APPENDIX E.6.4

STORM WATER POLLUTION PREVENTION PLAN FOR ENLOE DAM

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ENLOE DAM HYDROELECTRIC PROJECT

Draft Storm Water Pollution Prevention Plan

Prepared for:
Okanogan County PUD No. 1
1331 Second Avenue North
Okanogan, WA 98840-9609

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LIST OF ATTACHMENTS

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1. SCOPE

The purpose of this Stormwater Pollution Prevention Plan (SWPPP) is to ensure the design of erosion and sediment control measures. Implementation and management of these measures, and the maintenance of Best Management Practices (BMPs) provided in this document will reduce the amount of sediment and other pollutants in storm water discharges from construction and maintenance activities associated with the Enloe Dam Hydroelectric Project (Project). If construction or maintenance conditions change, the SWPPP will be revised accordingly to effectively control erosion, sedimentation, and the off-site discharge of pollutants associated with storm water discharges.

2. GENERAL INFORMATION

2.1 Project Owner and Operator

Okanogan County PUD No. 1
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2.2 Project Contact information

Company:	Okanogan County PUD No. 1 (OCPUD)
Name of Contact:	Dan Boettger, Director of Regulatory & Environmental Affairs
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2.3 Project Location

Enloe Dam, located on the Similkameen River 3 miles northwest of Oroville, WA at Similkameen River Mile 8.8

2.4 Receiving Waterbody for Storm Discharges

Similkameen River

2.5 Potential Sources of Pollution at the Project Site

Sediment from construction disturbances; construction debris and trash; minor petroleum leaks from construction equipment

3. SITE DESCPRITION

3.1 Introduction

This Storm Water Pollution Prevention Plan (SWPPP) has been prepared to comply with the provisions of the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges from Construction Activities (USEPA 2005). This plan presents the means for controlling the off-site discharge of pollutants associated with storm water discharges associated with construction activities on the Enloe Dam Hydroelectric Project.

The State of Washington, under the regulatory authority of the Washington Department of Ecology (WDOE), has authorization from the USEPA to regulate storm water discharges from construction activities. As owner of Enloe Dam, OCPUD will submit a Notice of Intent to the WDOE so that project construction activities will be covered by the General Permit prior to the beginning of construction. The SWPPP will be submitted to the WDOE for approval before construction begins.

In general, this SWPPP includes specifications for best management practices that will be utilized to control erosion and sedimentation during construction to minimize impacts resulting from construction activities. The OCPUD's objective is to minimize the potential for erosion and sedimentation during dam conversion activities, and to effectively restore disturbed areas created during construction activities at the Enloe Dam. The measures described in this plan are intended to prevent discharge of pollutants during construction activities. OCPUD will meet these objectives by employing the erosion and sediment control measures set forth in this plan. This plan presents typical structural and non-structural erosion and sediment control measures and management practices that will be implemented during construction activities. The erosion and sediment control measures described in this plan will serve as minimum standards during construction. In general, the measures are designed to minimize erosion and sedimentation by:

- Minimizing the quantity and duration of soil exposure;
- Protecting critical areas during construction by reducing the velocity of run-off and redirecting runoff away from disturbed areas;
- Installing and maintaining erosion and sediment control measures during construction;
- Re-establishing vegetation as soon as possible following final grading; and
- Inspecting and maintaining erosion and sediment controls as necessary until final stabilization and revegetation is achieved.

Environmental Inspectors (EIs) will be responsible for ensuring that contractors implement and maintain erosion and sediment control measures during construction. This plan and a copy of the Notice of Intent will be kept at all of the construction sites (if practical) or at the nearest contractor office or trailer and plan will be available for review upon request.

To be eligible under the NPDES general permits for storm water discharges from construction activities, an applicant must certify that storm water discharge will not adversely affect threatened and endangered species. The applicant will review the completed and ongoing threatened and endangered species consultations with various agencies for this project in the application. Storm water discharges from this project are not expected to have adverse affects to threatened and endangered species.

The NPDES general permits for storm water discharges from construction activities have removed the requirements for review of historic preservation issues. Rather the USEPA is conducting consultations on a case-by-case basis.

Following is a project description. The description is broken down by the Project's constituent sections.

3.1.1 Dam and Spillway

Enloe Dam is a concrete gravity arch dam that is 315 feet long with an arch radius of 200 feet and a maximum hydraulic height of 54 feet. The dam structure is 40 feet thick at the base of the spillway tapering to a 6 feet thick rounded crest. It was constructed at Similkameen River Mile 8.8 approximately 400 ft upstream of Similkameen Falls.

The right (West) abutment of the dam contains the intake structure for the previously licensed Enloe Hydroelectric Project, which ceased operation in 1958. The original sluice gates, which controlled flow from the impoundment into two above ground woodstave penstocks and delivered water to the Enloe powerhouse, are now silted in. One of the penstocks has been removed while the other remains in place.

The dam crest is designed to accommodate the installation of 5-foot high flashboards which increase the crest elevation to by 5 ft. The proposed project includes restoration of flashboards by retrofitting five-foot crest gates on the crest of the existing spillway. Crest gates, which would be raised as spring flows recede, would increase Project head and power generation. A section of gate near the left abutment would be operated independently to provide a bypass sluice for ice and debris in the vicinity of the proposed headworks.

3.1.2 Headworks

The purpose of the proposed headworks is to divert a portion of streamflow from the Similkameen River and convey it to the intake of the proposed hydroelectric power plant. An important function of the headworks is to control trash, ice, sediment in the inflow to the power plant and protect resident fish in Enloe Reservoir.

The proposed headworks is comprised of:

- Approach channel
- River intake structure
- Intake Canal

Approach Channel

A short approach channel would convey water from Enloe Reservoir to the river intake structure located in the left bank of the reservoir. The entrance to the approach channel is located as close as practical to the existing dam to minimize the footprint of the project and to minimize any disturbance to sediment in the reservoir. A shear log boom would be located between the upstream end of the approach channel and the dam to divert logs and floating debris.

River Intake

The river intake structure would control flow from the approach channel into the intake channel and would exclude trash, ice floes and adult resident fish from the intake channel to the powerhouse. The river intake would be a concrete trashrack structure 86 feet long and 20 feet wide. An automatic trashrack cleaner mounted on a monorail would keep the racks clear of accumulated trash and ice.

Intake Canal

The intake canal would carry inflow from the river intake structure to the penstock intake structure. The canal would be a 140 feet long unlined rectangular cross section canal

excavated in rock, with a maximum depth of approximately 26 feet below the existing ground surface, at the intake.

3.1.3 Penstocks and Penstock Intake

The penstock intake would be located at the downstream end of the approach channel, in a rock cut through the east abutment of the dam. The intake would be founded on bedrock and connected to two steel penstocks. Two above-ground steel penstocks, 8.5 feet in diameter and approximately 150 feet long, would slope steeply from the intake to the powerhouse and would carry water to the turbines. The penstocks would be supported on concrete saddles and by concrete anchor blocks at the penstock bends.
Two vertical-lift wheeled gates would be provided for emergency closure, and two bulkhead gates, located upstream of the main gates, would be provided for dewatering of the main gates. Trashracks would be installed upstream of the bulkhead gates. An enclosure building on top of the intake structure would house the gate hoists and controls and the air vent/access for the penstocks.

3.1.4 Powerhouse

The proposed powerhouse location is sited in an alcove on the left bank of the Similkameen River about 230 feet downstream of the east abutment of Enloe Dam and 140 feet upstream of Similkameen Falls. The reinforced concrete substructure would be founded in an open rock excavation in bedrock that outcrops in the banks of the river and the broad terrace upstream of the falls. The repair bay and laydown area would be located at the east end of the powerhouse.

3.1.6 Tailrace

The tailrace, an unlined channel excavated in rock, would convey water from the powerhouse to the Similkameen River, downstream of the Similkameen Falls. The channel would have a negative sloping invert toward the river and a maximum depth of approximately 30 feet below the existing ground surface.

3.2 Existing Site Conditions

3.2.1 General Existing Site Drainage

The Similkameen River basin drains the eastern side of the Cascades in Washington and British Columbia and the Thompson (or Interior) Plateau of British Columbia (**Error! Reference source not found.**). The river is fed by three main tributaries, which include the Pasayten River near Manning Park, BC (most of which is in northern Washington), the Tulameen River at Princeton, BC and the Ashnola River near Keremos, BC. Downstream of the international border at Chopaka, the Similkameen River receives almost all of its incremental flow within Washington from the Palmer Lake/Sinlahekin Creek watershed. Flows at high stages are regulated somewhat by a natural diversion into and release from Palmer Lake.

The deep gorge cut by the river traverses steep, sparsely vegetated rocky hills. Shrub-steppe vegetation communities dominate the lower elevations of the Similkameen River Canyon. The most prevalent species include sagebrush and bitterbrush, with an understory of cheatgrass, bluebunch wheatgrass, and associated herbaceous species. Moist draws and seasonally flooded areas support deciduous trees and shrubs including black cottonwood, willow, water birch, mountain alder, Douglas hawthorn, and red-osier dogwood. The steepest slopes and draws above the river are sparsely vegetated with scattered ponderosa pine and deciduous shrubs, such as smooth sumac and serviceberry.

Similkameen Falls, about 350 feet below Enloe Dam, forms a 33-foot barrier impassible to anadromous fish (HAER Report, see Appendix C.1). Above the dam lies a shallow reservoir (mean depth of 8.4 feet at the existing dam crest elevation of 1044.3 ft amsl.; maximum depth 55.6 feet (MaxDepth 2006) filled with an accumulated sediment volume of approximately 2.43 million cubic yards (MaxDepth 2006). The existing reservoir is approximately 2 miles long and averages about 250 feet in width.

Topography in the Project vicinity has been significantly affected by glaciation and is moderately steep and rugged. In the lower part of the river canyon, steep slopes adjacent to the river are interspersed with relatively flat benches of alluvial or glacial origin. The upper portions of the river canyon are steep and rocky. The mountains of the Okanogan Highlands lie to the east and the North Cascades to the west. Elevations range from 1,000 feet at the mouth of the Similkameen River at Oroville, to over 3,600 feet at the summit of surrounding mountains.

The climate in the lower Similkameen River Basin is typical of eastern Washington, with cool, moist winters and hot dry summers. The Cascade Mountains act as a barrier to the movement of maritime and continental air masses, creating the generally dry conditions observed in the Project vicinity. Average annual precipitation is approximately 11 inches. River flows peak in late spring to early summer when warm temperatures melt the extensive winter snowpacks at the higher elevations in the basin. Low flows occur in mid-winter when cold temperatures minimize runoff.

The Similkameen River joins the Okanogan River in Oroville in north central Washington, approximately 8 miles south of the Canadian border. Enloe Dam is located on the Similkameen River 8.8 miles upstream from the confluence. The majority of both river basins are located in British Columbia. At their confluence, the Okanogan and Similkameen River basins are similar in size (3,150 mi^2 and 3,592 mi^2, respectively) but the mean annual flow of the Similkameen River is, on average, more than 3.3 times the mean annual flow of the Okanogan. The Similkameen is also a more variable river; although its median daily flow is only 1.3 times as high as that of the Okanogan, peak flows on the Similkameen River are on average more than 8 times as high.

3.2.2 Adjacent Areas

Located in north-central Washington a few miles south of the Canadian border, the Enloe Hydroelectric Project[1] is situated in a narrow constriction of the Similkameen River valley, about 3.5 miles northwest of the City of Oroville (See Figure E.1-1). The Similkameen River is tributary to the Okanogan River just south of the City of Oroville; the Okanogan in turn flows into the Columbia River east of the City of Brewster, Washington. The Similkameen River drains the east slopes of the Cascade Mountains in northern Washington and southern British Columbia, Canada. The majority (79 percent) of the drainage basin lies within Canada.

3.2.3 Critical Areas

No specifically designated critical areas are located within the project boundary or adjacent to the project site.

3.2.4 Geology and Soils

[1] "Project Area" is defined as the area between the upper end of the Enloe reservoir and the tailrace below the dam.

Within Enloe reservoir, from Shanker's Bend downstream to approximately 1600 feet above the dam, the Similkameen River lies at the boundary of the Kobau Formation, characterized by highly deformed Triassic/Permian metamorphic rocks and Ellemeham Formation, characterized by Jurassic/Cretaceous metaconglomerate and metavolcanic rock. Between 1600 feet above and 1000 feet below the dam the river flows over Eocene sandstone and conglomerate. Enloe dam is located above the Similkameen Falls on resistant granitic-clast conglomerate. Downstream of the dam and falls the river again flows over metamorphic rocks of the Kobau and Spectacle Formations. These geologic features are overlain by Quaternary glacial drift, colluvium, and alluvial deposits (Villalobos 1982).

The soils present within or adjacent to the FERC boundary are classified as follows:

1. Nighthawk loam
2. Nighthawk extremely stony loam.
3. Ewall loamy fine sand
4. Lithic Xerochrepts (Nighthawk complex soils)
5. riverwash and rock outcrop areas

Nighthawk loam soils are present just upstream of the dam and upstream of Shanker's Bend. These soils are deep and well-drained. Nighthawk loam soils with 3 to 8 percent slopes (map symbol 131) are characterized by slow runoff and present a slight erosion hazard. Nighthawk loam soils with 8 to 15 percent slopes (132) are characterized by medium runoff and present a moderate erosion hazard.

Nighthawk extremely stony loam soils are located adjacent to the dam and powerhouse and a portion of Shanker's Bend. These soils are deep and well-drained. Nighthawk extremely stony loam soils with 8 to 25 percent slopes (134) are characterized by medium runoff and present a high to very high erosion hazard. When slopes reach 25 to 65 percent (135) these soils are characterized by rapid to very rapid runoff and present a high to very high erosion hazard.
Ewall loamy fine sand soils are located in a small area immediately downstream of Shanker's Bend. These soils are deep and excessively drained. Ewall loamy fine sand soils with 0 to 15 percent slopes (53) are characterized by slow runoff, and present a slight erosion hazard and a high soil-blowing hazard.

Lithic Xerochrepts soils are generally shallow and well-drained and are located downstream of the dam. Lithic Xerochrepts-Nighthawk complex soils with 15 to 45 percent slopes (93) are characterized by medium runoff and present a moderate erosion hazard.

Areas classified as riverwash and rock outcrops are also present within or adjacent to the FERC boundary. Riverwash (161) consists of coarse sand and gravelly alluvium. Rock outcrop areas (162) contain little or no shallow soil material.

3.2.5 Potential Erosion Problem Areas

Headworks
Potential erosion problems that may occur during construction of the headworks include:

- General Stormwater Runoff – Runoff from slopes to the east of the headworks work area could flow into the construction work area and would require control and disposal. Presently this runoff enters Enloe Reservoir. One of the initial stages of the Project will be construction of stormwater interceptors above the headworks work area and installation of culverts to direct stormwater to surface waters (bypass reach and Enloe Reservoir).

- Stormwater Runoff from Construction Laydown Areas, Borrow Area and Construction Roadways – Areas disturbed by construction other than the headworks work area will be appropriately graded and graveled to minimize erosion. Appropriate flow and sediment controls are to be deployed to capture sediments from runoff and minimize any offsite effects.

Dam and Spillway

- General Stormwater Runoff – A significant portion of the area surrounding the dam and spillway is gravel covered and little general stormwater runoff is expected. However, some runoff from slopes east of the dam could reach areas of disturbed soil associated with installation of the new penstocks. Appropriate sediment control measures are to be deployed at the edge of these work areas to minimize the potential for any offsite sedimentation.

Powerhouse

- General Stormwater Runoff – the area surrounding the Powerhouse is characterized by rock benches and outcroppings with a thin layer of soil in some areas. Little erosion is expected. Appropriate sediment control measures are to be deployed at the edge of these work areas to minimize the potential for any offsite sedimentation.

3.3 Construction schedule

A preliminary construction schedule has been developed for the Enloe Hydroelectric Project to show the sequencing of principal activities through the engineering design and construction process (Table 3.1). The four-year-long schedule shows a traditional design-bid-build approach, however depending on project financing needs and conditions in construction markets, The OCPUD may choose to construct the project under a design-build approach which would somewhat condense the design and construction processes.

The construction schedule shows the planned phasing of engineering design and construction activities relative to the seasonal weather and river conditions at the Enloe site. The actual dates for various activities will be determined when the license has been issued and according to the means, construction methods and detailed construction plan of the selected construction contractor.

Construction of power facilities would take 12 months followed by 6 weeks of commissioning prior to start of commercial operation in the Spring. Installation of the Crest gates would be carried out during the subsequent Fall since the new power plant would be used to draw down the reservoir below the crest of the spillway.

4. CONSTRUCTION STORMWATER POLLUTION PLAN ELEMENTS

Best Management Practices (BMPs) are incorporated into this SWPPP to prevent erosion and protect water quality, control dust control, minimize loss of native vegetation, protect wildlife, protect cultural resources, protect and minimize potential adverse impacts to wetlands and water bodies. The following BMPs are taken from the Washington Department of Ecology, *Stormwater Management Manual for Eastern Washington* (WDOE 2004). BMPs are described in detail in the above referenced document, which is made a part of this plan by reference. Additionally, each BMP is briefly described in this document. Construction contractors will submit to the Project Engineer additional BMPs that conform to this SWPPP. The SWPPP may be further modified during permit consultation with FERC. The Contractor will implement approved BMPs during construction to control off-site discharge of pollutants.

4.1 Mark Clearing Limits

Prior to beginning land disturbing activities, including clearing and grading, the limits of the area to be disturbed shall be clearly marked and shall include sensitive areas, their buffers, and trees that are to be preserved within the construction area. Plastic, metal, or stake wire fence may be used to mark the clearing limits.

4.1.1 Buffer Zone (BPM C102)

A Buffer zone is an undisturbed vegetation area or strip of newly planted vegetation that helps to reduce soil erosion and runoff velocities. Buffer zones will be used along the River, especially on steep slopes, to protect against runoff and sedimentation.

4.1.2 Visibility Plastic or Metal Fence (BMP 103)

High visibility orange-colored fence made of a high-density polyethylene material at least four feet in height will be used to protect buffer zones and other sensitive areas. At maximum, wood or metal posts will be placed every six feet for structural support. Additionally, polyethylene ties will fasten fencing material to each post at a minimum of every six inches. Metal fences will be at least three feet high, highly visible, and not fastened to any trees or natural vegetation. Should the visibility or function of the fence be compromised, the fence will be immediately repaired and visibility restored.

4.2 Establish Construction Access

Relocation of the upstream access road to the project site will be necessary to avoid seasonally wet areas and minimize water quality impacts on the River. The proposed road alignment is expected to use the old Oroville-Tonasket Irrigation ditch right of way (ROW). This new access road shall be stabilized with gravel to minimize tracking of sediment onto public highways. The public roadways shall be cleaned thoroughly as required. Sediment shall be removed from roads and shall be disposed of in a controlled sediment disposal area. At a minimum, road approaches shall be constructed as directed by the engineer and in conformance with the following two BMPs:

4.2.1 Stabilized Construction Entrance (BMP C105)

To stabilize construction entrances and reduce the amount of sediment transported onto paved roads by vehicles or equipment, stabilized pads of quarry spalls shall be constructed at entrances to construction sites. Construction entrances shall be stabilized wherever traffic will be leaving a construction site and traveling on paved roads or other paved areas within 1,000 feet of the site. Specifications on the design and installation of construction entrances can be found in *Stormwater Management Manual for Eastern Washington* (WDOE 2004).

4.2.2 Construction Road/Parking Area Stabilization (BMP 107)

Construction laydown areas, parking (both temporary and permanent), and access roads will be stabilized immediately after grading to reduce erosion caused by traffic. A six-inch depth of two- to four-inch crushed rock base and crushed surfacing course shall be applied. Areas shall be graded to promote runoff into adjacent vegetated areas.

4.3 Control Flow Rates

The Simillkameen River is exempt from flow control requirements to protect stream morphology as specified in WDOE 2004.

4.4 Install Sediment Controls

Temporary sediment barriers are designed to reduce water velocity and intercept suspended sediment conveyed by sheet flow, while allowing runoff to continue down gradient. These installations limit sediment transport out of the construction area. Temporary sediment barriers will be installed at the following locations immediately after initial ground disturbance:

- adjacent to paved roadways, drainages, wetlands (dry or wet), springs (dry or wet), impoundments (dry or wet), and other sensitive resources where topography will direct sediment into these resource areas;
- around soil or spoil piles, where necessary (e.g., adjacent to flowing drainages); and
- where requested by the Environmental Inspector to prevent significant sediment transport into adjacent resource areas.

Prior to starting any construction activities and/or before any land disturbing activities are started appropriate sediment barriers shall be installed. Sediment barriers will be placed at the bottom of slopes and will be located at least 6 feet from the toe of the slope, where possible, in order to increase ponding volume. The ends of each sediment barrier will be turned upslope to capture sediment.

Sediment barriers will be placed above the ordinary high water mark of active stream channels in a manner that will not hinder construction activities. .The ends of each sediment barrier will be turned upslope to capture sediment. If silt fences or straw bale sediment barriers are placed across the construction area, provisions will be made for traffic flow. A gap approximately 15 feet wide, will be provided along the silt fence or straw bale row, with the ends of the sediment barrier turned slightly upslope. Across the gap, a driveable earth berm will be installed and maintained immediately upslope of the sediment barrier (upturned ends of the sediment barrier will tie into the driveable earth berm).

If sediment builds up to greater than 40 percent of barrier capacity, the accumulated sediment will be removed or spread on an approved sediment disposal site. Damaged or undermined sediment control barriers will be repaired or replaced as described in this plan. Primary control of sediment discharge from this activity will be achieved with the BMPs listed below.

4.4.1 Straw Bale Barrier (BMP C230)

Straw bale sediment barriers consist of a row of tightly abutted straw bales placed perpendicular to the runoff direction with the ends of the barrier turned upslope. Such barriers are typically one bale high, placed on the fiber-cut edge (ties not in contact with the ground) in a 4-inch-deep trench, and anchored securely with two wooden stakes driven through each bale. Soil will be placed and compacted along the toe of the uphill side of the straw bale barrier. If a dugout area cannot be excavated due to the presence of rocky material, the Contractor will install the straw bale so that the bale will not be undermined. Only straw bales that are certified to be free of noxious weeds will be used. The Contractor will acquire weed-free straw and provide CAW with the appropriate documentation.

4.4.2 Silt Fence (BMP C233)

Silt fence composed of commercial filter fabrics with sufficient strength to prevent failure will be provided and installed by the Contractor. The height of the silt fence will not exceed 36 inches above the ground. The fabric will be cut from a continuous roll of fabric with splices only at the support posts. When splicing sections, at least a 6-inch overlap of fabric will be secured and wrapped to the post(s). Support posts will be a maximum of 10 feet apart. Silt fences will be constructed at the base of slopes adjacent to the new access roadway and the River. They will also be installed downslope of all disturbed areas.

The bottom edge of the silt fence will be embedded in a trench excavated approximately 4 inches wide by 6 inches deep and refilled with compacted soil, unless on-site constraints dictate otherwise (e.g., rock). If a trench cannot be excavated, the Contractor will secure the bottom edge of the silt fence so that it will not be undermined. Silt fences will be attached to supporting posts by staples or wire. As determined by the Environmental Inspector, a wire fence may be used instead of wooden support posts to provide additional strength on hillsides.

4.4.3 Sandbags

Sandbags may be used as dikes or sediment barriers to control sediment in drainage swales. Sandbags can be strategically placed to control runoff, dissipate runoff energy, and catch sediment.

4.5 Stabilize Soils

Exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrops, flowing water and wind. From October 1 through June 30, no soils shall remain exposed and unworked for more than five days. From July 1 to September 30, no soils shall remain exposed and unworked for more than ten days. This stabilization requirement applies to all soils on site, whether at final grade or not.

Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast. Applicable practices include, but are not limited to, temporary and

permanent seeding, sodding, mulching, plastic covering, erosion control fabrics and matting, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved and dust control.

Selected soil stabilization measures shall be appropriate for the time of year, site conditions, estimated duration of use and the water quality impacts that stabilization agents may have on downstream waters or ground water. Soil stockpiles must be stabilized and protected with sediment trapping measures.

Seeding may be used throughout the project on areas that have reached final grade or that will remain unworked for more than 30 days.

BMPs to be employed in stabilizing soils include:

4.5.1 Mulching (BMP C121)

Mulching is an erosion control practice that uses hay, straw, or wood fibers placed on the soil surface for temporary soil stabilization. In addition to stabilizing soils, mulching can reduce the speed of stormwater runoff, aid in plant growth, and retain moisture in the soil after an area has been planted. Mulch, consisting of weed-free straw, wood fiber, or an approved equivalent, may be applied to disturbed soils to minimize the effects of wind or rain on exposed soils. During rainy conditions, mulch reduces the impact of rainfall in initiating erosion and slows the down slope velocity of surface flow.

- Straw mulch will be required in the following areas:
  - within 100 feet of flowing streams;
  - slopes of 30 to 40 percent with less than 70 percent surface cover; and
  - slopes of 0 to 30 percent with highly wind erodible soils and less than 70 percent surface cover, as directed by the Environmental Inspector or other qualified personnel.

- Straw mulch will be applied at a rate of 2,000 to 4,000 pounds (3,000 average) per acre, as directed by the Environmental Inspector. Mulch rates may be reduced or eliminated by the Environmental Inspector, where necessary.

- Only straw that is free of noxious weeds will be used. Written confirmation from an approved supplier will be required.

- Straw fiber length will be at least 8 inches long to facilitate crimping in place after application.

- Equipment specifically designed to crimp straw will be used to crimp straw fibers to a depth of 2 to 3 inches. Steep slopes inaccessible with a crimper will be crimped by tracking with tracked equipment running perpendicular to the slope. Farm discs will not be allowed for crimping.

If reclamation and seeding is deferred more than 10 days after final grade restoration, all disturbed slopes above waterbodies and wetlands will be temporarily stabilized by applying 3 tons of dry straw mulch per acre for a minimum distance of 100 feet above the edge of the waterbody or wetland.

After final restoration and seeding, mulch will be applied to all dry sandy sites, slopes greater than 8 percent, and all slopes within 100 feet of waterbodies to control erosion. Mulch will be spread over the area to a visible coverage of at least 75 percent of the ground surface and at a rate of 2 tons of dry straw (or functional equivalent) per acre.

4.5.2 Temporary and Permanent Seeding (BMP C120)

Following final recontouring of the project site and installation of permanent erosion control measures, the project site will be seeded with a seed mix that is native and appropriate for the local conditions. Due to the dispersed nature of this project, the Environmental Inspector, in conjunction with the landowner, will determine specific revegetation requirements (including seed mixtures and soil amendments) for each site. The project site will be seeded within 6 working days of final grading in accordance with recommended seeding dates, weather and soil conditions permitting. Slopes steeper than 3:1 will be seeded immediately after final grading in accordance with recommended seeding dates, weather permitting.

Prior to seed application, the seedbed will be prepared to depth of 3 to 4 inches using appropriate equipment to provide a firm, smooth seedbed that is free of debris. For broadcast and hydro-seeding, the seedbed will be scarified to ensure sites for seeds to lodge and germinate. The seed will be applied and covered uniformly per local soil conservation authorities' recommendations for the seed mixture being applied. A range drill will be used on many of the disturbed sites; however, broadcast or hydro-seeding may also be used at double the recommended seeding rates. Where broadcast seeding is used, the area will be lightly raked or dragged with appropriate equipment after seeding to lightly cover the seeds.

Seed will be purchased in accordance with the specifications for seed mixes described in the Botanical Resource Management Plan (Appendix XX). and used within 12 months of testing. PLS is an agricultural industry standard that omits dust, chaff, and empty seed, weed and other crop seed in the calculation of the weight and value of purchased seed. Specifics on the calculation of PLS can be found at http://www.dot.state.tx.us/mnt/wildflower/pls/explanation.htm. Legume seed will be treated with a species-specific inoculate per manufacturer's specifications.

4.5.3 Matting/Netting

Where determined necessary by the Environmental Inspector and/or Construction Inspector, erosion control matting will be installed along banks of flowing streams and steep slopes (greater than 33 percent) after final grade restoration to reduce rain impacts on soils, to control erosion, and to stabilize steep slopes and waterbody banks.

The Contractor will use matting supplied in continuous rolls of 30 feet or greater with a minimum width of 4 feet. Staples will be made of wire, 0.09 inch in diameter or greater, and have a "U" shape with legs 8 inches in length and a 2-inch crown. Wire staples will be driven into the ground for the full length of the staple legs. Alternatively, wood pegs (0.5-inch-diameter) may be used to secure erosion control fabric. In areas of active livestock grazing, protection measures other than fabric must be used.

As it is unrolled, matting will be anchored to prevent stretching of the material and incomplete ground contact. For stream bank installations, mats will be laid parallel (upper mat overlapping lower mat in a shingle pattern) to the waterbody to a point above the top of the bank. Native materials (e.g., rocks, logs, etc.) may be used in conjunction with the matting to aid in bank stabilization.

During regular erosion control monitoring, erosion control matting will be inspected for washouts, adequate staking, and loss of matting. Damaged or undermined matting will be repaired or replaced, as necessary.

4.6 Protect Slopes

Fill and cut slopes will be part of the construction activities on the site. These will include access ramps, permanent and temporary fill and excavation slopes. Slopes will be constructed in accordance with applicable codes and regulations.

Cut and fill slopes shall be constructed in a manner that will minimize erosion. Slopes exceeding 100 feet in length will be terraced. No more than five acres of slopes will be exposed at any given time. All surface runoff will be routed away from exposed slopes using curbs and interceptor dikes, and conveyed to the base of the slope using slope drains. Slopes will be track walked when at finish grade or whenever they will be left unworked for 30 days or more. Final stabilization BMPs will be installed within two days of slope completion.

Temporary erosion control measures will be installed where needed immediately following significant soil disturbance and will be maintained throughout the course of construction. In general, temporary erosion control measures will be removed during cleanup activities after permanent erosion control measures have been installed. Permanent erosion control measures are designed to minimize erosion and sedimentation after construction until revegetation efforts have effectively stabilized the construction area.

4.6.1 Waterbars (BMP C203)

Waterbars are utilized in various forms (e.g., rolling dips on access roads, driveable berms across travel ways, waterbars on slopes, etc.) during project construction and after final grade restoration. Waterbars are intended to intercept water traveling down a disturbed slope and divert water off disturbed soil into stable, well-vegetated, or adjacent rocky areas.

Waterbars will be installed near the base of slopes adjacent to wetlands and drainages, except at those specific sites (e.g., terrain slopes away from a canal) where, in the judgment of the Environmental Inspector, waterbars are not necessary to prevent discharge of sediment into sensitive resources. The general spacing for temporary and permanent waterbars is as follows:

- 300 feet for slopes of 5 to 15 percent
- 200 feet for slopes of 15 to 30 percent
- 100 feet for slopes greater than 30 percent

The Environmental Inspector can modify the final spacing of waterbars in the field. Waterbar spacing is based on a site-specific evaluation of the project site and standard construction protective measures. This spacing takes into account the soils, timing of construction, and area of disturbance anticipated for construction of the project. Except for site-specific situations as determined by the Environmental Inspector (e.g., extremely long slopes with highly erodible soils), waterbars will not be constructed on slopes with less than a 5 percent gradient.

Earthen waterbars will be constructed of existing suitable material and compacted to increase durability. Alternatives to waterbars may include a series of tightly abutted straw bales

(constructed as per Section 4.4.1), excelsior logs, or abutted burlap bags filled with native sand/soil. The installation angle will be 2 to 8 percent down slope (as measured by a hand-held clinometer or level) and will extend to, or slightly beyond, the edge of the disturbed construction area, but within the boundaries of the project area.

Where possible, waterbars will discharge into stable, non-erosive (vegetated or rocky) receiving areas. In isolated instances where waterbars discharge into unstable or highly erosive areas without rock or vegetation, flow energy dissipators or "J-hook" shaped sediment barriers may be positioned at the waterbar outlet. Additionally, in highly erodible soils, the spacing between waterbars may be decreased to further slow the velocity of water. Whenever feasible, waterbars will be sited so that they do not drain into sensitive resource areas (e.g., cultural sites, rare plant sites, drainages, waterbodies, wetlands, etc.).

The Contractor will regularly inspect and repair waterbars during construction to maintain their effectiveness. Waterbars worn down by heavy construction traffic or filled with sediments will be repaired, as needed, and sediment will be spread on the disturbed area uphill of the waterbar.

4.6.2 Check Dams (BMP C207)

Where determined necessary by the Environmental Inspector, the Contractor will install check dams in bar ditches or other intermittent drainages to minimize the transport of sediment from the construction zone. Check dams will be constructed of staked straw bales or stacked sand bags just inside the drainage area edge. The center of the structure will be lower than the ends to channel water and create a sediment dump immediately upstream of the structure. The structure, and any deposited sediment, will be removed following final restoration of the site.

4.6.3 Surface Roughening (BMP C130)

Surface roughening involves tracking ground surface with heavy machinery creating a series of shallow depressions running parallel to the ground surface contours. Surface roughening assists in controlling erosion by reducing the speed of storm water runoff, increasing infiltration, and trapping sediment.

4.7 Protect Drain Inlets

Inlet protection shall be provided to prevent coarse sediment from entering drainage systems prior to permanent stabilization of the disturbed area. Protection should be provided for all culvert and drain inlets downslope and within 500 feet of a disturbed or construction area, unless the runoff that enters the culvert or drain will be conveyed to a sediment pond or trap. Inlet protection may be used anywhere to protect the drainage system. BMPs to be used for protection of Drain Inlets include straw bales, silt fences, and straw wattles.

4.8 Stabilize Channels and Outlets

Temporary diversions will be located to prevent erosion of slopes, prevent run-on to disturbed areas, and divert runoff away from existing inlets. Temporary conveyance channels shall be design for the two-year, 24-hour storm event. Riprap will be placed at the locations shown on the drawings for minimizing and preventing additional and future erosion. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks,

slopes, and downstream reaches shall be provided at the outlets of all conveyance systems. Other riprap uses may include slope stabilization or channel check dams, etc. Relocation and use of practices will occur as construction progresses.

4.9 Control Pollutants

All pollutants, including waste material and demolition debris, that occur on the site during construction shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread on site. No hazardous or toxic substances, except vehicle fueling and lubricants, will be utilized for the work on this project. Vehicle fueling and maintenance will occur in a staging area as identified on the drawings.

Accidental leaks and spills of chemicals or fluids (including petroleum-based products) from equipment and machinery, wet concrete, concrete leachate or particulates, or demolition debris in the construction area could release potentially toxic substances directly to surface water, or to soil areas within the margins of the active channel. This would potentially violate water quality standards or impact aquatic resources. A site-specific Spill Prevention, Containment, and Countermeasure (SPCC) Plan to be submitted by the Contractor shall address these potential problems and methods for avoiding them on the Project site. The SPCC Plan shall include, at minimum, the following measures to protect water quality:

- Refueling of construction equipment and vehicles in the staging area would only occur within a designated, paved, and bermed area where possible spills can be contained. Fuel storage would be in double contained areas, capable of holding 125 percent of the volume of fuel being stored.

- Truck and cement equipment wash-down would not occur in the ordinary high water area of the channel.

- Equipment and vehicles operated within the ordinary high water would be checked and maintained daily to prevent leaks of fuels, lubricants, or other fluids to the stream.

- Litter and construction debris would be removed from below the ordinary high water line daily and disposed of at an appropriate site. All litter, debris, and unused materials, equipment or supplies would be removed from the construction staging areas above ordinary high water at the end of the construction season.

- At the end of each workday, all construction equipment will be moved to the staging area to protect against accidental spills.

- All vehicles carrying over 150 gallons of fuel will have a fuel spill prevention plan and all materials required to clean up a spill if it were to occur in transit. In some cases, a vehicle following the fuel truck would carry the clean-up equipment.

4.10 Control De-watering

4.11 Maintain BMPs

Temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function.

The contractor shall inspect sediment control BMPs weekly or after runoff producing storm events during the dry season and daily during the wet season. Maintenance activities will be completed within 24 hours of the inspection. An inspection and maintenance report will be prepared following each inspection. Specific maintenance requirement for each BMP will be performed according to the maintenance guidelines in the Washington State Department of Ecology's Stormwater Management Manual, Western Washington, Volume II.

Temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

The contractor shall review daily the location of silt fences and drainage swales where active construction is occurring to ensure that silt fences and swales are properly located and functioning. If any turbid discharges are observed, the Construction Manager will be notified immediately and corrective actions will be prescribed. Where deficiencies exist, additional BMPs shall be installed as directed by the Construction Manager.

4.12 Manage the Project

In general the construction of sedimentation and erosion control features are planned to proceed in the following sequence of activities:

- Install filtration best management practices (BMP)
- Install gravel access (ingress/egress) road
- Construct and install diversion structures
- Excavate area
- Construct facilities
- Finish grade
- Revegetate and landscape
- Remove BMPs when no longer required

The sequence and methods planned will be reviewed periodically and will be adjusted as necessary to minimize and control the area disturbed at any one time.

5. INSPECTIONS AND MONITORING

All BMPs shall be inspected, maintained and repaired as needed to assure continued performance of their intended function. Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate due to the actual discharge of or potential to discharge a significant amount of any pollutant, the SWPPP shall be modified, as appropriate, in a timely manner.

Inspections shall be carried out as follows: routine inspections will be performed at least weekly and within 24 hours after a rain event greater than 0.5 inches in a 24 hours period. All weekly written reports will include active construction activities as well as restored areas until

revegetation is established. All inspections shall be documented using the "Routine inspection Form" located in Attachment D.

Any noncompliance or discharge that may seriously endanger health or the environment will be reported as soon as possible, but no later than 24 hours from the time OCPUD first becomes aware of the circumstance. The report will be made to the appropriate agency in accordance with the SPCC Plan and will be made to the US EPA Emergency Response Branch, and the appropriate State Agency. In addition to verbal notification, a written submission to both the USEPA and the State Agency will be provided within 5 days of the time that OCPUD becomes aware of the circumstances. The submission will contain the following:

- Description of the noncompliance and its cause;
- Period of noncompliance, including exact dates and times;
- Estimated time noncompliance is expected to continue, if it has not been corrected; and
- Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

5.1 Location and Implementation of Construction SWPPP

The SWPPP will be kept on file at the construction site and available for review. The SWPPP will be reviewed and evaluated and any changes shall be approved by the Project Engineer. The SWPPP will be appropriately amended whenever there is a significant change in construction operation.

5.2 Construction Management

Overall project control will be under a Construction Manager (CM) who will have personnel onsite. Included in the CM's responsibility will be monitoring of work completed including implementation of BMPs as specified in the SWPPP. The CM will also have responsibility for Quality Assurance/Quality Control including verification of the effectiveness of the implemented BMPs.

6. RECORDKEEPING

Copies of this SWPPP and all documentation shall be retained within this SWPPP for at least three years from the date of construction. The following records must be retained:

- A copy of this SWPPP;
- All reports and actions required by the Construction General Permit (CGP)(USEPA 2005), including a copy of the construction site notice; and
- All data required to complete the Notice of Intent for coverage under the GCP.

7. TRAINING

Any employee working at the project site has the potential to cause pollution of the stormwater. Therefore, all employees must receive annual training on the SWPPP. The dates and

attendees must be documented at each training class. Copies of the training documentation will be retained by OCPUD.

All personnel involved in the project will attend an environmental training program that will include a discussion on general erosion and sediment control requirements, proper clearing and grading methods, and the importance of protecting sensitive resources on the project. Crews specializing in erosion control tasks will be given additional training on proper installation and maintenance of erosion and sediment control measures.

It shall be the responsibility of OCPUD, its Contractors and their employees to read, understand and comply with the requirements and commitments set forth in this SWPPP.

8. COMPLETION PROCEDURES

8.1 Final Termination

Final stabilization in the *NPDES General Permit for Stormwater Discharges from Construction Activities* (GCP) is defined as:

- "All soil disturbing activities have been completed and a uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70 percent of the native background vegetative cover for the area has been established on all unpaved areas not covered by permanent structures, or equivalent permanent stabilization measures (such as rip-rap, gabions, or geotextiles) have been employed" (USEPA 2005).

- "In some parts of the country, background vegetation will cover less than 50 percent of the ground (i.e., arid areas). Establishing at least 70 percent of the native vegetation cover criteria for final stabilization (e.g., if the native vegetation covers 50 percent of the ground), 70 percent of the 50 percent would require 35 percent total cover for final stabilization." (USEPA 2005).

8.2 Notice of Termination

Following completion of construction activities and final stabilization of disturbed areas, a Notice of Termination (NOT) will be submitted to federal, state, and local authorities. The NOT serves as notification that permit coverage of storm water discharges associated with the construction activities under the general NPDES Permit have been terminated.

8.3 Long-term Stormwater Management

Following completion of construction activities, all disturbed areas will be stabilized either through revegetation or other appropriate measures. After the construction areas are adequately stabilized and a NOT has been filed, no additional stormwater management will be undertaken.

9. LITERATURE CITED

USEPA, 2005. NPDES General Permit for Stormwater Discharges from Construction Activities. Construction General Permit (CGP) 2003. Modified January 21, 2005. http://www.epa.gov/npdes/pubs/cgp2003_entirepermit.pdf

WDOE, 2004. Stormwater Management Manual for Eastern Washington. Washington Department of Ecology Water Quality Program. September 2004. Publication #: 04-10-076

10. STORM WATER POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the systems, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____

Name Date
Title
Company