguishers and an oil spill response kit. At a minimum, this kit must include:

- Ten, 48”x 3” oil socks
- Five, 18” x 18” oil pillow
- One, 10’x 3” oil boom
- Twenty-five, 24” x 24” oil mats/pads
- One box garden size, 6-mil, disposable polyethylene bags (with ties)
- Four pair of oil-proof gloves
- One, 55-gallon PE open-head drum
- Blank drum labels
- 2 shovels

3.0 EMERGENCY RESPONSE PROCEDURES

This section provides a generic description of emergency response procedures to be performed to address oil and hazardous materials spills at the job site. Each response will vary depending upon the nature and extent of the incident. However, the general procedures outlined below will be followed.

3.1 Contractor Responsibilities

- The Contractor must designate both an Emergency Coordinator (EC) and an Alternate EC for the Project.

- The Contractor is responsible for appropriately addressing all spills that occur directly as a result of construction-related activities.

- For de minimus spills (spills that take less than a shovel-full of dirt to clean-up and are not in wetlands, waterbodies or other sensitive areas), no internal notification requirements of this Plan need to be followed. However, this does not relieve the Contractor from appropriately cleaning up the area.

- The Contractor shall supply the necessary manpower, Personal Protective Equipment (PPE) and spill response equipment to appropriately address all spills that directly occur as a result of construction-related activities.

- Ensure that all emergency spill response equipment and PPE is well-stocked and kept in good condition. Replace any materials when necessary.
- If the situation warrants it, the Contractor shall immediately notify any local emergency responders for assistance.
- The Contractor shall be responsible for contracting an outside emergency spill response team if the nature of the emergency incident requires it.
- The Contractor is responsible for immediately notifying the CI (or MC) of any non-de minimus spills.

3.2 Company Regulations

- Northwest shall be responsible for ensuring that the Contractor adequately follows the procedures outlined in this Plan at all times.
- Northwest shall be responsible for all verbal and written external notifications made to any regulatory agency or any local emergency responders.

3.3 Emergency Contacts

Attachment A provides a list of Northwest and Contractor emergency contacts.

3.4 Duties of Chief Inspector (or Maintenance Coordinator)

The duties of the CI (or MC) include the following:

- Determine the source, character, amount and extent of the spill.
- Assess the potential hazards to the job site, environment and surrounding community.
- Evacuate the area if necessary.
- Report the spill in accordance with the Internal Notification Procedures outlined in Section 5.1 and the External Notification Procedures outlined in Section 5.2.
- Commit manpower and equipment for minor incidents that can be reasonably remediated by the Contractor.
- Oversee Contractor's spill response efforts to contain and control all spills to ensure they adequately follow the procedures outlined in this Plan.
- Document the Contractor's response efforts, including taking photographs whenever possible.
- Generate a Williams Emergency Incident Report.

4.0 EMERGENCY SPILL RESPONSE AND PERSONAL PROTECTIVE EQUIPMENT

Attachment B provides a list of the minimally-required Emergency Spill Response Equipment and PPE for this Project. This is in addition to the minimally-required spill response equipment previously specified in Section 2.2.3.

5.0 SPILL NOTIFICATION PROCEDURES

5.1 Internal Notifications

All non-de minimus spills are to be immediately reported to the CI (or MC) who will contact Gas Control and/or Environmental Compliance. Attachment A includes a list of emergency contacts.

A Williams Emergency Incident Report must be forwarded to Environmental Compliance as soon as technically feasible by the CI (or MC). Environmental Compliance will determine if the spill constitutes a:

- Reportable Quantity under the Comprehensive Environmental Response, Compensation, and Liability Act,
- Reportable release under the CWA or Resource Conservation and Recovery Act, or
- Reportable Threshold Quantity under the Superfund Amendments and Reauthorization Act Title III

If any reporting is necessary, Environmental Compliance shall be responsible for immediately contacting the appropriate Federal and state regulatory authorities and following-up in writing, if required.

5.2 External Notifications

Any non-de minimus spills that may pose a threat to human health or the environment shall be immediately reported to the CI (or MC) who will contact the Local Emergency Planning Committee (LEPC) if necessary. When determining if the LEPC should be contacted or not, any gas release to the atmosphere must be taken into consideration.

The appropriate LEPC is:

Name:	Ernie Schnabler
Organization:	Cowlitz County LEPC
Phone Number:	360/577-3130

Environmental Compliance is responsible for submitting any required written follow-up notifications to the LEPC or any local emergency responders.

5.3 Emergency Spill Response Contractors

Northwest has arrangements with several emergency spill response contractors to address emergency responses beyond the capabilities of the Contractor. If necessary, the following firms could be utilized for this Project:

Company: PSC Emergency Spill Response

Name: Emergency Response Division

Location: 24-hour nation-wide response

Phone Number: 877/577-2669

Company: CCS

Name: Emergency Response Division

Location: Longview, WA

Phone Number: 360/423-6316 888/423-6316

5.4 Local Emergency Response Teams

The Contractor or the CI (or MC) may call the following local emergency responders should their assistance be required:

Service	Organization Name	Telephone Number
Emergency Medical Services	Ambulance	911
Hospital	St. John Medical Center	360/414-2000
Fire	Cowlitz County Fire Dept.	360/578-5218
Police	Cowlitz County Sheriff's Dept.	360/577-3092

6.0 CLEAN-UP PROCEDURES

The following section outlines specific procedures to be followed when addressing spills.

6.1 Spills

- Small spills and leaks must be remediated as soon as feasible. Use adsorbent pads wherever possible.
- Restrict spills to the containment area if possible by stopping or diverting flow.
- If the spill exceeds the containment structure's capacity, immediately construct additional containment using sandbags or fill material. Every effort must be made to prevent the spill from entering any waterway, wetland or other sensitive area.
- If a spill does reach a waterway, immediately place oil booms downstream in order to contain the material. As soon as possible, remove the floating layer with absorbent pads.
- After all recoverable oil has been collected and drummed, place all contaminated PPE, spill clean-up equipment and any impacted soil into appropriate drums.
- For significant quantities of impacted soils, construct temporary waste piles using plastic sheets. This material should subsequently be transferred into lined roll-off boxes as soon as feasible.
- Environmental Compliance will coordinate all waste characterization and disposal activities.

6.2 Equipment Cleaning/Storage

- Upon completion of remedial activities, the Contractor shall be responsible for decontaminating the used emergency response equipment as well as the PPE.
- The Contractor shall be responsible for replacing any spent emergency response equipment and PPE prior to resuming construction-related activities.
- Decontamination rinse fluids shall be collected and containerized. Environmental Compliance will coordinate waste characterization and disposal activities.
- Reusable PPE will be tested and inventoried prior to being placed back into service.

6.3 Waste Disposal

The Contractor is responsible for waste management and waste disposal; however, Environmental Compliance will coordinate all waste characterization, profiling and disposal activities.

ATTACHMENT A

LIST OF EMERGENCY CONTACTS

LIST OF EMERGENCY CONTACTS

Company	Job Description	Phone Number
GAS CONTROL	Salt Lake City	801/584-6574 (24-hrs)
TBD	Chief Inspector	*TBD*
Troy Robey	District Manager	360/606-4504 (m) 360/666-2119 (o)
Larry West	Maintenance Coordinator	541/912-9079(m) 360/666-2141 (o)
Mitch Singer	Environmental Compliance	360/518-9377 (m) 360/666-2107 (o)
Kris Thorne	Environmental Permitting	360/553- 6692(m) 801/584-6474 (o)

Contractor:	Job Description	Phone Number
TBD - to be completed by Contractor	Emergency Coordinator	*TBD - to be completed by Contractor*
TBD - to be completed by Contractor	Alternate Emergency Coordinator	*TBD - to be completed by Contractor*

Regulatory Agencies:	Name	Phone Number
	National Response Center	800/424-8802
	Washington Emergency Management Division (EMD)	800/258-5990

ATTACHMENT B

EMERGENCY SPILL RESPONSE AND PERSONAL PROTECTIVE EQUIPMENT

EMERGENCY SPILL RESPONSE AND PERSONAL PROTECTIVE EQUIPMENT

Equipment	Quantity	Location
(1) chemical spill kit	**	Strategically located along the right-of-way (ROW) and adjacent to work space/waterbodies
(2) oil spill kit	**	Strategically located along the ROW and adjacent to work space/waterbodies

EMERGENCY SPILL RESPONSE EQUIPMENT:

(1) 1 bag loose chemical pulp	3 chemical pillows (18” x 18”)
3 chemical socks (48” x 3”)	10 chemical mats/pads (24” x 24”)
1 box garden-sized, 6-mil, disposable, polyethylene bags (with ties)	
Blank waste labels	one 30-gallon polyethylene (PE) open-head drum
2 shovels	

(2) 1 oil boom (100’ x 3”)	10 oil pillows (18” x 18”)
10 oil socks (48” x 3”)	25 oil mats/pads (24” x 24”)
1 box garden-sized, 6-mil, disposable, polyethylene bags (with ties)	
Blank waste labels	three, 55-gallon PE open-head drums
4 shovels	

** The appropriate quantity of spill kits for the Project shall be determined and based on site-specific observations that are continuously made during construction. This emergency spill response equipment, in addition to the BMPs implemented in Section 2.1 of this Spill Plan, shall minimize off-site impacts should a spill and/or release occur.

PERSONAL PROTECTIVE EQUIPMENT:

The inventory of PPE should include enough for at least 4 responders reacting to a spill.

Splash goggles, half-face respirators (with cartridges for benzene)
Tyvek suits, nitrile gloves, waterproof/ chemical resistant hip-waders

KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX G
Wetland/Stream Delineation Report and Wetland Rating Forms

CASCADIA
ECOLOGICAL SERVICES, INC.

MEMORANDUM

TO:	FROM:
Mike Timpson	Jim Barnes
COMPANY:	DATE:
Natural Resource Group	9/13/2012
RE:	CC:
Williams Kalama Lateral Project Wetland Survey	

☐ URGENT ☑ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

On April 19, 2012, Cascadia Ecological Services, Inc. (CES) completed a wetland delineation survey for the following tax parcels within the scope of the Williams Kalama Lateral Project:

West Portion	East Portion
CW-020.100AB	CW-001.000
CW-019.000	CW-002.000
CW-020.000	CW-003.000
CW-019.100AB	
CW-018.000	
CW-017.000	
CW-017.100AB	

Prior to conducting the site investigation, CES reviewed existing information to assist with the determination of wetland boundaries on the project area. This review included field maps provided by NRG, Cowlitz County Soil Survey, National Wetland Inventory (NWI) maps, USGS Topographic Quadrangle maps and aerial photographs. According to the NWI the western portion of the proposed pipeline corridor crosses an extensive area of emergent and forested wetlands.

During the field visit, we encountered no wetlands within the eastern portion of the 150-foot-wide survey corridor. The route in this area generally follows a forested ridge line between 700 and 900 feet in elevation. According to the Natural Resource Conservation Service Web Soil Survey, this portion of the route is mapped as Hazeldell gravelly silt loam, 30 to 65 percent slopes. This soil type is generally found at elevations between 200 and 1,800 feet and is well drained.

The plant community in this section is dominated by an overstory of Douglas fir (*Pseudotsuga menziesii*), red alder (*Alnus rubra*), and occasional western red cedar (*Thuja plicata*). The shrub layer consists mainly of beaked hazelnut (*Corylus cornuta*), scotch broom (Cytisus scoparius), snowberry (*Symphoricarpos albus*), red elderberry (*Sambucus racemosa*), salmonberry (Rubus spectabilis), salal (*Gaultheria shallon*), Oregon grape (*Mahonia aquifolium*), and osoberry (*Oemleria cerasiformis*). The herbaceous layer is dominated by waterleaf (*Hydrophyllum tenuipes*), bentgrasses (*Agrostis* spp.), St. John's wort (*Hypericum perforatum*), and stinging nettle (*Urtica dioica*).

Two wetlands and an intermittent stream were located within the west portion of the survey. A small slope wetland (W-2A1) was mapped along the east side of Tax Parcel CW-018.000. This wetland is approximately 50 feet north of the centerline of the proposed gas line and on the east side of a gravel road. The wetland was likely formed by surface water which flows along the east side of the road in a 6" wide ditch collecting in a small depressional area. The wetland is dominated by Douglas spirea (*Spiraea douglasii*), soft rush (*Juncus effusus*), and nootka rose (*Rosa nutkana*). The surrounding uplands contain large thickets of Himalayan blackberry (*Rubus discolor*), bracken fern (*Pteridium aquilinum*), and salal. Corresponding wetland determination data forms for W-2A1 are 1 and 2.

The topography west of this location is very steep with exposed rocky slopes which are dominated by stands of mature Oregon white oak (*Quercus garryana*) and Douglas fir. Other dominant shrubs include Oceanspray (*Holodiscus discolor*), snowberry, and poison oak (*Toxicodendron diversilobum*).

At the west base of the hillslope is a small intermittent stream (S-2A3) which crosses the proposed gas line route. This stream originates in a draw approximately 1,000 feet northeast of a rock quarry along the east side of Old Highway 99. It passes along the east side of the quarry and flows south towards a large forested wetland on Tax Parcel CW-019-100AB. The wetland plant community adjacent to the stream consists mainly of red alder, thickets of Himalayan blackberries, stinging nettle, creeping buttercup (*Ranunculus repens*), horsetails (*Equisetum* spp.), and reed canarygrass. This wetland area is identified as W-2A2. Corresponding wetland determination data forms for this W-2A2 are 3 and 4.

A large Oregon ash forested wetland (W-2A4) is located directly to the south of the rock quarry on tax parcels CW-020.000 and CW-019.100AB. The boundary between the rock quarry and wetlands is abrupt with the upland boundary line consisting of large boulders which slope up to the level of the quarry approximately 10 feet higher in elevation. Other dominant vegetation in the forested wetland includes red-osier dogwood (*Cornus stolonifera*), reed canarygrass, and stinging nettles. Corresponding wetland determination forms for this wetland are 5 and 6.

Attachments:

Wetland Determination Data Forms (1-6)
Field Maps

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Williams Kalama Lateral Project **City/County:** Cowlitz County **Sampling Date:** 19-Apr-12

Applicant/Owner: Williams **State:** WA **Sampling Point:** **01 (W2-A1)**

Investigator(s): Jim Barnes **Section, Township, Range:** **S** 31 **T** 7N **R** 1W

Landform (hillslope, terrace, etc.): Hillslope **Local relief (concave, convex, none):** undulating **Slope:** 1.0 **%** / 0.6 **°**

Subregion (LRR): LRR A **Lat.:** 46.052118224743 **Long.:** -122.84741520881653 **Datum:** NAD83

Soil Map Unit Name: Hazeldell gravelly silt loam, 20 to 30 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks:
Small slope wetland; east side of gravel road.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Alnus rubra	40	☑ 100.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	40	= Total Cover	

Sapling/Shrub Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Spiraea douglasii	60	☑ 60.0%	FACW
2. Rosa nutkana	20	☑ 20.0%	FAC
3. Polystichum munitum	20	☑ 20.0%	FACU
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	100	= Total Cover	

Herb Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	0	= Total Cover	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 75.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	60	x 2 =	120
FAC species	60	x 3 =	180
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	140 (A)		380 (B)

Prevalence Index = B/A = 2.714

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 01 (W2-A1)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type[1]	Loc[2]	Texture	Remarks
0-17	10YR	4/1	80%	10YR	3/6	20%	RM	M	Silty Clay Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☑ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☑ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	0.5
Water Table Present?	Yes ◉	No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Small depressional area on east side of road fed by ~6" wide shallow ditch

Plot ID: 1 Photo Path: Y:\Dropbox\CASCADIA ACTIVE PROJECTS AND FILES FOLDER\F

Photo File: ▪ untitled▪ (1).j Orientation: North northeast -facing

Lat/Long or UTM : Long/Easting: **-122.84741520** Lat/Northing: **46.0521182247**

Description:

Wetland W-2A1, view to the northeast.

No Photo

Photo File: None.bmp Orientation: -facing

Lat/Long or UTM: Long/Easting: **0** Lat/Northing: **0**

Description:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Williams Kalama Lateral Project **City/County:** Cowlitz County **Sampling Date:** 19-Apr-12

Applicant/Owner: Williams **State:** WA **Sampling Point:** **02 (W2-A1)**

Investigator(s): Jim Barnes **Section, Township, Range:** **S** 31 **T** 7N **R** 1W

Landform (hillslope, terrace, etc.): Hillside **Local relief (concave, convex, none):** undulating **Slope:** 0.5 **%** / 0.3 **°**

Subregion (LRR): LRR A **Lat.:** 46.052118224743 **Long.:** -122.84741520881653 **Datum:** NAD83

Soil Map Unit Name: Hazeldell gravelly silt loam, 20 to 30 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ○ No ◉

Hydric Soil Present? Yes ○ No ◉

Wetland Hydrology Present? Yes ○ No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:
Small slope wetland; east side of gravel road.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	

Herb Stratum (Plot size: 3'x3')			
1. Phalaris arundinacea	10	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	10	= Total Cover	

Woody Vine Stratum (Plot size: 3'x3')			
1. Rubus discolor	90	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	90	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	2	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	50.0%	(A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	0	x 3 =	0
FACU species	90	x 4 =	360
UPL species	0	x 5 =	0
Column Totals:	100 (A)		380 (B)

Prevalence Index = B/A = 3.800

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☐ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 02 (W2-A1)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR	3/3								

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Williams Kalama Lateral Project **City/County:** Cowlitz County **Sampling Date:** 19-Apr-12

Applicant/Owner: Williams **State:** WA **Sampling Point:** **03 (W-2A2)**

Investigator(s): Jim Barnes **Section, Township, Range:** **S** 31 **T** 7N **R** 1W

Landform (hillslope, terrace, etc.): Hillside **Local relief (concave, convex, none):** concave **Slope:** 0.5 **%** / 0.3 **°**

Subregion (LRR): LRR A **Lat.:** 46.05074817090417 **Long.:** -122.85086989402771 **Datum:** NAD83

Soil Map Unit Name: Olympic silt loam, 2 to 8 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks:
Hillslope wetland composed mainly of red alder, adjacent to stream S-2A3, but not within.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Alnus rubra	60	☑ 100.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	60	= Total Cover	

Sapling/Shrub Stratum (Plot size: 3'x3')			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	

Herb Stratum (Plot size: 3'x3')			
1. Urtica dioica	35	☑ 35.0%	FAC+
2. Ranunculus repens	30	☑ 30.0%	FACW
3. Equisetum arvense	15	☐ 15.0%	FAC
4. Phalaris arundinacea	20	☑ 20.0%	FACW
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	100	= Total Cover	

Woody Vine Stratum (Plot size:)			
1. Rubus discolor	10	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	10	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across All Strata:	5	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	80.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	110	x 3 =	330
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	170 (A)		470 (B)

Prevalence Index = B/A = 2.765

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 03 (W-2A2)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR	3/2	90%	10YR	3/4	10%	RM	M	Silt Loam	Rocks and pieces of asphalt within stream

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☑ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☑ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ◉	No ○	Depth (inches):	3
Water Table Present?	Yes ◉	No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Plot ID: 3 Photo Path: Y:\Dropbox\CASCADIA ACTIVE PROJECTS AND FILES FOLDER\F

Photo File: ▪ untitled▪ 1.jp Orientation: Northeast -facing

Lat/Long or UTM : Long/Easting: **-122.85086989** Lat/Northing: **46.0507481709**

Description:

Wetland W-2A2, Waterbody S-2A3, view to the northeast. Sample point 3.

No Photo

Photo File: None.bmp Orientation: -facing

Lat/Long or UTM: Long/Easting: **0** Lat/Northing: **0**

Description:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Williams Kalama Lateral Project **City/County:** Cowlitz County **Sampling Date:** 19-Apr-12

Applicant/Owner: Williams **State:** WA **Sampling Point:** **04 (W-2A2)**

Investigator(s): Jim Barnes **Section, Township, Range:** **S** 31 **T** 7N **R** 1W

Landform (hillslope, terrace, etc.): Channel (active) **Local relief (concave, convex, none):** **Slope:** 0.0 **%** / 0.0 **°**

Subregion (LRR): LRR A **Lat.:** 46.05074817090417 **Long.:** -122.85086989402771 **Datum:** NAD83

Soil Map Unit Name: Olympic silt loam, 2 to 8 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ○ No ◉

Wetland Hydrology Present? Yes ○ No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:
Hillslope wetland composed mainly of red alder, adjacent to stream S-2A3, but not within.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Alnus rubra	60	☑ 100.0%	FAC
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	60	= Total Cover	

Sapling/Shrub Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	

Herb Stratum (Plot size: 3'x3')			
1. Phalaris arundinacea	10	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	10	= Total Cover	

Woody Vine Stratum (Plot size: 3'x3')			
1. Rubus discolor	70	☐ 100.0%	FACU
2.	0	☐ 0.0%	
	70	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	66.7%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	60	x 3 =	180
FACU species	70	x 4 =	280
UPL species	0	x 5 =	0
Column Totals:	140 (A)		480 (B)

Prevalence Index = B/A = 3.429

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☐ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 04 (W-2A2)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR	3/2	100%						Silt Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Plot ID: **4** Photo Path: Y:\Dropbox\CASCADIA ACTIVE PROJECTS AND FILES FOLDER\F

Photo File: **untitled 1.jp** Orientation: Northeast -facing

Lat/Long or UTM : Long/Easting: **-122.85086989** Lat/Northing: **46.0507481709**

Description:

Wetland W-2A2, Waterbody S-2A3, view to the northeast. Sample Point 4.

No Photo

Photo File: **None.bmp** Orientation: -facing

Lat/Long or UTM: Long/Easting: **0** Lat/Northing: **0**

Description:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Williams Kalama Lateral Project **City/County:** Cowlitz County **Sampling Date:** 19-Apr-12

Applicant/Owner: Williams **State:** WA **Sampling Point:** **05 (W-2A4)**

Investigator(s): Jim Barnes **Section, Township, Range:** **S** 31 **T** 7N **R** 1W

Landform (hillslope, terrace, etc.): Lowland **Local relief (concave, convex, none):** undulating **Slope:** 0.0 % / 0.0 °

Subregion (LRR): LRR A **Lat.:** 46.05050245113235 **Long.:** -122.8521466255188 **Datum:** NAD83

Soil Map Unit Name: Pilchuck loamy fine sand, 0 to 8 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○
Hydric Soil Present?	Yes ○	No ◉
Wetland Hydrology Present?	Yes ○	No ◉

Is the Sampled Area within a Wetland? Yes ○ No ◉

Remarks:
Large Oregon ash forested wetland; south of sand and gravel processing site along east side of Old Highway 99.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	0	= Total Cover	
Herb Stratum (Plot size: 3'x3')			
1. Phalaris arundinacea	30	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	30	= Total Cover	
Woody Vine Stratum (Plot size:)			
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 60

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	30	x 2 =	60
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	30 (A)		60 (B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:
Upland fringe is dominated by a fill slope of large boulders and rock to the edge of the wetlands.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 05 (W-2A4)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR	3/2								

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 10

Hydric Soil Present? Yes ○ No ◉

Remarks:

Wetland/upland interface is at the edge of a rock slope extending south from the rock pit

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Plot ID: **5** Photo Path: Y:\Dropbox\CASCADIA ACTIVE PROJECTS AND FILES FOLDER\F

Photo File: **▪ untitled▪ 4.jp** Orientation: Southwest -facing

Lat/Long or UTM : Long/Easting: **-122.85215198** Lat/Northing: **46.0504577746**

Description:

Wetland W-2A4, view to the southwest. Sample point 5.

No Photo

Photo File: **None.bmp** Orientation: -facing

Lat/Long or UTM: Long/Easting: **0** Lat/Northing: **0**

Description:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Williams Kalama Lateral Project **City/County:** Cowlitz County **Sampling Date:** 19-Apr-12

Applicant/Owner: Williams **State:** WA **Sampling Point:** **06 (W-2A4)**

Investigator(s): Jim Barnes **Section, Township, Range:** **S** 31 **T** 7N **R** 1W

Landform (hillslope, terrace, etc.): Lowland **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR): LRR A **Lat.:** 46.05045777469278 **Long.:** -122.85215198993683 **Datum:** NAD83

Soil Map Unit Name: Pilchuck loamy fine sand, 0 to 8 percent slopes **NWI classification:** N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ◉ No ○ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ◉ No ○

Hydric Soil Present? Yes ◉ No ○

Wetland Hydrology Present? Yes ◉ No ○

Is the Sampled Area within a Wetland? Yes ◉ No ○

Remarks:
Large Oregon ash forested wetland; south of sand and gravel processing site along east side of Old Highway 99.

VEGETATION - Use scientific names of plants.

Tree Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Fraxinus latifolia	80	☑ 100.0%	FACW
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
	80	= Total Cover	

Sapling/Shrub Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Cornus stolonifera	30	☑ 54.5%	FACW
2. Rosa nutkana	25	☑ 45.5%	FAC
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
	55	= Total Cover	

Herb Stratum (Plot size: 3'x3')	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1. Urtica dioica	30	☑ 100.0%	FAC+
2.	0	☐ 0.0%	
3.	0	☐ 0.0%	
4.	0	☐ 0.0%	
5.	0	☐ 0.0%	
6.	0	☐ 0.0%	
7.	0	☐ 0.0%	
8.	0	☐ 0.0%	
9.	0	☐ 0.0%	
10.	0	☐ 0.0%	
11.	0	☐ 0.0%	
	30	= Total Cover	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover	Indicator Status
1.	0	☐ 0.0%	
2.	0	☐ 0.0%	
	0	= Total Cover	

% Bare Ground in Herb Stratum: 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	110	x 2 =	220
FAC species	55	x 3 =	165
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	165 (A)		385 (B)

Prevalence Index = B/A = 2.333

Hydrophytic Vegetation Indicators:

- ☐ **1 - Rapid Test for Hydrologic Vegetation**
- ☑ **2 - Dominance Test is > 50%**
- ☑ **3 - Prevalence Index is ≤3.0** [1]
- ☐ **4 - Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **5 - Wetland Non-Vascular Plants** [1]
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 06 (W-2A4)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR	2/1	80%	10YR	3/4	20%	RM	M	Silt Loam	

[1]Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except in MLRA 1)
- ☑ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☑ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres on Living Roots (C3)
- ☑ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ☐ Drainage Patterns (B10)
- ☐ Dry Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☑ FAC-neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):	
Water Table Present?	Yes ◉	No ○	Depth (inches):	2
Saturation Present? (includes capillary fringe)	Yes ○	No ◉	Depth (inches):	0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitor well, aerial photos, previous inspections), if available:

Remarks:

Plot ID: **6** Photo Path: Y:\Dropbox\CASCADIA ACTIVE PROJECTS AND FILES FOLDER\F

Photo File: **▪ untitled▪ 6.jp** Orientation: West southwest -facing

Lat/Long or UTM : Long/Easting: **-122.85214662** Lat/Northing: **46.0505024511**

Description:

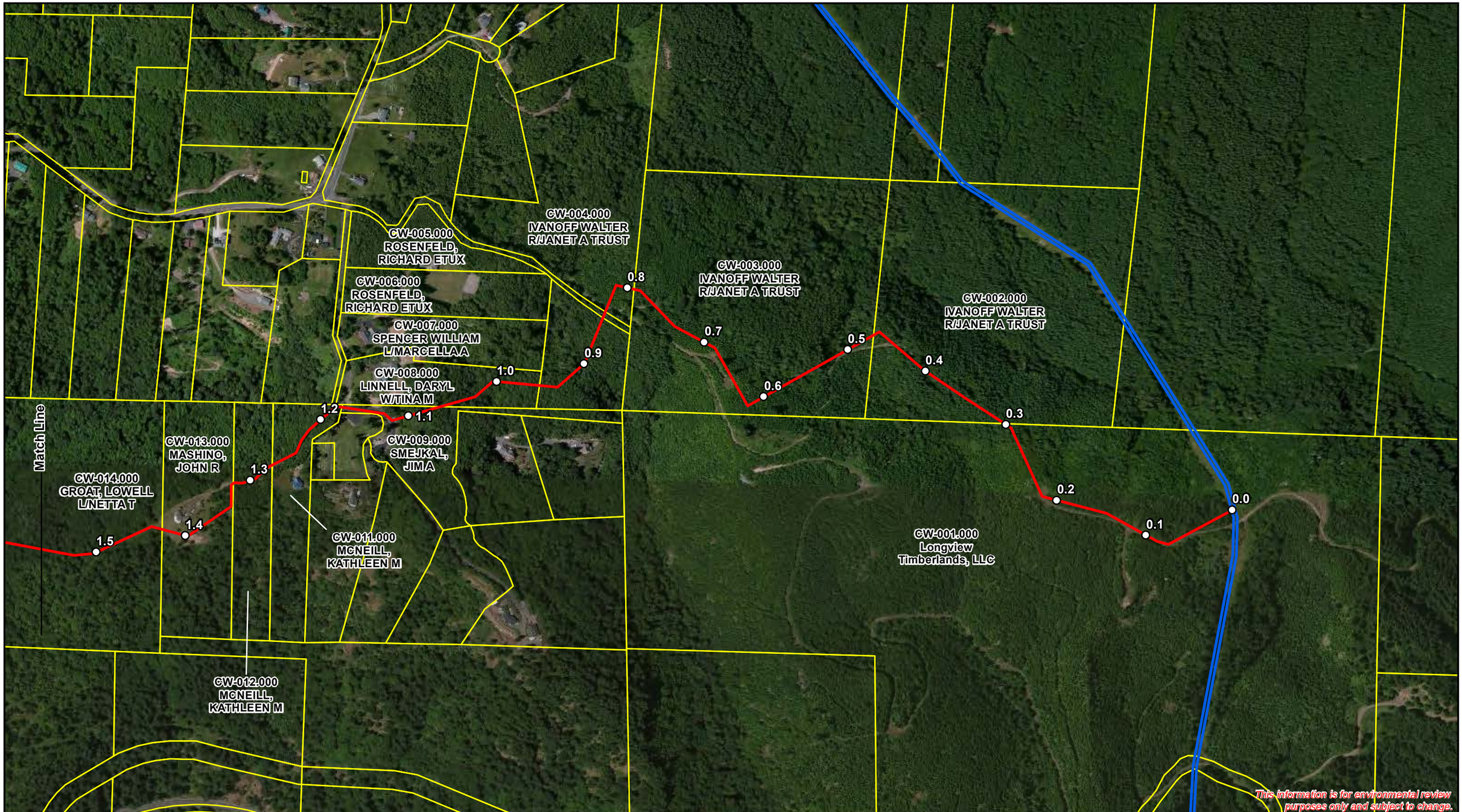
Wetland W-2A4, view to the southwest. Sample point 6.

No Photo

Photo File: **None.bmp** Orientation: -facing

Lat/Long or UTM: Long/Easting: **0** Lat/Northing: **0**

Description:



0 250 500 Feet

1 inch = 500 feet

N

Milepost

Timber Rock Route

Existing Northwest Pipeline System

GPS Wetland/Waterbody Data

Parcel Boundary

Sheet 1 of 2

Williams

Williams

Kalama Lateral Project

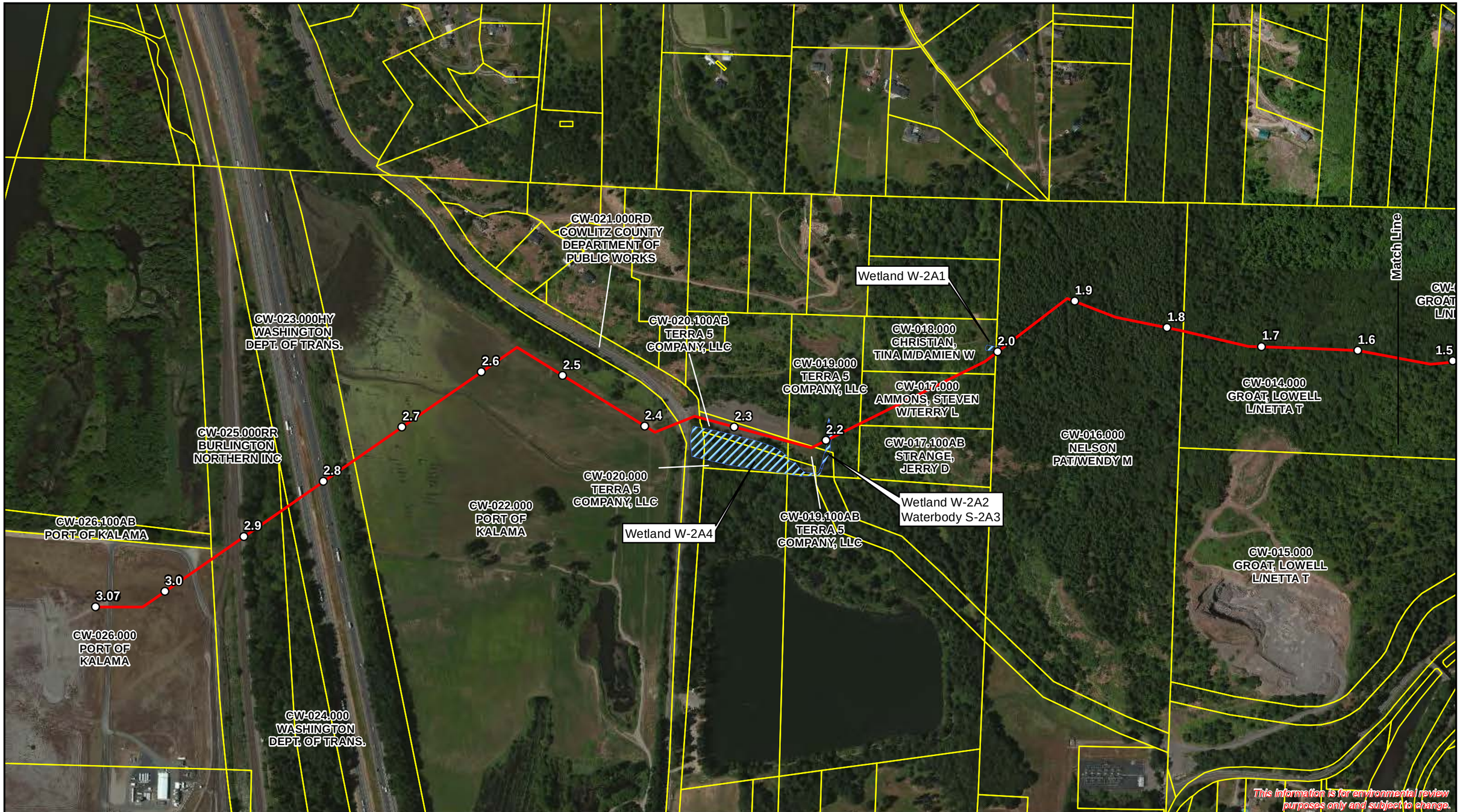
Field Maps

NATURAL RESOURCE GROUP

M:\Clients\V-X\WGP\Kalama_Lateral_ArcGIS\2012\04_Timber_Rock_Route_Maps.mxd

REVISED: 09/14/2012

DRAWN BY: JPBOENTJE



0 250 500 Feet

1 inch = 500 feet

N

- Milepost
- Timber Rock Route
- Existing Northwest Pipeline System
- GPS Wetland/Waterbody Data
- Parcel Boundary

Sheet 2 of 2

Williams

Williams

Kalama Lateral Project

Field Maps

NATURAL RESOURCE GROUP

M:\Clients\V-X\WGP\Kalama_Lateral_ArcGIS\2012\04_Timber_Rock_Route_Maps.mxd

REVISED: 09/14/2012 | DRAWN BY: JPBOENTJE

Wetland Rating Form

Washington State Wetland Rating System for Western Washington

Rating Summary

Wetland Name or Designation	W-2A1
Location (S,T,R)	S31 T7N R1W
Completed by	Jim Barnes
Affiliation	Cascadia Ecological Services, Inc.
Date of site visit	4/19/2012

Rating Based on Functions	Category III
Water Quality Function Score	7
Hydrologic Function Score	8
Habitat Function Score	19
Total	34
Rating based on Special Characteristics	N/A
Final Rating	Category III

Special Wetland Type	N/A
HGM Class	Slope
Rating Form Class	Slope

Considerations for Special Protection	y/n
Has the wetland been documented as habitat for any Federally listed Threathened or Endangered species?	n
Has the wetland been documented as habitat for any State listed Threathened or Endangered species?	n
Are Priority Species listed by Washington Department of Fish and Wildlife present?	n
Is the wetland designated as a "Wetland of Local Significance" by the local jurisdication?	n

Classification of Vegetated Wetlands for Western Washington

Rating Form Determination:	Slope
HGM Class:	Slope

	Check all that apply		
1	Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?	☐	FALSE
	If true, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?	☐	FALSE
2	Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.	☐	FALSE
3	Does the wetland meet both of the following criteria?		
	The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);	☐	FALSE
	At least 30% of the open water area is deeper than 6.6 ft (2 m)?	☐	FALSE
4	Does the wetland meet all of the following criteria?		
	The wetland is on a slope (slope can be very gradual),	☑	TRUE
	The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.	☑	TRUE
	The water leaves the wetland without being impounded?	☑	TRUE
	NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks(depressions are usually <3 ft. diameter and less than 1 foot deep).		
5	Is the wetland in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river? The flooding should occur at least once every two years, on the average, to answer "yes. " The wetland can contain depressions that are filled with water when the river is not flooding.	☐	FALSE
6	Is the wetland in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year? This means that any outlet, if present, is higher than the interior of the wetland.	☐	FALSE
7	Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.	☐	FALSE
8	Your wetland seems to be difficult to classify. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland being rated. If the area of the second class is less than 10% classify the wetland using the first class.		FALSE
	HGM Classes Within a Delineated Wetland Boundary		
	Slope + Riverine		Riverine
	Slope + Depressional		Depressional
	Slope + Lake-fringe		Lake-fringe
	Depressional + Riverine along stream within boundary		Depressional
	Depressional + Lake-fringe		Depressional
	Salt Water Tidal Fringe and any other class of freshwater wetland		Estuarine
9	If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as (d)epressional for the rating.		FALSE

Slope Wetlands		
Water Quality functions		
S1. Does the wetland have the potential to improve water quality? (see p. 64)		
1.1 Characteristics of the average slope of the wetland:		
Slope is 2% to 5% (1)		1
1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).	☐	0
1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants:		
Choose the score appropriate for the description that best fits the vegetation in the wetland. Dense vegetaion means that it is difficult to see the soil surface.		
Dense ungrazed, herbaceous vegetation > 90% of the area wetland (6)		6
S1 Subtotal		7
S2. Does the wetland have the opportunity to improve water quality? (see p. 67)		
Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Note which of the following conditions provide the sources of pollutants.		
Grazing in the wetland or within 150 ft.	☐	
Untreated stormwater discharges to wetland	☐	
Tilled fields or orchards within 150 ft. of wetland	☐	
Residential, urban areas, golf courses are within 150 ft. upslope of wetland	☐	
Other (Note)	☐	
Multiplier		1
TOTAL for Water Quality Functions		7

Slope Wetlands		
Hydrologic Functions		
S3. Does the wetland have the potential to reduce flooding and erosion? (see p. 68)		
3.1 Characteristics of vegetaion that reduce velocity of surface flows during storms:		
Choose the score appropriate for the description that best fits the vegetation in the wetland.		
Dense, uncut, rigid vegetation covers > 90% of the area of the wetland (6)		6
3.2 Characteristics of slope wetland that holds back small amounts of flood flows:		
The slope of the wetland has small surface depressions that can retain water over at least 10% of its area.	☑	2
S3 Subtotal		8
S4. Does the wetland have the opportunity to to reduce flooding and erosion? (see p. 70)		
Is the wetland in a landscape position where the reduction in water velocity it provides halps protect downstream propeorty and aquatic resouirces from flooding or excessive and/or erosive flows?		
Note which of the following conditions apply:		
Wetland has runoff that drains to a river or stream that has flooding problems	☐	
Other (Note)	☐	
Answer NO if the major source of water is controlled by a reservoir (e.g. the wetlandis a seep that on the downstream side of a dam)		
Multiplier		1
TOTAL for Hydrologic Functions		8

All Wetlands

Habitat Functions

H1. Does the wetland have the potential to provide habitat for many species?

1.1 Vegetation structure (see p. 72):

Note all plant communities (Cowardin) that cover more than 10% of the wetland or 1/4/ acre

Aquatic bed	☐	
Emergent plants	☑	
Scrub/Shrub (more than 30% shrub cover)	☑	
Forested (more than 30% tree cover)	☑	
Forested ares with at least 3 strata (canopy, sub-canopy, shrub, herb/forb, moss/groundcover)	☐	2

1.2 Hydroperiod (see p. 73):

Note the types of water regimes(hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4/ acre to count (refer to text for descriptions of water regimes)

Permanently flooded or inundated	☐	
Seasonally flooded or inundated	☐	
Occaionally flooded or inundated	☐	
Saturated only	☑	
Permanently flowing stream or river in, oradjacent to, the wetland	☐	
Seasonally flowing stream or river in, oradjacent to, the wetland	☐	
Lafe-fringe wetland = 2 points	☐	
Freshwater tidal wetland = 2 points	☐	0

1.3 Richenss of Plant Species (see p. 75):

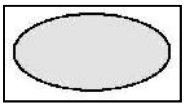
Count the number of plant species in the wetland that cover at least 10 sq. ft. Differenent patches of the same species can be combined to meet the size threshold.

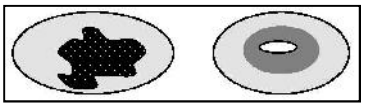
Do not include eurasian milfoil, reed canarygrass, purple loostrife, or canadian thistle.

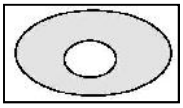
> 19 species	☐	
5 -19 species	☑	
< 5 species	☐	1

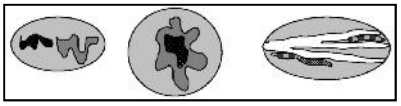
1.4 Interspersion of habitats (see p. 76):

Use the diagrams below to determine interspersion between vegetation types, or vegetation types and unvegetatioed areas (may include open water or mudflats).


None


Moderate


Low


High

Moderate (2)		2

NOTE: If there are 4 or more vegetaion types or 3 vegetation types and openwater the score will be "High".

All Wetlands

Habitat Functions

1.5 Special habitat features (see p. 77):

Note all the habitat features that are present in the wetland.

Large, downed, woody debris (> 4 in. diameter and at least 6 ft. long)	☐	
Standing snags (diameter at the base > 4 in.)	☐	
Undercut banks are present for at least 6.6. ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream for at least 33 ft. (10m)	☐	
Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 deg. Slope) OR signs of recent beaver activity are presnet.	☐	
At least 1/4 acre of thin stemmed persistent vegetation or woody branched are present in areas that are permenantly or seasonally inundated (structures for amphibian egg-laying)	☐	
Invasive pants cover less than 25% of the area in each stratum	☐	0
H1 Subtotal		**5**

H2. Does the wetland have the opportunity to provide habitat for many species?

2.1 Buffers (see p. 80):

Choose the description that best represents the condition of the wetland buffer. The highest scoring criterion that applies to the wetland is to be used in the rating. Refer to the text for the definition of "undisturbed".

100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No developed areas within undisturbed part of the buffer (also no grazing).	☑	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference.	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
If the buffer does not meet any of the criteria above		
No paved areas (except paved trails) or buildings within 25 m (80ft.) of wetland > 95% circumference. Light to moderate grazing or lawns OK.	☐	
No paved areas or buildings within 50 m (170ft.) of wetland > 50% circumference. Light to moderate grazing or lawns OK.	☐	
Heavy grazing in buffer	☐	
Vegetated buffers are < 2m (6.6 ft.) wide for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock to the edge of wetland).	☐	
Buffer does not meet any of the criteria above.	☐	5

All Wetlands		
Habitat Functions		
2.2 Corridors and connections (see p. 81):		
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 250 acres in size (dams in riparian corridors and heavilty used gravel roads are considered breaks inthe corridor) ?	☑	
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 25 acres in size OR a Lake-fringe wetland, if it does not have an undisturbed corridor as in the question above?	☐	
Is the wetland:		
within 5 mi. (8km) of a brackish or salt water estuary OR	☐	
within 3 mi. of a large field or pasture (>40 acres) OR	☐	
within 1 mi. of a lake of a greater than 20 acres?	☐	4
2.3 Near or adjacent to other priority habitats listed by WDFW Note all PHS types that are within 330 ft. (100m) of the wetland.		
Riparian	☐	
Aspen Stands	☐	
Cliffs	☐	
Old Growth Forest	☐	
Mature Forest	☐	
Prairies	☐	
Talus Slopes	☐	
Caves	☐	
Oregon White Oak Woodlands	☐	
Urban Natural Open Space	☐	
Estuary/Esturary-like	☐	
Marine/Estuarine Shorelines	☐	0
2.4 Wetland Landscape (see p. 84) Choose the description below that best fits		
There are at least 3 other wetlands within 1/2 mi. and the connections between them are relatively undisturbed (5)		
		5
H2 Subtotal		**14**
TOTAL for Habitat Functions		19

Wetland Rating Form

Washington State Wetland Rating System for Western Washington

Rating Summary

Wetland Name or Designation	W-2A2
Location (S,T,R)	S31 T7N R1W
Completed by	Jim Barnes
Affiliation	Cascadia Ecological Services, Inc.
Date of site visit	4/19/2012

Rating Based on Functions	Category II
Water Quality Function Score	16
Hydrologic Function Score	20
Habitat Function Score	20
Total	56
Rating based on Special Characteristics	N/A
Final Rating	Category II

Special Wetland Type	N/A
HGM Class	Multiple
Rating Form Class	Depressional

Considerations for Special Protection	y/n
Has the wetland been documented as habitat for any Federally listed Threathened or Endangered species?	n
Has the wetland been documented as habitat for any State listed Threathened or Endangered species?	n
Are Priority Species listed by Washington Department of Fish and Wildlife present?	n
Is the wetland designated as a "Wetland of Local Significance" by the local jurisdication?	n

Classification of Vegetated Wetlands for Western Washington

Rating Form Determination:	Depressional
HGM Class:	Multiple

Check all that apply			
1	Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?	☐	FALSE
	If true, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?	☐	FALSE
2	Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.	☐	FALSE
3	Does the wetland meet both of the following criteria?		
	The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);	☐	FALSE
	At least 30% of the open water area is deeper than 6.6 ft (2 m)?	☑	TRUE
4	Does the wetland meet all of the following criteria?		
	The wetland is on a slope (slope can be very gradual),	☑	TRUE
	The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.	☐	FALSE
	The water leaves the wetland without being impounded?	☐	FALSE
	NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks(depressions are usually <3 ft. diameter and less than 1 foot deep).		
5	Is the wetland in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river? The flooding should occur at least once every two years, on the average, to answer "yes. " The wetland can contain depressions that are filled with water when the river is not flooding.	☐	FALSE
6	Is the wetland in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year? This means that any outlet, if present, is higher than the interior of the wetland.	☑	TRUE
7	Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.	☑	TRUE
8	Your wetland seems to be difficult to classify. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland being rated. If the area of the second class is less than 10% classify the wetland using the first class.		Depressional
	HGM Classes Within a Delineated Wetland Boundary		
	Slope + Riverine		Riverine
	Slope + Depressional		Depressional
	Slope + Lake-fringe		Lake-fringe
	Depressional + Riverine along stream within boundary		Depressional
	Depressional + Lake-fringe		Depressional
	Salt Water Tidal Fringe and any other class of freshwater wetland		Estuarine
9	If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as (d)epressional for the rating.		FALSE

Depressional and Flats Wetlands

Water Quality Functions

D1. Does the wetland have the potential to improve water quality? (see p. 38)

1.1 Characteristics of surface water flows out of the wetland: Wetland is a depression with no surface water outlet (3)		3
1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).	☑	4
1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest class): Wetland has persistent, ungrazed, vegetation > = 95% of area (5)		5
1.4 Characteristics of seasonal ponding or inundation. This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs. Area seasonally ponded is> 1/2 total area of wetland (4)		4
NOTE: See text for indicators of seasonal and permanent inundation		
Subtotal		**16**

D2. Does the wetland have the opportunity to improve water quality? (see p. 44)

Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Note which of the following conditions provide the sources of pollutants.

Grazing in the wetland or within 150 ft.	☐
Untreated stormwater discharges to wetland	☐
Tilled fields or orchards within 150 ft. of wetland	☐
A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging	☐
Residential, urban areas, golf courses are within 150 ft. of wetland	☐
Wetland is fed by groundwater high in phosphorus or nitrogen	☐
Other (Note)	☐
Multiplier	**1**

TOTAL for Water Quality Functions	16

Depressional and Flats Wetlands

Hydrologic Functions

D3. Does the wetland have the potential to reduce flooding and erosion? (see p. 46)

3.1 Characteristics of surface water flows out of the wetland (see D1.1):	4
3.2 Depth of storage during wet periods: Estimate the height of ponding above the bottom of the outlet. Wetland is flat but has small depressions on the surface that trap water (1)	1
3.3 Contribution of wetland to storage in the watershed: Estimate the ratio of the area of the upstream basin contributing surface water to the wetland to the area of the wetland itself. The area of the basin is less than 10 times the area of the wetland (5)	5
Subtotal	**10**

D4. Does the wetland have the opportunity to to reduce flooding and erosion? (see p. 49)

Answer YES if the wetland is in a location in the watershed where flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows.

Answer NO if the water coming into the wetland is controlled by a structure such as a floodgate, tide gate, flap valve, reservoir, etc. OR you estimate that more than 90% of the water in the wetland is from groundwater.

Note which of the following indicators of opportunity apply.

Wetland is in a headwater of a river or stream that has flooding problems	✓
Wetland drains to a river or stream that has flooding problems	✓
Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding	✓
A stream or culvert discharges into wetland that drains developed areas,	✓
residential areas, farmed fields, roads, or clear-cut logging	✓
Other (Note)	✓
Multiplier	**2**
TOTAL for Hydrologic Functions	20

All Wetlands

Habitat Functions

H1. Does the wetland have the potential to provide habitat for many species?

1.1 Vegetation structure (see p. 72):

Note all plant communities (Cowardin) that cover more than 10% of the wetland or 1/4/ acre

Aquatic bed	☐	
Emergent plants	☑	
Scrub/Shrub (more than 30% shrub cover)	☑	
Forested (more than 30% tree cover)	☐	
Forested ares with at least 3 strata (canopy, sub-canopy, shrub, herb/forb, moss/groundcover)	☐	1

1.2 Hydroperiod (see p. 73):

Note the types of water regimes(hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4/ acre to count (refer to text for descriptions of water regimes)

Permanently flooded or inundated	☐	
Seasonally flooded or inundated	☐	
Occaionally flooded or inundated	☐	
Saturated only	☑	
Permanently flowing stream or river in, oradjacent to, the wetland	☐	
Seasonally flowing stream or river in, oradjacent to, the wetland	☑	
Lafe-fringe wetland = 2 points	☐	
Freshwater tidal wetland = 2 points	☐	1

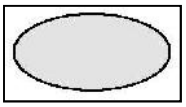
1.3 Richenss of Plant Species (see p. 75):

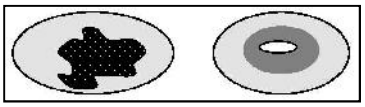
Count the number of plant species in the wetland that cover at least 10 sq. ft. Differenent patches of the same species can be combined to meet the size threshold.
Do not include eurasian milfoil, reed canarygrass, purple loostrife, or canadian thistle.

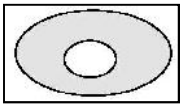
> 19 species	☐	
5 -19 species	☑	
< 5 species	☐	1

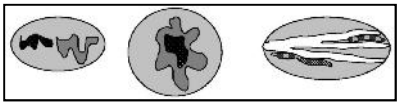
1.4 Interspersion of habitats (see p. 76):

Use the diagrams below to determine interspersion between vegetation types, or vegetation types and unvegetatioed areas (may include open water or mudflats).


None


Moderate


Low


High

Moderate (2)		2

NOTE: If there are 4 or more vegetaion types or 3 vegetation types and openwater the score will be "High".

All Wetlands		
Habitat Functions		
1.5 Special habitat features (see p. 77): Note all the habitat features that are present in the wetland.		
Large, downed, woody debris (> 4 in. diameter and at least 6 ft. long)	☐	
Standing snags (diameter at the base > 4 in.)	☐	
Undercut banks are present for at least 6.6. ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream for at least 33 ft. (10m)	☐	
Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 deg. Slope) OR signs of recent beaver activity are presnet.	☐	
At least 1/4 acre of thin stemmed persistent vegetation or woody branched are present in areas that are permenantly or seasonally inundated (structures for amphibian egg-laying)	☐	
Invasive pants cover less than 25% of the area in each stratum	☐	0
H1 Subtotal		**5**
H2. Does the wetland have the opportunity to provide habitat for many species?		
2.1 Buffers (see p. 80): Choose the description that best represents the condition of the wetland buffer. The highest scoring criterion that applies to the wetland is to be used in the rating. Refer to the text for the definition of "undisturbed".		
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No developed areas within undisturbed part of the buffer (also no grazing).	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☑	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference.	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
If the buffer does not meet any of the criteria above		
No paved areas (except paved trails) or buildings within 25 m (80ft.) of wetland > 95% circumference. Light to moderate grazing or lawns OK.	☐	
No paved areas or buildings within 50 m (170ft.) of wetland > 50% circumference. Light to moderate grazing or lawns OK.	☐	
Heavy grazing in buffer	☐	
Vegetated buffers are < 2m (6.6 ft.) wide for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock to the edge of wetland).	☐	
Buffer does not meet any of the criteria above.	☐	4

All Wetlands		
Habitat Functions		
2.2 Corridors and connections (see p. 81):		
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 250 acres in size (dams in riparian corridors and heavilty used gravel roads are considered breaks inthe corridor) ?	☑	
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 25 acres in size OR a Lake-fringe wetland, if it does not have an undisturbed corridor as in the question above?	☐	
Is the wetland:		
within 5 mi. (8km) of a brackish or salt water estuary OR	☐	
within 3 mi. of a large field or pasture (>40 acres) OR	☐	
within 1 mi. of a lake of a greater than 20 acres?	☑	4
2.3 Near or adjacent to other priority habitats listed by WDFW Note all PHS types that are within 330 ft. (100m) of the wetland.		
Riparian	☑	
Aspen Stands	☐	
Cliffs	☐	
Old Growth Forest	☐	
Mature Forest	☐	
Prairies	☐	
Talus Slopes	☐	
Caves	☐	
Oregon White Oak Woodlands	☑	
Urban Natural Open Space	☐	
Estuary/Esturary-like	☐	
Marine/Estuarine Shorelines	☐	2
2.4 Wetland Landscape (see p. 84) Choose the description below that best fits There are at least 3 other wetlands within 1/2 mi. and the connections between them are relatively undisturbed (5)		5
H2 Subtotal		**15**
TOTAL for Habitat Functions		20

Wetland Rating Form

Washington State Wetland Rating System for Western Washington

Rating Summary

Wetland Name or Designation	W-2A4
Location (S,T,R)	S31 T7N R1W
Completed by	Jim Barnes
Affiliation	Cascadia Ecological Services, Inc.
Date of site visit	4/19/2012

Rating Based on Functions		Category II
Water Quality Function Score		16
Hydrologic Function Score		20
Habitat Function Score		26
	Total	62
Rating based on Special Characteristics		N/A
Final Rating		Category II

Special Wetland Type	N/A
HGM Class	Multiple
Rating Form Class	Depressional

Considerations for Special Protection	y/n
Has the wetland been documented as habitat for any Federally listed Threathened or Endangered species?	n
Has the wetland been documented as habitat for any State listed Threathened or Endangered species?	n
Are Priority Species listed by Washington Department of Fish and Wildlife present?	n
Is the wetland designated as a "Wetland of Local Significance" by the local jurisdication?	n

Classification of Vegetated Wetlands for Western Washington

Rating Form Determination:	Depressional
HGM Class:	Multiple

	Check all that apply		
1	Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?	☐	FALSE
	If true, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?	☐	FALSE
2	Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.	☐	FALSE
3	Does the wetland meet both of the following criteria?		
	The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);	☐	FALSE
	At least 30% of the open water area is deeper than 6.6 ft (2 m)?	☑	TRUE
4	Does the wetland meet all of the following criteria?		
	The wetland is on a slope (slope can be very gradual),	☑	TRUE
	The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.	☐	FALSE
	The water leaves the wetland without being impounded?	☐	FALSE
	NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks(depressions are usually <3 ft. diameter and less than 1 foot deep).		
5	Is the wetland in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river? The flooding should occur at least once every two years, on the average, to answer "yes. " The wetland can contain depressions that are filled with water when the river is not flooding.	☐	FALSE
6	Is the wetland in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year? This means that any outlet, if present, is higher than the interior of the wetland.	☑	TRUE
7	Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.	☑	TRUE
8	Your wetland seems to be difficult to classify. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland being rated. If the area of the second class is less than 10% classify the wetland using the first class.		Depressional
	HGM Classes Within a Delineated Wetland Boundary		
	Slope + Riverine		Riverine
	Slope + Depressional		Depressional
	Slope + Lake-fringe		Lake-fringe
	Depressional + Riverine along stream within boundary		Depressional
	Depressional + Lake-fringe		Depressional
	Salt Water Tidal Fringe and any other class of freshwater wetland		Estuarine
9	If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as (d)epressional for the rating.		FALSE

Depressional and Flats Wetlands

Water Quality Functions

D1. Does the wetland have the potential to improve water quality? (see p. 38)

1.1 Characteristics of surface water flows out of the wetland:		
Wetland is a depression with no surface water outlet (3)		3
1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).	☑	4
1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest class):		
Wetland has persistent, ungrazed, vegetation > = 95% of area (5)		5
1.4 Characteristics of seasonal ponding or inundation. This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.		
Area seasonally ponded is> 1/2 total area of wetland (4)		4
NOTE: See text for indicators of seasonal and permanent inundation		
Subtotal		**16**

D2. Does the wetland have the opportunity to improve water quality? (see p. 44)

Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Note which of the following conditions provide the sources of pollutants.

Grazing in the wetland or within 150 ft.	☐
Untreated stormwater discharges to wetland	☐
Tilled fields or orchards within 150 ft. of wetland	☐
A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging	☐
Residential, urban areas, golf courses are within 150 ft. of wetland	☐
Wetland is fed by groundwater high in phosphorus or nitrogen	☐
Other (Note)	☐
Multiplier	**1**

TOTAL for Water Quality Functions	16

Depressional and Flats Wetlands

Hydrologic Functions

D3. Does the wetland have the potential to reduce flooding and erosion? (see p. 46)

3.1 Characteristics of surface water flows out of the wetland (see D1.1):	4
3.2 Depth of storage during wet periods: Estimate the height of ponding above the bottom of the outlet. Wetland is flat but has small depressions on the surface that trap water (1)	1
3.3 Contribution of wetland to storage in the watershed: Estimate the ratio of the area of the upstream basin contributing surface water to the wetland to the area of the wetland itself. The area of the basin is less than 10 times the area of the wetland (5)	5
Subtotal	**10**

D4. Does the wetland have the opportunity to to reduce flooding and erosion? (see p. 49)

Answer YES if the wetland is in a location in the watershed where flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows.

Answer NO if the water coming into the wetland is controlled by a structure such as a floodgate, tide gate, flap valve, reservoir, etc. OR you estimate that more than 90% of the water in the wetland is from groundwater.

Note which of the following indicators of opportunity apply.

Wetland is in a headwater of a river or stream that has flooding problems	☐
Wetland drains to a river or stream that has flooding problems	☑
Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding	☑
A stream or culvert discharges into wetland that drains developed areas,	☑
residential areas, farmed fields, roads, or clear-cut logging	☐
Other (Note)	☑
Multiplier	**2**
TOTAL for Hydrologic Functions	20

All Wetlands

Habitat Functions

H1. Does the wetland have the potential to provide habitat for many species?

1.1 Vegetation structure (see p. 72):

Note all plant communities (Cowardin) that cover more than 10% of the wetland or 1/4/ acre

Aquatic bed	☐	
Emergent plants	☑	
Scrub/Shrub (more than 30% shrub cover)	☑	
Forested (more than 30% tree cover)	☑	
Forested ares with at least 3 strata (canopy, sub-canopy, shrub, herb/forb, moss/groundcover)	☑	4

1.2 Hydroperiod (see p. 73):

Note the types of water regimes(hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4/ acre to count (refer to text for descriptions of water regimes)

Permanently flooded or inundated	☐	
Seasonally flooded or inundated	☐	
Occasionally flooded or inundated	☑	
Saturated only	☑	
Permanently flowing stream or river in, oradjacent to, the wetland	☐	
Seasonally flowing stream or river in, oradjacent to, the wetland	☑	
Lafe-fringe wetland = 2 points	☐	
Freshwater tidal wetland = 2 points	☐	2

1.3 Richenss of Plant Species (see p. 75):

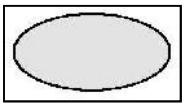
Count the number of plant species in the wetland that cover at least 10 sq. ft. Differenent patches of the same species can be combined to meet the size threshold.

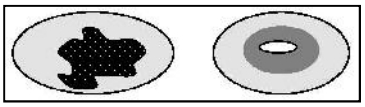
Do not include eurasian milfoil, reed canarygrass, purple loostrife, or canadian thistle.

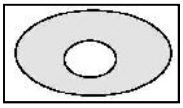
> 19 species	☑	
5 -19 species	☐	
< 5 species	☐	2

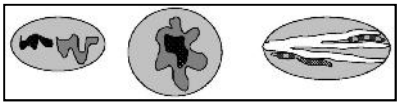
1.4 Interspersion of habitats (see p. 76):

Use the diagrams below to determine interspersion between vegetation types, or vegetation types and unvegetatioed areas (may include open water or mudflats).


None


Moderate


Low


High

Moderate (2)		2

NOTE: If there are 4 or more vegetaion types or 3 vegetation types and openwater the score will be "High".

All Wetlands		
Habitat Functions		
1.5 Special habitat features (see p. 77): Note all the habitat features that are present in the wetland.		
Large, downed, woody debris (> 4 in. diameter and at least 6 ft. long)	☑	
Standing snags (diameter at the base > 4 in.)	☑	
Undercut banks are present for at least 6.6. ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream for at least 33 ft. (10m)	☐	
Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 deg. Slope) OR signs of recent beaver activity are presnet.	☐	
At least 1/4 acre of thin stemmed persistent vegetation or woody branched are present in areas that are permenantly or seasonally inundated (structures for amphibian egg-laying)	☑	
Invasive pants cover less than 25% of the area in each stratum	☐	3
H1 Subtotal		**13**
H2. Does the wetland have the opportunity to provide habitat for many species?		
2.1 Buffers (see p. 80): Choose the description that best represents the condition of the wetland buffer. The highest scoring criterion that applies to the wetland is to be used in the rating. Refer to the text for the definition of "undisturbed".		
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No developed areas within undisturbed part of the buffer (also no grazing).	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☑	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference.	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
If the buffer does not meet any of the criteria above		
No paved areas (except paved trails) or buildings within 25 m (80ft.) of wetland > 95% circumference. Light to moderate grazing or lawns OK.	☐	
No paved areas or buildings within 50 m (170ft.) of wetland > 50% circumference. Light to moderate grazing or lawns OK.	☐	
Heavy grazing in buffer	☐	
Vegetated buffers are < 2m (6.6 ft.) wide for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock to the edge of wetland).	☐	
Buffer does not meet any of the criteria above.	☐	4

All Wetlands		
Habitat Functions		
2.2 Corridors and connections (see p. 81):		
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 250 acres in size (dams in riparian corridors and heavilty used gravel roads are considered breaks inthe corridor) ?	☐	
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 25 acres in size OR a Lake-fringe wetland, if it does not have an undisturbed corridor as in the question above?	☑	
Is the wetland:		
within 5 mi. (8km) of a brackish or salt water estuary OR	☐	
within 3 mi. of a large field or pasture (>40 acres) OR	☐	
within 1 mi. of a lake of a greater than 20 acres?	☑	2
2.3 Near or adjacent to other priority habitats listed by WDFW Note all PHS types that are within 330 ft. (100m) of the wetland.		
Riparian	☑	
Aspen Stands	☐	
Cliffs	☐	
Old Growth Forest	☐	
Mature Forest	☐	
Prairies	☐	
Talus Slopes	☐	
Caves	☐	
Oregon White Oak Woodlands	☑	
Urban Natural Open Space	☐	
Estuary/Esturary-like	☐	
Marine/Estuarine Shorelines	☐	2
2.4 Wetland Landscape (see p. 84) Choose the description below that best fits		
There are at least 3 other wetlands within 1/2 mi. and the connections between them are relatively undisturbed (5)		
		5
H2 Subtotal		**13**
TOTAL for Habitat Functions		26

Wetland Rating Form

Washington State Wetland Rating System for Western Washington

Rating Summary

Wetland Name or Designation	W-2A5
Location (S,T,R)	S31 T7N R1W
Completed by	Jim Barnes
Affiliation	Cascadia Ecological Services, Inc.
Date of site visit	4/19/2012

Rating Based on Functions		Category III
Water Quality Function Score		2
Hydrologic Function Score		18
Habitat Function Score		10
	Total	30
Rating based on Special Characteristics		N/A
Final Rating		Category III

Special Wetland Type	N/A
HGM Class	Depressional
Rating Form Class	Depressional

Considerations for Special Protection	y/n
Has the wetland been documented as habitat for any Federally listed Threathened or Endangered species?	n
Has the wetland been documented as habitat for any State listed Threathened or Endangered species?	n
Are Priority Species listed by Washington Department of Fish and Wildlife present?	n
Is the wetland designated as a "Wetland of Local Significance" by the local jurisdication?	n

Classification of Vegetated Wetlands for Western Washington

Rating Form Determination:	Depressional
HGM Class:	Depressional

	Check all that apply		
1	Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?	☐	FALSE
	If true, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?	☐	FALSE
2	Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.	☐	FALSE
3	Does the wetland meet both of the following criteria?		
	The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);	☐	FALSE
	At least 30% of the open water area is deeper than 6.6 ft (2 m)?	☐	FALSE
4	Does the wetland meet all of the following criteria?		
	The wetland is on a slope (slope can be very gradual),	☑	TRUE
	The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.	☐	FALSE
	The water leaves the wetland without being impounded?	☑	TRUE
	NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks(depressions are usually <3 ft. diameter and less than 1 foot deep).		
5	Is the wetland in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river? The flooding should occur at least once every two years, on the average, to answer "yes. " The wetland can contain depressions that are filled with water when the river is not flooding.	☐	FALSE
6	Is the wetland in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year? This means that any outlet, if present, is higher than the interior of the wetland.	☑	TRUE
7	Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.	☐	FALSE
8	Your wetland seems to be difficult to classify. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland being rated. If the area of the second class is less than 10% classify the wetland using the first class.		FALSE
	HGM Classes Within a Delineated Wetland Boundary		
	Slope + Riverine		Riverine
	Slope + Depressional		Depressional
	Slope + Lake-fringe		Lake-fringe
	Depressional + Riverine along stream within boundary		Depressional
	Depressional + Lake-fringe		Depressional
	Salt Water Tidal Fringe and any other class of freshwater wetland		Estuarine
9	If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as (d)epressional for the rating.		FALSE

Depressional and Flats Wetlands

Water Quality Functions

D1. Does the wetland have the potential to improve water quality? (see p. 38)

1.1 Characteristics of surface water flows out of the wetland: Wetland has an unconstricted surface outlet (1)		1
1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).	☐	0
1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest class): Wetland has persistent, ungrazed vegetation <1 / 10 of area (0)		0
1.4 Characteristics of seasonal ponding or inundation. This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs. Area seasonally ponded is < '/4 total area of wetland (0)		0
NOTE: See text for indicators of seasonal and permanent inundation		
Subtotal		**1**

D2. Does the wetland have the opportunity to improve water quality? (see p. 44)

Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Note which of the following conditions provide the sources of pollutants.

Grazing in the wetland or within 150 ft.	☐
Untreated stormwater discharges to wetland	☐
Tilled fields or orchards within 150 ft. of wetland	☑
A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging	☐
Residential, urban areas, golf courses are within 150 ft. of wetland	☐
Wetland is fed by groundwater high in phosphorus or nitrogen	☐
Other (Note)	☐
Multiplier	**2**

TOTAL for Water Quality Functions	2

Depressional and Flats Wetlands

Hydrologic Functions

D3. Does the wetland have the potential to reduce flooding and erosion? (see p. 46)

3.1 Characteristics of surface water flows out of the wetland (see D1.1):	1
3.2 Depth of storage during wet periods: Estimate the height of ponding above the bottom of the outlet. Marks are at least 0.5 ft. to < 2 ft. from surface (3)	3
3.3 Contribution of wetland to storage in the watershed: Estimate the ratio of the area of the upstream basin contributing surface water to the wetland to the area of the wetland itself. The area of the basin is less than 10 times the area of the wetland (5)	5
Subtotal	**9**

D4. Does the wetland have the opportunity to to reduce flooding and erosion? (see p. 49)

Answer YES if the wetland is in a location in the watershed where flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows.

Answer NO if the water coming into the wetland is controlled by a structure such as a floodgate, tide gate, flap valve, reservoir, etc. OR you estimate that more than 90% of the water in the wetland is from groundwater.

Note which of the following indicators of opportunity apply.

Wetland is in a headwater of a river or stream that has flooding problems	☐
Wetland drains to a river or stream that has flooding problems	☑
Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding	☐
A stream or culvert discharges into wetland that drains developed areas,	☐
residential areas, farmed fields, roads, or clear-cut logging	☐
Other (Note)	☐
Multiplier	**2**
TOTAL for Hydrologic Functions	18

All Wetlands

Habitat Functions

H1. Does the wetland have the potential to provide habitat for many species?

1.1 Vegetation structure (see p. 72):

Note all plant communities (Cowardin) that cover more than 10% of the wetland or 1/4/ acre

Aquatic bed	☐	
Emergent plants	☑	
Scrub/Shrub (more than 30% shrub cover)	☐	
Forested (more than 30% tree cover)	☐	
Forested ares with at least 3 strata (canopy, sub-canopy, shrub, herb/forb, moss/groundcover)	☐	0

1.2 Hydroperiod (see p. 73):

Note the types of water regimes(hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4/ acre to count (refer to text for descriptions of water regimes)

Permanently flooded or inundated	☐	
Seasonally flooded or inundated	☐	
Occasionally flooded or inundated	☐	
Saturated only	☑	
Permanently flowing stream or river in, oradjacent to, the wetland	☐	
Seasonally flowing stream or river in, oradjacent to, the wetland	☐	
Lafe-fringe wetland = 2 points	☐	
Freshwater tidal wetland = 2 points	☐	0

1.3 Richenss of Plant Species (see p. 75):

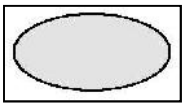
Count the number of plant species in the wetland that cover at least 10 sq. ft. Differenent patches of the same species can be combined to meet the size threshold.

Do not include eurasian milfoil, reed canarygrass, purple loostrife, or canadian thistle.

> 19 species	☐	
5 -19 species	☑	
< 5 species	☐	1

1.4 Interspersion of habitats (see p. 76):

Use the diagrams below to determine interspersion between vegetation types, or vegetation types and unvegetatioed areas (may include open water or mudflats).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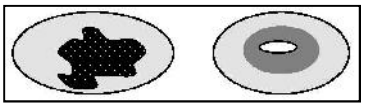
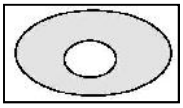
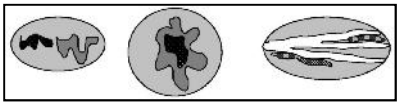

Moderate


Low


High

None (0) 0

NOTE: If there are 4 or more vegetaion types or 3 vegetation types and openwater the score will be "High".

All Wetlands		
Habitat Functions		
1.5 Special habitat features (see p. 77): Note all the habitat features that are present in the wetland.		
Large, downed, woody debris (> 4 in. diameter and at least 6 ft. long)	☐	
Standing snags (diameter at the base > 4 in.)	☐	
Undercut banks are present for at least 6.6. ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream for at least 33 ft. (10m)	☐	
Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 deg. Slope) OR signs of recent beaver activity are presnet.	☐	
At least 1/4 acre of thin stemmed persistent vegetation or woody branched are present in areas that are permenantly or seasonally inundated (structures for amphibian egg-laying)	☐	
Invasive pants cover less than 25% of the area in each stratum	☐	0
H1 Subtotal		**1**
H2. Does the wetland have the opportunity to provide habitat for many species?		
2.1 Buffers (see p. 80): Choose the description that best represents the condition of the wetland buffer. The highest scoring criterion that applies to the wetland is to be used in the rating. Refer to the text for the definition of "undisturbed".		
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No developed areas within undisturbed part of the buffer (also no grazing).	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference.	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
If the buffer does not meet any of the criteria above		
No paved areas (except paved trails) or buildings within 25 m (80ft.) of wetland > 95% circumference. Light to moderate grazing or lawns OK.	☑	
No paved areas or buildings within 50 m (170ft.) of wetland > 50% circumference. Light to moderate grazing or lawns OK.	☐	
Heavy grazing in buffer	☐	
Vegetated buffers are < 2m (6.6 ft.) wide for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock to the edge of wetland).	☐	
Buffer does not meet any of the criteria above.	☐	2

All Wetlands		
Habitat Functions		
2.2 Corridors and connections (see p. 81):		
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 250 acres in size (dams in riparian corridors and heavilty used gravel roads are considered breaks inthe corridor) ?	☐	
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 25 acres in size OR a Lake-fringe wetland, if it does not have an undisturbed corridor as in the question above?	☑	
Is the wetland:		
within 5 mi. (8km) of a brackish or salt water estuary OR	☐	
within 3 mi. of a large field or pasture (>40 acres) OR	☐	
within 1 mi. of a lake of a greater than 20 acres?	☑	2
2.3 Near or adjacent to other priority habitats listed by WDFW Note all PHS types that are within 330 ft. (100m) of the wetland.		
Riparian	☐	
Aspen Stands	☐	
Cliffs	☐	
Old Growth Forest	☐	
Mature Forest	☐	
Prairies	☐	
Talus Slopes	☐	
Caves	☐	
Oregon White Oak Woodlands	☐	
Urban Natural Open Space	☐	
Estuary/Esturary-like	☐	
Marine/Estuarine Shorelines	☐	0
2.4 Wetland Landscape (see p. 84) Choose the description below that best fits There are at least 3 other wetlands within 1/2 mi. and the connections between them are relatively undisturbed (5)		5
H2 Subtotal		**9**
TOTAL for Habitat Functions		10

Wetland Rating Form

Washington State Wetland Rating System for Western Washington

Rating Summary

Wetland Name or Designation	W-2A8
Location (S,T,R)	S31 T7N R1W
Completed by	Jim Barnes
Affiliation	Cascadia Ecological Services, Inc.
Date of site visit	4/19/2012

Rating Based on Functions	Category II
Water Quality Function Score	28
Hydrologic Function Score	14
Habitat Function Score	20
Total	62
Rating based on Special Characteristics	N/A
Final Rating	Category II

Special Wetland Type	N/A
HGM Class	Multiple
Rating Form Class	Depressional

Considerations for Special Protection	y/n
Has the wetland been documented as habitat for any Federally listed Threathened or Endangered species?	n
Has the wetland been documented as habitat for any State listed Threathened or Endangered species?	n
Are Priority Species listed by Washington Department of Fish and Wildlife present?	n
Is the wetland designated as a "Wetland of Local Significance" by the local jurisdication?	n

Classification of Vegetated Wetlands for Western Washington

Rating Form Determination:	Depressional
HGM Class:	Multiple

	Check all that apply		
1	Are the water levels in the wetland usually controlled by tides (i.e. except during floods)?	☐	FALSE
	If true, is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?	☐	FALSE
2	Is the topography within the wetland flat and precipitation is only source (>90%) of water to it.	☐	FALSE
3	Does the wetland meet both of the following criteria?		
	The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) are permanently inundated (ponded or flooded);	☐	FALSE
	At least 30% of the open water area is deeper than 6.6 ft (2 m)?	☐	FALSE
4	Does the wetland meet all of the following criteria?		
	The wetland is on a slope (slope can be very gradual),	☑	TRUE
	The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.	☐	FALSE
	The water leaves the wetland without being impounded?	☐	FALSE
	NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks(depressions are usually <3 ft. diameter and less than 1 foot deep).		
5	Is the wetland in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river? The flooding should occur at least once every two years, on the average, to answer "yes. " The wetland can contain depressions that are filled with water when the river is not flooding.	☐	FALSE
6	Is the wetland in a topographic depression in which water ponds, or is saturated to the surface, at some time of the year? This means that any outlet, if present, is higher than the interior of the wetland.	☑	TRUE
7	Is the wetland located in a very flat area with no obvious depression and no stream or river running through it and providing water. The wetland seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.	☑	TRUE
8	Your wetland seems to be difficult to classify. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. Sometimes we find characteristics of several different hydrogeomorphic classes within one wetland boundary. Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland being rated. If the area of the second class is less than 10% classify the wetland using the first class.		Depressional
	HGM Classes Within a Delineated Wetland Boundary		
	Slope + Riverine		Riverine
	Slope + Depressional		Depressional
	Slope + Lake-fringe		Lake-fringe
	Depressional + Riverine along stream within boundary		Depressional
	Depressional + Lake-fringe		Depressional
	Salt Water Tidal Fringe and any other class of freshwater wetland		Estuarine
9	If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as (d)epressional for the rating.		FALSE

Depressional and Flats Wetlands

Water Quality Functions

D1. Does the wetland have the potential to improve water quality? (see p. 38)

1.1 Characteristics of surface water flows out of the wetland: Wetland has an unconstricted surface outlet (1)		1
1.2 The soil 2 inches below the surface is clay, organic, or smells anoxic (hydrogen sulfide or rotten eggs).	☑	4
1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest class): Wetland has persistent, ungrazed, vegetation > = 95% of area (5)		5
1.4 Characteristics of seasonal ponding or inundation. This is the area of the wetland that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs. Area seasonally ponded is> 1/2 total area of wetland (4)		4
NOTE: See text for indicators of seasonal and permanent inundation		
Subtotal		**14**

D2. Does the wetland have the opportunity to improve water quality? (see p. 44)

Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? Note which of the following conditions provide the sources of pollutants.

Grazing in the wetland or within 150 ft.	☐
Untreated stormwater discharges to wetland	☐
Tilled fields or orchards within 150 ft. of wetland	☐
A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging	☑
Residential, urban areas, golf courses are within 150 ft. of wetland	☐
Wetland is fed by groundwater high in phosphorus or nitrogen	☐
Other (Note)	☐
Multiplier	**2**

TOTAL for Water Quality Functions	28

Depressional and Flats Wetlands

Hydrologic Functions

D3. Does the wetland have the potential to reduce flooding and erosion? (see p. 46)

3.1 Characteristics of surface water flows out of the wetland (see D1.1):		1
3.2 Depth of storage during wet periods: Estimate the height of ponding above the bottom of the outlet. Marks are at least 0.5 ft. to < 2 ft. from surface (3)		3
3.3 Contribution of wetland to storage in the watershed: Estimate the ratio of the area of the upstream basin contributing surface water to the wetland to the area of the wetland itself. The area of the basin is 10 to 100 times the area of the wetland (3)		3
Subtotal		**7**

D4. Does the wetland have the opportunity to to reduce flooding and erosion? (see p. 49)

Answer YES if the wetland is in a location in the watershed where flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows.

Answer NO if the water coming into the wetland is controlled by a structure such as a floodgate, tide gate, flap valve, reservoir, etc. OR you estimate that more than 90% of the water in the wetland is from groundwater.

Note which of the following indicators of opportunity apply.

Wetland is in a headwater of a river or stream that has flooding problems	☐	
Wetland drains to a river or stream that has flooding problems	☑	
Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding	☐	
A stream or culvert discharges into wetland that drains developed areas,	☐	
residential areas, farmed fields, roads, or clear-cut logging	☐	
Other (Note)	☐	
Multiplier		**2**
TOTAL for Hydrologic Functions		14

All Wetlands

Habitat Functions

H1. Does the wetland have the potential to provide habitat for many species?

1.1 Vegetation structure (see p. 72):

Note all plant communities (Cowardin) that cover more than 10% of the wetland or 1/4/ acre

Aquatic bed	☐	
Emergent plants	☑	
Scrub/Shrub (more than 30% shrub cover)	☑	
Forested (more than 30% tree cover)	☑	
Forested ares with at least 3 strata (canopy, sub-canopy, shrub, herb/forb, moss/groundcover)	☑	4

1.2 Hydroperiod (see p. 73):

Note the types of water regimes(hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or 1/4/ acre to count (refer to text for descriptions of water regimes)

Permanently flooded or inundated	☑	
Seasonally flooded or inundated	☑	
Occasionally flooded or inundated	☑	
Saturated only	☑	
Permanently flowing stream or river in, oradjacent to, the wetland	☐	
Seasonally flowing stream or river in, oradjacent to, the wetland	☐	
Lafe-fringe wetland = 2 points	☐	
Freshwater tidal wetland = 2 points	☐	3

1.3 Richenss of Plant Species (see p. 75):

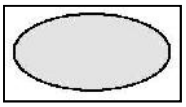
Count the number of plant species in the wetland that cover at least 10 sq. ft. Differenent patches of the same species can be combined to meet the size threshold.

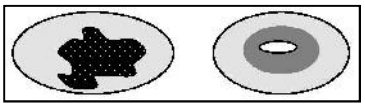
Do not include eurasian milfoil, reed canarygrass, purple loostrife, or canadian thistle.

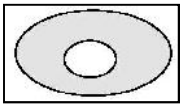
> 19 species	☑	
5 -19 species	☐	
< 5 species	☐	2

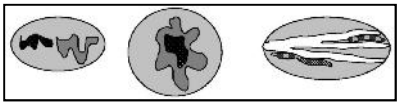
1.4 Interspersion of habitats (see p. 76):

Use the diagrams below to determine interspersion between vegetation types, or vegetation types and unvegetatioed areas (may include open water or mudflats).


None


Moderate


Low


High

Moderate (2)		2

NOTE: If there are 4 or more vegetaion types or 3 vegetation types and openwater the score will be "High".

All Wetlands		
Habitat Functions		
1.5 Special habitat features (see p. 77): Note all the habitat features that are present in the wetland.		
Large, downed, woody debris (> 4 in. diameter and at least 6 ft. long)	☑	
Standing snags (diameter at the base > 4 in.)	☑	
Undercut banks are present for at least 6.6. ft. (2m) and/or overhanging vegetation extends at least 3.3 ft. (1m) over a stream for at least 33 ft. (10m)	☐	
Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 deg. Slope) OR signs of recent beaver activity are presnet.	☐	
At least 1/4 acre of thin stemmed persistent vegetation or woody branched are present in areas that are permenantly or seasonally inundated (structures for amphibian egg-laying)	☑	
Invasive pants cover less than 25% of the area in each stratum	☐	3
H1 Subtotal		**14**
H2. Does the wetland have the opportunity to provide habitat for many species?		
2.1 Buffers (see p. 80): Choose the description that best represents the condition of the wetland buffer. The highest scoring criterion that applies to the wetland is to be used in the rating. Refer to the text for the definition of "undisturbed".		
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference. No developed areas within undisturbed part of the buffer (also no grazing).	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 95% of circumference.	☐	
100 m (330 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% of circumference.	☐	
50 m (170 ft.) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% of circumference.	☐	
If the buffer does not meet any of the criteria above		
No paved areas (except paved trails) or buildings within 25 m (80ft.) of wetland > 95% circumference. Light to moderate grazing or lawns OK.	☐	
No paved areas or buildings within 50 m (170ft.) of wetland > 50% circumference. Light to moderate grazing or lawns OK.	☐	
Heavy grazing in buffer	☐	
Vegetated buffers are < 2m (6.6 ft.) wide for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock to the edge of wetland).	☐	
Buffer does not meet any of the criteria above.	☑	1

All Wetlands		
Habitat Functions		
2.2 Corridors and connections (see p. 81):		
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 250 acres in size (dams in riparian corridors and heavilty used gravel roads are considered breaks inthe corridor) ?	☐	
Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft. wide, has at lest 30% cover of shrubs, forest, or native undisturbed prairie, that connects to estuaries, other wetlands, or undisturbed uplands that are at least 25 acres in size OR a Lake-fringe wetland, if it does not have an undisturbed corridor as in the question above?	☐	
Is the wetland:		
within 5 mi. (8km) of a brackish or salt water estuary OR	☐	
within 3 mi. of a large field or pasture (>40 acres) OR	☐	
within 1 mi. of a lake of a greater than 20 acres?	☑	1
2.3 Near or adjacent to other priority habitats listed by WDFW Note all PHS types that are within 330 ft. (100m) of the wetland.		
Riparian	☐	
Aspen Stands	☐	
Cliffs	☐	
Old Growth Forest	☐	
Mature Forest	☑	
Prairies	☐	
Talus Slopes	☐	
Caves	☐	
Oregon White Oak Woodlands	☐	
Urban Natural Open Space	☐	
Estuary/Esturary-like	☐	
Marine/Estuarine Shorelines	☐	1
2.4 Wetland Landscape (see p. 84) Choose the description below that best fits There are at least 3 other wetlands within 1/2 mi. a, BUT the connections between them are disturbed. (3)		3
H2 Subtotal		**6**
TOTAL for Habitat Functions		20

KALAMA LATERAL PIPELINE PROJECT

Joint Aquatic Resources Permit Application

APPENDIX H
Wetland, Waterbody and Critical Area Buffer Mitigation Plan

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Attachment 1 Tables – Summarizing Wetland Impacts
Table 1-1 Wetlands Impacted by the Kalama Lateral Project
Table 1-2 Wetland and Riparian Buffer Impacts for the Kalama Lateral Project
Table 1-3 Wetland and Critical Area Compensatory Mitigation Proposal and Calculations

1.0 INTRODUCTION

Construction activities associated with the approximately 3.1-mile long Northwest Pipeline LLC (Northwest) Kalama Lateral Project (Project) will directly impact approximately 4 acres of wetlands and waterbodies at 12 systems identified along the Project. The pipeline trench will cross through wetlands for approximately 1,120 linear feet (0.21 mile). Of the total impact to wetlands, Project construction will temporarily affect 3.99 acres of palustrine emergent (PEM) wetlands and 0.04 acre of palustrine scrub shrub (PSS) wetlands and (Table 1-1, Attachment 1). All of the impacts to the PEM wetlands will occur within previously disturbed areas, primarily used for agricultural production. Additionally, land use activities associated with residential development and timber harvest may have also disturbed these wetland systems.

Table 1-2 of Attachment 1 contains a complete list of wetlands and waterbody buffers that will be crossed by the Project. The table provides the wetland or waterbody and the area of impact (acres) from the construction right-of-way (ROW) and temporary extra work areas by Cowardin wetland type or DNR stream type, as applicable.

The Project will cross seven waterbodies (two perennial and five intermittent) as indicated in Table 1-2. Available data indicate two of the waterbodies have the potential to support fish.

2.0 WETLAND AND WATERBODY MITIGATION

The Project's wetland and waterbody impacts will be mitigated according to federal, state and local regulations following a standard mitigation sequence: (1) avoidance; (2) mitigation/minimization of impacts; and (3) compensation. Current federal and state regulations require that impacts to wetlands be avoided whenever practicable. Where avoidance of wetlands is not possible, impacts will be minimized and mitigated by restoration. Where permanent impacts to wetlands are unavoidable, compensation is required to offset the loss of wetland area and function. Each of the steps in the wetland mitigation sequence, as applied to the Project, is described below.

2.1 AVOIDANCE AND MINIMIZATION

2.1.1 Project Design

Northwest is proposing to construct and operate approximately 3.1 miles of 24-inch diameter natural gas pipeline to provide 320,000 dekatherms per day of natural gas to supply Northwest Innovation Works' (NWIW) proposed methanol production facility located within the north industrial area of the Port of Kalama, in Cowlitz County, Washington (Methanol Plant). The proposed Methanol Plant will provide significant economic growth to this region. Once fully operational, the Methanol Plant will employ 240 full-time employees.

As part of the initial route analysis, Northwest evaluated numerous route possibilities. Northwest considered routes crossing less wetlands and fewer streams preferable to routes affecting more of these resources. Additionally, longer routes that would significantly increase the amount of land disturbance and easements required were considered less desirable. The Project will utilize existing roads, rights-of-way and previously disturbed areas to minimize impacts to the extent practicable. The proposed

route was selected as the alternative that would result in fewer impacts to aquatic habitats and water quality while minimizing impacts to residences.

Northwest is planning to use the horizontal directional drill (HDD) crossing method to install the pipeline beneath Interstate 5 and the adjacent railroad line. This method will also be utilized to cross the two perennial streams and a significant portion of wetlands. HDD is considered an effective technique for avoiding in-stream impacts by eliminating the need for in-stream excavation and will eliminate the need to open cut and backfill a large portion of emergent wetlands.

2.1.2 Project Measures to Minimize Impacts

Northwest has reduced/minimized potential wetland and waterbody impacts by incorporating the measures outlined in Federal Energy Regulatory Commission's (FERC) Wetland and Waterbody Construction and Mitigation Procedures (FERC Procedures) and FERC's Upland Erosion Control, Revegetation, and Maintenance Plan (FERC Plan) into the Project design. FERC Procedures and FERC Plan are provided with the Erosion Control and Revegetation Plan (ECRP, Appendix C). There are situations where Northwest has requested a variance from FERC Procedures based on site-specific conditions. Variance requests and rationales are included in Table B-5 of Appendix B.

The intent of FERC Procedures is to minimize the extent and duration of Project-related disturbance in wetlands and waterbodies. The intent of FERC Plan is to confine Project-related disturbance to certificated areas (including construction ROWs, TEWAs, and access roads), to minimize erosion and to enhance revegetation in areas affected during construction. The FERC Plan and the FERC Procedures have been developed with the participation of Federal, state and local agencies, industry and the public specifically to mitigate potential impacts from pipeline projects.

To minimize the extent of Project-related disturbance, Northwest will verify and clearly mark (with flagging) the construction limits and boundaries of all sensitive areas (including waterbodies and wetlands) prior to clearing for construction. Flagged boundaries will be maintained during construction. Northwest will ensure that all construction activities are confined to the certificated work limits authorized for construction.

TEWAs have been located a minimum of 50 feet from the edge of wetlands and waterbodies, where possible, to minimize impacts to wetland buffers and riparian zones as required by FERC Procedures. Northwest has requested variances from the FERC Wetland and Waterbody Procedures at a few locations (Table B-5 in Appendix B) based on topographic or other site-specific construction feasibility issues which prevent locating a TEWA 50 feet from a wetland or waterbody boundary.

During construction, Northwest will have an Environmental Inspector (EI) present during all phases of construction within wetlands and waterbodies to ensure compliance with the FERC Upland Plan and Wetland and Waterbody Procedures as well as other Project permit stipulations/requirements. Sections II A. and B. of FERC Plan outline the responsibility of the EI.

Northwest's proposed erosion control and revegetation techniques minimize erosion and the extent and duration of Project-related impacts and maximize revegetation success.

Those techniques are described in the ECRP. The ECRP incorporates measures outlined in FERC Plan and the FERC Procedures.

To minimize potential for spills and any impact from such spills, Northwest developed a Spill Plan for Oil and Hazardous Materials (Spill Plan) to implement during construction. Fueling and storage of hazardous materials will be conducted in accordance with Northwest's Spill Plan (Appendix F) and FERC Procedures.

2.1.3 Specific Measures to Minimize Wetland Impacts

To minimize impacts to wetlands, Northwest has reduced (or "necked-down") the width of the construction ROW through wetlands from 100 feet to 75 feet where feasible. Neck-downs through wetlands are consistent with FERC Procedures. A typical construction ROW configuration through wetlands is shown on Drawing 2504.34-X-0008 in the ECRP.

Where clearing is required, Northwest will cut, mow, or shear woody vegetation and leave roots intact to facilitate sprouting of tree and shrubs, help minimize erosion and reduce recovery time following construction. Silt fence and/or hay bale sediment barriers will be installed at the edges of the construction ROW in wetlands where there is a possibility for excavated trench spoil to flow into undisturbed areas of the wetland. Dewatering of the trench will be accomplished in a manner such that no heavily silt-laden water flows into any wetland or waterbody. Trench breakers will be installed where necessary to prevent the wetland from draining through the pipeline trench and to maintain its hydrologic integrity. A diagram of a trench breaker is provided in the ECRP, (Drawing 2504.34-X-0001). Where the pipeline trench can potentially drain a wetland, the trench bottom will be sealed as necessary to maintain wetland hydrology. After construction, all disturbed areas within wetlands will be returned to their preconstruction contours, to the extent practicable, to maintain the wetland's hydrologic characteristics.

2.1.4 Specific Measures to Minimize Waterbody Crossing Impacts

Two perennial waterbodies will be crossed using the HDD method. The remaining waterbodies are expected to be dry at the time of construction, and if so, crossings may take place outside of the Washington Department of Fish and Wildlife (WDFW)-recommended in-water work windows for the Kalama River tributaries (August 1 to August 15) and Columbia River tributary (August 1 to March 31).

All streams flowing at the time of construction, not crossed using the HDD method, will be crossed using dry open cut crossing procedures (flume or dam and pump). A full discussion of the fluming and dam and pump crossing methods and safeguards are provided in appendices D and E. A summary of typical fluming procedures follows:

- A flume pipe (or pipes) is placed on the bottom of the waterbody and aligned with the flow of the stream. The size of the flume pipe and the number of pipes to be used is determined by the potential amount of flow in the particular waterbody at the time of construction. The flume pipe is longer than the construction area width of the crossing.

- A temporary dam of sandbags and plastic is constructed at the upstream end of the flume, resulting in the entire stream flow passing through the flume and

bypassing the construction area. This allows continuous stream flow to downstream reaches.

- A similar temporary dam of sandbags and plastic is constructed at the downstream end of the flume. This prevents the water in the stream from backflowing into the construction area.
- Fish are removed in the construction area between the dams prior to dewatering the work area.
- All in-stream excavation is done between the dams. The dams prevent turbid water created by construction from flowing downstream.
- Adequate downstream flow rates will be maintained through the flume pipe.
- Temporary spoil placement will be at least 10 feet from the waterbody and will be contained by sediment barriers.
- Clean gravel or cobbles will be placed in the upper one-foot of trench backfill using specifications provided by WDFW.
- All banks will be stabilized and temporary sediment barriers will be installed within 24 hours of completing the crossing.

The dam and pump crossing method is similar to the fluming method, except instead of a flume pipe to divert stream flow to the downstream side of the construction zone, hoses and pumps are used to move water from upstream past the downstream dam, effectively isolating the construction zone. Flumes or dams and pumps will be completely installed and functioning prior to any in-stream disturbance. All dry open cut crossings will be completed as a single effort to minimize the time of in-stream disturbance.

Northwest will use dry open cut crossing methods to cross the five intermittent streams, if water is present at the time of construction. None of these streams support fish life; therefore, no fish handling will be required. Northwest proposes to install the pipeline at potentially fish-bearing waterbodies using the HDD method, which may occur outside of WDFW recommended in-water construction windows.

2.2 IMPACT MITIGATION/RECTIFICATION

Temporary impacts to wetlands and critical area buffers will be mitigated through restoration of disturbed sites. Construction impacts to palustrine emergent and palustrine scrub-shrub wetlands, as well as urban, agricultural, pasture and mixed environs wetland buffers are considered temporary and short-term. It is expected that palustrine emergent wetlands, including urban, agricultural, pasture and mixed environs wetland buffers can be reestablished within one growing season. Scrub-shrub wetlands typically require approximately two to five years to return to pre-construction cover and density. Impacts to forested wetlands and Westside Lowlands Conifer-Hardwood Forest riparian buffers are considered long-term (10 to 25 years or longer) because of the time required to reestablish these systems. Restoration measures that will be utilized to mitigate impacts to wetlands and wetland and riparian buffers are described below.

Compaction of wetland soils and soil mixing from rutting within wetlands will be minimized by using low ground-weight equipment and/or by working from prefabricated timber mats. In addition, where there is reasonable access around a wetland in upland areas, construction equipment operating in wetland areas will be limited to that needed to clear the ROW, dig the trench, fabricate and install the pipe, backfill the trench and restore the ROW. All other equipment traffic in wetlands will be limited to minimize impacts. Compacted surfaces will be appropriately scarified during restoration, as directed by the EI.

Vegetation in wetlands and Westside Lowlands Conifer-Hardwood Forest riparian buffers will be cut to ground level in the construction ROW to promote vegetation regeneration. Grading and stump removal will be performed only over the trench, except where required for safety and as determined by Northwest's Chief Inspector. This will facilitate reestablishment of woody species by enabling sprouting from existing root systems.

To further promote reestablishment of native wetland species, up to12 inches of topsoil will be salvaged in all unsaturated wetlands and wetland buffers over the trenchline. The salvaged topsoil will be stockpiled separately to prevent mixing with subsoils or spoil materials and returned to the top of the trench after construction. Topsoil salvaging will promote reestablishment of wetland and wetland buffer species by preserving the vegetative propagules (seeds, roots, tubers, rhizomes, bulbs) present in the soil. Propagules potentially promote reestablishment of existing wetland vegetation by germinating or sprouting from replaced topsoil.

After completion of construction and during final clean-up, original topographic conditions and contours of uplands, wetlands, riparian areas and streambeds will be restored to reestablish drainage patterns and wetland hydrology. Any excess backfill will be spread over upland areas and stabilized during cleanup. Where the pipeline trench may drain a wetland, Northwest will install trench breakers and/or seal the trench bottom as necessary to maintain the original wetland hydrology. A permanent slope breaker and a trench breaker will be installed through wetlands at the base of slopes near boundaries between the wetland and adjacent upland area. The trench breaker will be located immediately upslope of the slope breaker. A diagram of a trench breaker is provided in the ECRP (Drawing 2504.34-X-0001).

Impacts to wetlands and wetland buffers will also be mitigated or rectified using general revegetation procedures as outlined in the ECRP. Fertilizer or lime will not be used in wetlands. After construction, wetlands will be seeded using seed mixtures approved by the U.S. Army Corps of Engineers (COE), Washington Department of Ecology (WDOE) and Cowlitz County. Individual landowners may also specify specific seed mixtures for their properties. All restored sites along the pipeline corridor will be planted no later than the first planting season (October through March) after completion of the Project.

Selection and planting of woody species will be done in consultation with individual landowners. Plantings will conform to FERC Procedures (provided with the ECRP) which advise that trees exceeding 15 feet tall grow no closer than 15 feet to the pipeline and allow for maintenance of a 10-foot emergent corridor centered over the pipeline to facilitate corrosion and leak surveys according to U.S. Department of Transportation requirements. FERC Procedures limit vegetation maintenance adjacent to waterbodies to allow development of a riparian vegetative strip. Herbicides or pesticides will not be used within

100 feet of a wetland during maintenance activities for the life of the Project. Northwest will implement additional mitigation activities that may be required by Cowlitz County.

3.0 COMPENSATORY MITIGATION REQUIREMENTS

The Project will not permanently fill wetlands or wetland buffers, yet will cause some minor permanent wetland vegetation type conversion impacts. In addition to the proposed on-site revegetation and stabilization, Northwest will compensate for the extremely limited permanent impacts to low quality palustrine emergent and moderate quality scrub-shrub wetlands and temporary construction wetland impacts to palustrine scrub shrub wetlands, by purchasing credits at the Columbia River Wetland Mitigation Bank[1]. For impacts to Westside Lowlands Conifer-Hardwood Forest riparian areas, shrubs and trees will be planted across the ROW for a width of 25 feet from the waterbody banks subject to the existing land uses and landowner approval. Additional credits will be purchased at the Columbia River Wetland Mitigation Bank to compensate for impacts to the riparian area buffers.

The majority of the Project's wetland impacts are to low quality, non-native emergent wetland. For temporary impacts to wetlands dominated by non-native vegetation (e.g., blackberry, reed canarygrass, or pasture grasses), restoration of the affected wetland with native species and monitoring after construction is generally all that is required. None of the impacts to palustrine emergent wetland, permanent or temporary, will cause a loss of function due to the permanent conversion of wetlands.

Table 1-1 in Attachment 1 provides a summary of the Project impacts by Cowardin classification and wetland category rating. Table 1-2 in Attachment 1 provides a summary of the Project impacts by vegetation type for each wetland buffer and waterbody buffer and provides the wetland category and buffer width. As shown in Table 1-1, Project construction will temporarily affect a total of 0.04 acre of PSS wetlands and Project operations will permanently affect 0.25 acre of PEM wetlands and about 250 square feet of PSS wetlands. In addition, as indicated in Table 1-2, the Project will affect a total of 0.92 acres of Westside Lowlands Conifer-Hardwood Forest waterbody critical area riparian buffers. Although the Project does not propose any loss of function to the wetlands impacted, to mitigate for the Project's impacts, Northwest proposes to use WDOE's Wetland Mitigation Polices and Guidance (WDOE 2006). WDOE's guidance indicates that for long-term temporary impacts to scrub-shrub wetlands, the mitigation ratios are one-quarter of the typical ratios for permanent impacts, provided that specific restoration measures are completed. Northwest will comply with these specific measures as follows:

- An explanation of how hydric soils will be stored and handled. Section 2.2 of this Plan describes how Northwest will handle, store and protect hydric soils during Project implementation.

[1] http://www.habitatbank.com/mitigation-banks/columbia-river-mitigation-bank/

- Surface and groundwater flow patterns are maintained or can be restored immediately following construction. Northwest will maintain and restore surface and groundwater flow patterns as outlined in Section 2.2.

- Disturbed buffers are re-vegetated and monitored. Northwest describes how disturbed buffers will be revegetated in Section 2.2 and monitored in Section 4.0.

- Agency-recommended seed mixtures for the Project are included in Table 7.9-1 of the ECRP. Recommended native trees and shrubs for restoration of riparian areas are described in Table 7.12-1 of the ECRP.

- A 10-year monitoring and maintenance plan is developed and implemented for restored forested and scrub-shrub wetlands. Northwest proposes to deviate from this measure and proposes to increase the WDOE recommended mitigation ratios from one-quarter to one-half, because of Northwest's experience on past projects (i.e., Capacity Replacement Project and Evergreen Expansion Project), which has shown it can be problematic to meet restoration requirements due to landowner land use actions within the pipeline easements. Therefore, Northwest will increase the compensatory mitigation ratio to account for these potential unforeseen but common landowner actions. Northwest will, however, reseed all wetlands and replant shrub and tree species within scrub-shrub wetlands and riparian buffers affected by the Project and will continue annual maintenance and monitoring for three years to assess restoration success. At the end of the third year, Northwest will submit a report summarizing revegetation success and provide recommendations on any additional maintenance issues and continued monitoring. Section 4.0 describes Northwest's proposed monitoring in more detail

Table 1-3 in Attachment 1 provides the Project's wetland compensatory mitigation proposal with supporting calculations. As indicated in Table 1-3, Northwest will purchase 0.01 credit from the Columbia River Wetland Mitigation Bank to compensate for the Project's permanent wetland impacts.

For the Project's long-term temporal impacts to wetlands and critical area buffers, Northwest will apply the WDOE-recommended one-quarter compensatory mitigation ratio for temporary impacts to wetland and riparian buffers and will double the compensatory ratio for impacts to wetlands. Using these criteria, Northwest will purchase an additional 0.52 credit from the Columbia River Wetland Mitigation Bank.

4.0 MITIGATION MONITORING

To monitor the success of wetland and critical area buffer restoration efforts, after each wetland and buffer has been replanted Northwest will prepare an "As-Built" Report for each wetland and critical area buffer.

The Report will include the following:

1. Vicinity map showing site access;

2 Drawings that clearly identify the boundaries of the restoration areas;

3. The installed planting scheme showing quantities, densities, sizes and approximate locations of plants, as well as plant sources and the time of planting;

4. Photographs of the area taken from permanent reference points;

5. Locations of photo points, sampling and monitoring sites; and

6. An analysis of any changes to the restoration plan that occurred during construction.

The As-Built Report will be will be filed with COE, WDOE and Cowlitz County.

Consistent with FERC Procedures, monitoring of wetlands restored on the ROW will be conducted annually for three years following construction to determine the mitigation success of wetlands and critical area buffers impacted within the construction ROW. A qualified biologist will conduct monitoring during the growing season by collecting information on plant survival, percent vegetative cover, as well as hydrologic conditions. Photographs will be taken each year to support the monitoring efforts.

Reports will be prepared after each monitoring period to document collected data. At the end of the 3 years following construction, Northwest will file a report with FERC, COE, WDOE and Cowlitz County, identifying the status of the wetland revegetation efforts and indicating any remedial actions that have been implemented or are proposed. If the success criteria are reached, Northwest would request suspension of monitoring. Northwest would continue monitoring of restoration during subsequent years where remedial measures have been implemented and would continue monitoring until revegetation success criteria have been met.

Wetland revegetation shall be considered successful if the cover of herbaceous and/or woody species is at least 80 percent of the type, density and distribution of the vegetation in adjacent wetland areas that were not disturbed by construction.

5.0 REFERENCES

Cowlitz County. 2009a. Cowlitz County Planning Division, Department of Building and Planning. Critical Areas Ordinance 19.15. Part Two: Wetlands. Kelso, Washington.

Cowlitz County. 2009b. Cowlitz County Planning Division, Department of Building and Planning. Critical Areas Ordinance 19.15. Part Three: Fish & Wildlife Habitat. Kelso, Washington.

Cowlitz County. 2009c. Cowlitz County Planning Division, Department of Building and Planning. Critical Areas Ordinance 19.15. Part Eight: Mitigation Requirements, Subdivisions, Administrative Provisions. Kelso, Washington

Washington State Department of Ecology, U.S. Army Corps of Engineers Seattle District, and U.S. Environmental Protection Agency Region 10. March 2006. Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance (Version 1). Washington State Department of Ecology Publication #06-06-011a. Olympia, WA. Available online at: http://www.ecy.wa.gov/biblio/0606011a.html

ATTACHMENT 1

TABLES – SUMMARIZING WETLAND IMPACTS AND MITIGATION

Table 1-1
Wetlands Impacted by the Kalama Lateral Project

Approx. MP	Wetland ID	Cowardin Type [1]	Survey Type [2]	Approximate Crossing Length	Construction Impacts (Acres)	Operation Impacts(Acres)	Comments
2.0	W-2A1	PEM	FD	0	0.04	0	Small slope wetland; east side of gravel road. Will be temporarily impacted by TEWA 1.97-N.
2.2	W-2A2	PSS	FD	25	0.04	<0.01	Hillslope wetland composed mainly of red alder, adjacent to stream S-2A3, but not within. Crossed by pipeline.
2.2 and 2.3	W-2A4	PFO	FD	0	0	0	Large Oregon ash forested wetland; south of sand and gravel processing site along the east side of Old Highway 99. Will be within 50 feet of TEWAs 2.20-S and 2.34-S; buffer impacts only.
2.4-2.8	W-2A5	PEM	NWI	2050	3.95	0	The wetland area is presently used for agricultural production. About 955 feet will be crossed using HDD; will be open cut for about 1095 feet; will be temporarily impacted by TEWAs 2.36-N, 2.36-S, 2.51-S and 2.55-N.
2.8-2.9	W-2A8	PFO	NWI	297	0	0	Crossed using HDD

[1] – PEM = Palustrine Emergent; PSS= Palustrine Scrub/Shrub ; PFO = Palustrine Forested
[2] – FD = Field Delineation; NWI = National Wetlands Inventory

Table 1-2
Wetland and Riparian Buffer Impacts for the Kalama Lateral Project

Wetland/ Waterbody	MP	Stream Type/ Wetland Category	Cowardin Classification/ flow type	Wetland/ Riparian Buffer (feet)	Acres of Construction ROW in Buffer	Temporary Extra Work Area in Buffer	Total Wetland/ Riparian Buffer Impact (acres)	Buffer Vegetation Type
S-0A1	0.89	Ns	intermittent	50	0.23	0	0.23	Westside Lowlands-Conifer Hardwood Forest
S-1A1	1.02	Ns	intermittent	50	0.23	0	0.23	Westside Lowlands-Conifer Hardwood Forest
S-1A2	1.74	Ns	intermittent	50	0.23	0	0.23	Westside Lowlands-Conifer Hardwood Forest
S-1A3	1.86	Ns	intermittent	50	0.23	0	0.23	Westside Lowlands-Conifer Hardwood Forest
W-2A1	2.00	III	PEM	40	0.15	0.13	0.28	Westside Lowlands-Conifer Hardwood Forest
W-2A2	2.19	II	PSS	60	0.32	0.12	0.45	Westside Lowlands-Conifer Hardwood Forest; Urban and Mixed Environs

Table 1-2
Wetland and Riparian Buffer Impacts for the Kalama Lateral Project

Wetland/ Waterbody	MP	Stream Type/ Wetland Category	Cowardin Classification/ flow type	Wetland/ Riparian Buffer (feet)	Acres of Construction ROW in Buffer	Temporary Extra Work Area in Buffer	Total Wetland/ Riparian Buffer Impact (acres)	Buffer Vegetation Type
S-2A3[1]	2.19	Ns	intermittent	50	0	0	0	Westside Lowlands-Conifer Hardwood Forest; Urban and Mixed Environs
W-2A4	2.24 2.34	II II	PFO	90	0.22	0.11 0.02	0.35	Westside Lowlands-Conifer Hardwood Forest; Urban and Mixed Environs
W-2A5	2.38 - 2.77	III	PEM	40	0	0	All impacts to this wetland occur within the wetland itself and will not impact wetland buffers.	Agriculture, Pastures and Mixed Environs
S-2A6	2.64	F	perennial	100	0	0	These streams will be crossed using the HDD method and will not impact riparian buffer vegetation.	Agriculture, Pastures and Mixed Environs
S-2A7	2.78	F	perennial	100	0	0		
W-2A8	2.83 - 2.88	II	PEM	60	0	0	This wetland will be crossed using HDD and will not impact wetland buffer vegetation.	Urban and mixed Environs (Roads)

[1] No buffer impacts are calculated for this stream because buffer impacts to Wetland W-2A2 extend 60 feet which would encompass the 50 foot riparian buffer.

Table 1-3
Wetland and Critical Area Compensatory Mitigation Proposal and Calculations

	Wetland Category Rating	Project Disturbance in Wetland or Wetland/ Riparian buffer (acres)	Southwest Washington Mitigation Banks Bank Credits per Resource Impact[1]	Estimate Compensatory Mitigation Requirement for Permanent Wetland Impacts Project Disturbance (acres) x Bank Credits per Resource Impact	Estimated Compensatory Mitigation Requirement for Long-Term Temporary Project Impacts [3] (Ratio: one–quarter of ratio for Permanent Impacts)	Northwest Proposed Compensatory Mitigation Estimate for Long-Term Temporary Project Impacts [4] (Ratio: one-half of ratio for Permanent Impacts)
Totals by Wetland Category	I	0	Case by case	0	0	0
	II	0.04 (temp)	1.2	0	0.012	.024
	II	<0.01 (perm)	1.2	0.01	0	0
	III	0	1.0	0	0	0
	IV	0	.85	0	0	0
	Total	**0.05**	**--**	**0.01**	**0.01**	**0.02**
Critical Area Buffer						
Westside Lowlands Conifer-Hardwood Forest Riparian buffers		0.92	Case by Case 1.0 [2]	**0.92**	**0.23**	**N/A**
Wetland buffers		1.08	Case by Case 1.0 [2]	**1.08**	**0.27**	**N/A**

1 http://www.habitatbank.com/wp-content/uploads/2010/08/Southwest-Washington-Mitigation-Banks-Brochure.pdf
2 Assumed ratio.
3 http://www.ecy.wa.gov/biblio/0606011a.html Section 6.5.6 Mitigation Ratios for Temporary Impacts and Conversions (pg. 77).
4 Northwest proposes to increase the compensatory mitigation ratios for temporal impacts to wetlands recommended by WDOE from ¼ to ½ because of Northwest's experience with past projects (i.e., Capacity Replacement Project and Evergreen Expansion Project), which have shown it can be problematic to meet restoration requirements due to landowner actions within the pipeline easement(s).

KALAMA LATERAL PROJECT

Joint Aquatic Resources Permit Application

APPENDIX I
Drilling Fluid Contingency Plan for

Horizontal Directional Drilling Operations

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1.0 INTRODUCTION

Northwest Pipeline LLC (Northwest), a wholly owned subsidiary of Williams Partners L.P., proposes to construct and operate the Kalama Lateral Project (Project), a 3.1- mile-long, 24-inch-diameter natural gas pipeline and related facilities extending from Northwest's mainline to Northwest Innovation Works' (NWIW) proposed methanol plant located within the north industrial area of the Port of Kalama, in Cowlitz County, Washington.

Northwest will cross waterbodies S-2A6 and S-2A7 using the HDD method as part of the planned horizontal directional drill (HDD) crossing of Interstate 5 (I-5) and the Burlington Northern Santa Fe railroad line west of I-5. The HDD crossing of these waterbodies may not occur within Washington Department of Fish and Wildlife's (WDFW) in-water work window for Columbia River tributaries between the mouth of the river and the I-205 Bridge (August 1 to March 31). The remaining intermittent waterbodies are expected to be dry at the time of construction. Pipeline installation at four of those locations may take place outside of the in-water work window for Kalama River tributaries (August 1 to August 15), if no water is present at the time of construction. The fifth intermittent waterbody may be crossed out side the in-water work window for Columbia River tributaries, if no water is present a the time of construction. If water is present at the time of construction, the intermittent waterbodies that do not support fish will be crossed using dry open cut crossing techniques (i.e., flume, dam and pump) within the WDFW-recommended in-water work windows.

HDD is an increasingly popular method of installation whereby surface and/or streambed disturbance may be minimized with proper design and construction procedures. HDD installations may present a potential for surface and/or streambed disturbance through the inadvertent release of drilling fluid. Contingency planning and prevention control of an inadvertent release of drilling fluid to resources has been a major consideration in selecting and designing the proposed HDD crossings.

Northwest intends to protect public health and safety as well as natural resources in the event of an inadvertent return of drilling fluid. The HDD method was identified because it is environmentally conscientious and is considered a proven, safe and efficient method when feasible for crossing rivers and streams. The purpose of this document is to aid Northwest in developing a program designed to minimize the potential for occurrence of adverse effects resulting from an inadvertent return of drilling fluid to the ground surface and/or other sensitive resources.

2.0 COMPOSITION OF DRILLING FLUID

Drilling fluid utilized in the HDD process is composed primarily of water and bentonite; a naturally occurring clay. The primary purposes of this drilling fluid are to suspend and transport cuttings from the borehole, to stabilize the borehole and to act as a coolant and lubricant during the drilling process. The drilling fluid generally consists of 1 to 5 percent active clays, approximately 0 to 40 percent inert solids and the remainder consists of water. However, occasionally, some HDD applications require additional additives to maximize drilling fluids performance to meet specific subsurface conditions. The additives typically include polymers, surfactants, and dispersants, all of which are available in non-toxic forms. Because of the large number of product manufacturers, Material Safety Data Sheets (MSDS) cannot be provided for all of the existing products on the market. Northwest will only authorize the use of non-toxic drilling fluid additives, and will make MSDS available once the particular product(s) being used is determined.

The primary active clay component is bentonite. Bentonite is a naturally occurring, non-hazardous clay product. An MSDS for bentonite material will be supplied by the Contractor and kept on-site during construction.

3.0 CAUSES OF DRILLING FLUID LOSS

3.1 General

Drilling fluid is transported under pressure through the drill string to the cutting bit. The total drilling fluid pressure at the cutting bit is a function of pumping pressures, the elevation difference between the drill rig and the cutting bit and friction losses. Soil and rock formations around the drill path experience maximum drilling fluid pressures in the immediate proximity of the cutting bit or reaming tools.

Two primary processes by which drilling fluid circulation may be reduced or lost include the following.

- Formational fluid loss occurs when drilling fluid flows into surrounding permeable soil units within the pore spaces of the soil or along pre-existing fractures or voids.
- Hydraulic fracturing can occur where the combined resisting force of the available overburden pressure and the shear strength of the overburden soil is less than the hydrostatic pressure applied to the surrounding soil from the drilling fluid at the drill bit.

Formational Fluid Loss

Formational fluid losses typically occur when the drilling fluid flows through the pore spaces in the surrounding formation. Thus, a formation with a higher porosity potentially can lose a larger volume of fluid than a formation with a lower porosity. Silty sands, silts and clays typically have a low susceptibility to formational fluid losses. Coarse sands and gravels with low percentages of silt and clay have a moderate-to-high susceptibility for fluid loss.

Hydraulic Fracture

Hydraulic fracture is a term used to describe the situation where the down-hole fluid pressure exceeds the overburden pressure and shear strength of the formation above a drill path. Hydraulic fracture can occur when the drill path passes through relatively weak cohesive soils with low shear strength or very loose granular soils. Loose and silty sands and soft to medium stiff silts and clays typically have a higher hydraulic fracture potential. Medium dense to dense sands and gravels and very stiff to hard silts and clays have a low to moderate hydraulic fracture potential. Unfractured rock, because of its high shear strength, has a low potential for hydraulic fracture. HDD installations with greater depth or in formations with higher shear strength may reduce the potential for hydraulic fracturing.

3.2 Inadvertent Returns

Inadvertent returns occur when lost drilling fluid emerges at the ground surface or into waterbodies. Inadvertent returns, whether by formational fluid loss or hydraulic fracture, have the potential for releasing relatively large volumes of drilling fluid in a short period of time if the fluid pumps are not immediately disengaged.

In practice, inadvertent returns in general occur in close proximity to the entry or exit points where annular pressures are high and soil cover is thin. Inadvertent returns can also occur at locations along a drill path where there are low shear strength soils, the depth of soil cover is thin or along pre-existing fractures or voids. Other locations where inadvertent returns can occur include exploratory boring locations, or along the sides of structures such as piles or utility poles.

4.0 INADVERTENT RETURN PREVENTION, CONTAINMENT AND COUNTERMEASURES

4.1 Prevention

Design

The potential for inadvertent returns of drilling fluid will be reduced through proper HDD design. During design, the HDD crossing locations are selected and a design profile is developed. The primary factors in selecting the HDD profile are the type of surface topographic conditions, subsurface materials and the desired depth of cover at the proposed pipeline crossing location. Cohesive soils, such as clays, dense sands and competent rock are considered ideal materials for horizontal drilling. Another important factor to be considered in the design of an HDD profile is an adequate depth of overburden material. The appropriate depth of overburden is determined based on complex calculations and is different depending on the subsurface conditions.

The following summarizes some of the applicable processes by which the proposed HDD crossing is designed:

- Surface Reconnaissance: The proposed HDD site is evaluated for workspace, construction access and topographic relief.
- Subsurface Exploration: Subsurface conditions along a proposed HDD alignment are explored in order to assess drilling feasibility and to select an optimal drill path that passes through the most competent and desirable subsurface strata with the least potential for inadvertent returns.
- Hydraulic Fracture Analysis: Complex analyses are performed to calculate the safety factor against hydraulic fracture along the entire drill path. The analysis is based primarily on research completed by Delft Geotechnics, as discussed in Appendix B of The Army Corps of Engineers Report CPAR-GL-98 (Staehli, et al., 1998, “Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling,” US Army Corps of Engineers, Waterways Experiment Station, CPAR-98-1). The input parameters for the model include subsurface material properties, hydrostatic water pressures, drilling fluid properties, penetration rates and pump rates. Based on the assumptions and interpretations utilized during the modeling process, the evaluation may indicate a high potential (low factor of safety) for hydraulic fracture along the drill path. If a higher strength layer is not present above the weaker layer, the design profile may be modified in an attempt at improving the safety factor against inadvertent returns.

HDD Operations

Another important factor in reducing the potential for inadvertent returns is the HDD contractor’s construction procedures. Frequently, inadvertent returns are prevented

through proper drilling procedures. The following operational elements, if executed properly, significantly reduce the potential for inadvertent returns:

- Maintaining adequate pump volumes;
- Monitoring and maintaining ideal drilling fluid properties; and,
- Maintaining appropriate penetration rates to maintain proper circulation.

The HDD contractor is responsible for execution of the HDD operation, including actions for detecting and controlling an inadvertent return. Northwest will closely monitor the progress and actions of the HDD contractor.

Monitoring and Detection

HDD is a technically advanced process involving skilled operators. Early detection of a hydraulic fracture and/or an inadvertent return may prevent or reduce the volume of drilling fluid released to the ground surface. Early detection is highly dependent upon the skill and experience of the HDD contractor. Therefore, Northwest plans to utilize well qualified HDD contractors that specialize in horizontal directional drilling to install the two proposed stream crossings. The selection and monitoring of the HDD contractor will be the responsibility of Northwest.

Each drilling situation is unique in that the behavior of the subsurface material is highly variable and difficult to predict. If an inadvertent return occurs in one of the minor streams, detection should occur quickly due to low flow in the streams at the time of construction. Additionally, recent developments in the HDD industry have provided down-hole annular pressure tools that help detect a change in the annular pressure of the drilled hole during pilot hole operations. Detection depends on the proper use of these new tools and a proper interpretation of other factors that may indicate an inadvertent return is imminent. An on-site environmental inspector at each stream will also aid in identifying an inadvertent return so that corrective actions can be made in an attempt at reducing the amount of fluid released.

4.2 Containment

Terrestrial Inadvertent Returns

There is greater potential for an inadvertent return near the entry and exit locations of the HDD crossing. The entry and exit locations for the HDD crossings have dry land segments where inadvertent returns will be easily detected and contained. To contain and control inadvertent returns on the land area, earth-moving equipment such as backhoes or small bulldozers, portable pumps, hand tools, sand, silt fences and hay bales will be available at each of the drilling sites. Inadvertent returns will be contained and isolated using dirt berms, hay bales, or silt screens. Inadvertent returns will be cleaned and hauled or pumped to one of the drilling fluid storage pits at the closest drilling site.

Once an inadvertent return is detected the HDD contractor will take immediate corrective action. Drilling fluid pumps provide the only source of pressure to the drilling fluid; therefore, the most immediate corrective action is to shut off the drilling fluid pumps. Upon discontinuation of the drilling fluid pumps, the pressure in the hole will quickly dissipate. When the pressure diminishes down-hole, inadvertent returns of drilling fluid to the surface will slow and eventually stop. The mitigation response process will then be initiated. The drilling fluid released to the ground surface will be contained, where possible, through the use of containment structures and a determination will be made whether alternative

actions will be required prior to resuming the HDD process. If an inadvertent return occurs in an area where the fluid can be managed within containment structures, drilling activities will immediately resume and the area will be monitored throughout the remainder of the HDD process.

Aquatic Inadvertent Returns

The composition of the drilling fluid is primarily water and bentonite clay. Therefore a small volume of drilling fluid released into flowing waters will dissipate with a rate determined by the volumes and velocities of the waterbody at the proposed time of construction. In the event an inadvertent return is detected in a waterbody, agencies will be notified. If corrective measures can be feasibly implemented, an assessment will be made to determine the most appropriate containment structure to be erected to minimize the volume of drilling fluid released into the water. However, it will likely be impractical to erect effective containment structures within the waterbody to extract drilling fluid from the waterbody.

The area downstream of the Project site will be monitored to identify areas that may have substantial accumulations of drilling fluid. Potential accumulations will likely only occur in slow flowing areas that allow enough time for the suspended particulates to settle out of the water column. Where possible, drilling fluid volumes that represent significant adverse impacts to aquatic habitat will be removed from the substrate.

Areas where bentonite accumulations are removed will be monitored to assess the need for additional substrate. If the areas identified lack essential substrate materials including spawning gravels, these materials may be added to mitigate the impacts of the bentonite removal activities. These activities will not be conducted if clean-up measures will result in greater damage to the watercourse. In areas where clean-up methods are identified to result in greater damage, the area will not be altered and bentonite accumulations will remain in place and likely flush out during periods of high flow. High flow periods are typically associated with naturally occurring elevated turbidity levels and the effect of allowing the bentonite to flush naturally is not expected to significantly alter water quality.

4.3 Countermeasures

If an inadvertent return occurs, the HDD operation will be stopped temporarily to determine an appropriate response plan. The HDD contractor and Northwest will attempt to determine the cause of the hydraulic fracture and inadvertent return. Northwest will implement procedures which may control the factors causing the hydraulic fracture and inadvertent return to minimize the chance of recurrence. Developing corrective measures will be a joint effort between Northwest and the HDD contractor and will be site and problem specific. A combination of measures may be necessary to control hydraulic fracture and inadvertent return. Possible corrective measures that may be utilized to control or correct an inadvertent return are as follows:

1. Increase the drilling fluid viscosity in an attempt at sealing the point at which fluid is leaving the drilled hole. The drilling operation may be suspended for a short period (i.e., overnight) to allow the fractured zone to become sealed with the higher viscosity drilling fluid.

2. If increasing the drilling fluid viscosity is ineffective, lost circulation materials may be introduced into the hole by incorporating them in the drilling fluid and pumping the material down-hole. The drilling operation may again be suspended for a short

period (i.e., overnight) to allow the fractured zone to become sealed with the lost circulation materials.

3. Depending on the location of the fractured zone, a steel casing may be installed that is of sufficient size to receive the largest expected down-hole tools for the crossing. This casing installation provides a temporary conduit for drilling fluids to flow while opening the remaining section of the hole to a diameter acceptable for receiving the proposed pipe sections. To alleviate future concerns with the steel casing after the HDD installation is completed, the casing is generally extracted from the hole prior to or just after completing the HDD installation. However, there have been instances when attempts at extracting the steel casing were unsuccessful.

4. In the event drilling fluid flow is not regained through the annulus of the drilled hole and a steel casing installation is not utilized, the HDD contractor may elect to install a grout mixture into the drilled hole in an attempt to seal the fractured zone. The down-hole drilling assembly is generally extracted and existing hole is re-drilled to the point at which it had previously been drilled prior to having encountered the loss of drilling fluid.

5. In addition, a grouting program may be implemented from the surface in the event that the installation of grout into the drilled hole is unsuccessful. This approach is only practical in areas where drilling rigs with vertical drilling capabilities can access the HDD alignment. If a surface grouting program is utilized, the HDD drilling assembly is extracted from down-hole. Multiple holes are then drilled vertically on either side and along the HDD alignment to allow for grout slurry to be pumped into the fracture zone where the drilling fluid had previously been lost from the drilled hole. This process can take several days to complete in order to insert the grout in a grid pattern that covers the full fractured zone, during which time the HDD operation is suspended. Upon completion of the surface grouting program, the HDD operation will resume and the pilot hole will be reestablished through the grouted formation.

In some instances, it may be determined that the existing hole encountered a zone of unsatisfactory soil material and the hole may have to be abandoned. If the hole is abandoned, it will be filled with cuttings and drilling fluid.

5.0 RISK OF AQUATIC BIOLOGICAL IMPACTS

Waterbodies S-2A6 and S-2A7 are proposed to be crossed using the HDD method of construction. Based on information from WDFW, both waterways have the potential to support resident and anadromous fish species including coho salmon (*Oncorhynchus kisutch*), coastal cutthroat trout (*Oncorhynchus clarki clarki*) and steelhead trout (*Oncorhynchus mykiss*). However, due to the flow patterns, and limited connection with the Columbia River, these two waterbodies likely provide only limited rearing, refugia or potential foraging habitat for occasional fish that stray into the area or during extremely high water periods in the Columbia, when backwater flows may occur.

If an inadvertent return occurred into waterbodies S-2A6 or S-2A7, the release of bentonite would only affect juvenile rearing or refugia habitat for coho, cutthroat and/or steelhead. No spawning habitat with concomitant intragravel incubation and fry emergence life history functions would be affected. Inadvertent returns would not affect coho, cutthroat or steelhead fecundity or recruitment.

In the event an inadvertent return occurs into the waterbody, drilling fluid would enter the waterway causing short term, temporary water quality impacts downstream of the Project area including sedimentation and turbidity. Sediments discharged into aquatic systems have the potential, depending on the concentrations, to wear down fish gills and impair fish vision making it difficult to feed and also making the fish more susceptible to predation. However, these effects typically occur after relatively long-term exposure to concentrated sedimentation.

If drilling fluid accumulates in the substrate, it can adversely impact the quality and quantity of habitat available for aquatic species including salmonid spawning habitat and benthic macroinvertebrate rearing habitat. Drilling fluid that accumulates in the substrate may cover up food sources and smother fish eggs and other aquatic life in the streambed. The rheologic properties of drilling fluid allow it to remain suspended within the water column for prolonged periods of time and will likely settle out in very slow moving water downstream of the release. The potential for inadvertent returns is the most significant potential threat to the fish resources on the Project and the possibility of occurrence is extremely remote. Given the minimal stream flow conditions likely during the planned period of construction, there is limited potential for the increased turbidity resulting from an inadvertent return of drilling fluid to travel very far downstream. Although possible, the effects of an inadvertent return of drilling fluid on listed species would be minor, localized and relatively short lived. An inadvertent return of drilling fluid, if it occurred, would not adversely affect Essential Fish Habitat for the Pacific Salmon Fishery.

6.0 NOTIFICATION PROCEDURES

If monitoring indicates an inadvertent return occurring within a stream, wetland, or wetland buffer, or is posing a threat to public safety or other sensitive resources, the Environmental Inspector will immediately notify Northwest's construction management personnel. The Environmental Inspector will provide the following information:

- The location of the inadvertent return;
- A description of the area affected; and
- The containment measures implemented

The first step in any inadvertent return situation is to contain the drilling fluid. If the inadvertent return occurs in an upland area or in an accessible wetland or waterbody area, the next step is to clean up the drilling fluid. If the inadvertent release occurs in a wetland or waterbody that is not accessible, then the next step is to monitor the site for any changes.

Northwest will notify the appropriate Federal, state and local agencies (see Table 6-1) as soon as possible (within 24 hours of an in-stream release event) by telephone and/or email detailing the nature of the release and corrective actions being taken.

Table 6-1
[To be verified and updated, if necessary, prior to construction]
Emergency Release Call List

Agency	Contact	Phone Number	Email Address
Northwest Pipeline	Diana Anderson	970-379-9573	Diana.Anderson@williams .com
Northwest Pipeline	Kris Thorne	801-584-6474	Kris.Thorne@williams.com
NOAA-NMFS	Jeff Fisher	360-534-9342	Jeff.Fisher@noaa.gov
U.S. FWS	Lindsy Wright	360-259-1151	Lindsy_wright@fws.gov
WA Ecology	Kerry Carroll	360-407-7503	Kerry.Carroll@ecy.wa.gov
Cowlitz County	Ron Melin	360-573-3052	MelinR@co.cowlitz.wa.us

KALAMA LATERAL PIPELINE PROJECT

Joint Aquatic Resources Permit Application

APPENDIX J
SHPO Concurrence

Archaeological Investigations Northwest, Inc.

3510 N.E. 122nd Ave. • Portland, Oregon 97230
Phone (503) 761-6605 • Fax (503) 761-6620

Vancouver Phone (360) 696-7473
E-mail: ainw@ainw.com
Web: www.ainw.com

September 17, 2012

Robert G. Whitlam, Ph.D., State Archaeologist
Department of Archaeology and Historic Preservation
1063 S. Capitol Way, Suite 106
Olympia WA, 98504

Re: Northwest Pipeline GP
Kalama Lateral Pipeline Project
Cultural Resource Survey Report

Dear Dr. Whitlam:

Northwest Pipeline GP has retained Archaeological Investigations Northwest, Inc. (AINW), to conduct cultural resource studies for the Kalama Lateral Pipeline Project in Cowlitz County, Washington. With this letter I am transmitting AINW's report of the survey on behalf of Ms. Kris Thorne of Northwest Pipeline GP.

The enclosed report entitled *Cultural Resource Survey of the Northwest Pipeline GP Kalama Lateral Pipeline Project, Cowlitz County, Washington* (AINW Report No. 2847, dated September 15, 2012) describes cultural resource survey work for a natural gas pipeline lateral proposed to extend 3.1 miles from an existing mainline to the Port of Kalama. Three historic-period cultural resources (Northern Pacific Railroad, Old Pacific Highway, and Mt. Pleasant Cemetery) were identified within the project's Area of Potential Effects.

Northwest Pipeline GP plans to avoid impacts to all three of these historic-period cultural resources during project construction. No other cultural resources were identified. On behalf of Northwest Pipeline GP, AINW recommends a finding of "No Historic Properties Affected" based on findings to-date. Additional cultural resource survey fieldwork is planned in areas where landowners previously denied permission for survey access.

Please let me, or Ms. Thorne, know if you have comments or questions.

Sincerely,

Terry Ozbun, M.A., R.P.A.
Senior Archaeologist/ Lithic Technology Specialist

Enclosure: AINW Report No. 2847 on CD)

cc: Kris Thorne, Northwest Pipeline GP

STATE OF WASHINGTON

DEPARTMENT OF ARCHAEOLOGY & HISTORIC PRESERVATION

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
Mailing address: PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 • Fax Number (360) 586-3067 • Website: www.dahp.wa.gov

September 25, 2012

Ms. Kris Thorne
Williams Gas Pipelines
295 - Chipeta Way
Salt Lake City, Utah 84108

Re: NW Pipeline Kalama Lateral Project
Log No: 101211-03-FERC

Dear Ms. Thorne:

Thank you for contacting our department. We have reviewed the professional archaeological survey report you provided for the proposed NW Pipeline Kalama Lateral Project, Cowlitz County, Washington.

We concur with your determination of No Historic Properties Affected for 135 of the 173 acres of the Project. We concur with the stipulation for avoidance, please provide the draft avoidance and professional monitoring plan. Please provide the survey report for the remaining acres when available.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under the requirements of 36CFR800.4(a)(4).

These comments are based on the information available at the time of this review and on the behalf of the State Historic Preservation Officer in conformance with Section 106 of the National Historic Preservation Act and its implementing regulations 36CFR800. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist
(360) 586-3080
email: rob.whitlam@dahp.wa.gov

From:	Thorne, Kris
To:	"Whitlam, Rob (DAHP)"
Subject:	Northwest Pipeline - FERC Project - Kalama Lateral Pipeline Project (new application)
Date:	Friday, August 15, 2014 5:15:00 PM
Attachments:	image001.png image002.png image003.png image004.png image005.png

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Hello Rob,

In 2012, Northwest Pipeline (NWP) filed an application with the Federal Energy Regulatory Commission (FERC) to build a pipeline to the Port of Kalama property for another project that was not completed. As part of the agreement with Northwest Innovation Works (NWIW), NWP will re-file its original application with FERC for authorization to construct and operate a new 3.1-mile, 24-inch diameter pipeline and other facilities to deliver the necessary volumes of natural gas to the NWIW methanol facility. Though the route is expected to be very similar to the previously identified "Timber Rock route," final details of the pipeline route will be determined through the FERC regulatory process.

This email is to notify you that the Kalama Lateral Pipeline Project will be refiled and to ask if you will still be our contact representing Washington Department of Archaeology and Historic Preservation.

I look forward to hearing from you.

Best regards, Kris

(Ms.) Kris Thorne | Northwest Pipeline | Sr. Environmental Scientist
Office: 801-584-6474 | Cell: 360-553-6692
295 Chipeta Way | Salt Lake City, UT | 84108

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