



Application for a New License **Major Project – Existing Dam**

Log Cabin and Our House Diversion Dams Sediment Management Plan

Security Level: Public

**Yuba River Development Project
FERC Project No. 2246**

April 2014

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GLOSSARY - DEFINITION OF TERMS, ACRONYMS AND ABBREVIATIONS

Term	Definition
Cal Fish and Wildlife	California Department of Fish and Wildlife
cfs	cubic feet per second
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
FERC or Commission	Federal Energy Regulatory Commission
Forest Service	United States Department of Agriculture, Forest Service
ft	foot or feet
in	inch
invert	an arch constructed in an upside-down position to provide lateral support
mi	mile
NFS	National Forest System
Plan	Log Cabin and Our House Diversion Dam Sediment Management Plan
Project	Yuba River Development Project, FERC Project No. 2246
SWRCB	State Water Resources Control Board
TNF	Tahoe National Forest
USACE	United States Army Corps of Engineers
USFWS	United States Department of Interior, Fish and Wildlife Service
valve	slide gate that controls the low level outlets at Log Cabin and Our House Diversion Dams
work	Any activities described in the Plan
YCWA	Yuba County Water Agency
cu yds	cubic yard

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SECTION 1.0

INTRODUCTION

In April 2014, the Yuba County Water Agency (YCWA), pursuant to Section 5.18 of Title 18 of the Code of Federal Regulations (C.F.R.), filed with the Federal Energy Regulatory Commission (FERC or Commission) an Application for a New License for Major Project – Existing Dam – for YCWA’s 361.9 megawatt Yuba River Development Project (Project), FERC Project Number 2246. The initial License for the Project was issued by the Federal Power Commission, FERC’s predecessor, to YCWA on May 16, 1963, effective on May 1, 1963. The Federal Power Commission’s May 6, 1966, Order Amending License changed the License’s effective date to May 1, 1966, for a term ending on April 30, 2016.

YCWA included in its Application for a New License this Log Cabin and Our House Diversion Dams Sediment Management Plan (Plan).

The United States Department of Agriculture, Forest Service’s (Forest Service) Federal Power Act Section 4(e) authority only applies in this Plan to Project facilities on National Forest System (NFS) land. The Forest Service administers the Plumas National Forest in conformance with the Plumas National Forest Land and Resource Management Plan (Forest Service 1988), as amended, and administers the Tahoe National Forest (TNF) in conformance with TNF Land and Resource Management Plan (Forest Service 1990), as amended.

1.1 Background

1.1.1 Yuba River Development Project

The Project is located in Yuba, Sierra and Nevada counties, California, on the main stems of the Yuba River, the North Yuba River and the Middle Yuba River, and on Oregon Creek, a tributary to the Middle Yuba River. Major Project facilities, which range in elevation from 280 feet to 2,049 feet, include: 1) New Bullards Bar Dam and Reservoir; 2) Our House and Log Cabin diversion dams; 3) Lohman Ridge and Camptonville diversion tunnels; 4) New Colgate and Narrows 2 power tunnels and penstocks; 5) New Colgate, New Bullards Minimum Flow and Narrows 2 powerhouses; and 6) appurtenant facilities and features (e.g., administrative buildings, switchyards, roads, trails and gages). The existing Project does not include any aboveground open water conduits (e.g., canals or flumes) or any transmission lines.

In addition, the Project includes 16 developed recreation facilities. These include: 1) Hornswoggle Group Campground; 2) Schoolhouse Campground; 3) Dark Day Campground; 4) Cottage Creek Campground;¹ 5) Garden Point Boat-in Campground; 6) Madrone Cove Boat-in Campground; 7) Frenchy Point Boat-in Campground; 8) Dark Day Picnic Area; 9) Sunset Vista

¹ Cottage Creek Campground was burned in 2010 and has not been rebuilt. YCWA is in discussions with the United States Department of Agriculture, Forest Service (Forest Service) regarding rebuilding the burned campground.

Point; 10) Dam Overlook; 11) Moran Road Day Use Area; 12) Cottage Creek Boat Launch;² 13) Dark Day Boat Launch, including the Overflow Parking Area; 14) Schoolhouse Trail; 15) Bullards Bar Trail; and 16) floating comfort stations.³ All of the recreation facilities are located on NFS land, with the exception of the Dam Overlook, Cottage Creek Boat Launch and small portions of the Bullards Bar Trail, which are located on land owned by YCWA. All of the developed recreation facilities are located within the existing FERC Project Boundary, except for a few short segments of the Bullards Bar Trail to the east of the Dark Day Boat Launch. In addition, the Project includes two undeveloped recreation sites at Our House and Log Cabin diversion dams, both located on NFS land and within the existing FERC Project Boundary.

Figure 1.1-1 shows the Project Vicinity,⁴ proposed Project, and proposed FERC Project Boundary.⁵

² Emerald Cove Marina provides visitor services at Cottage Creek Boat Launch, including houseboat and boat rentals, boat slips and moorings, fuel and a general store. The marina is operated under a lease from YCWA by a private company.

³ The Project recreation facilities included one campground that is no longer part of the Project. Burnt Bridge Campground was closed initially by the Forest Service in 1979 due to low use levels. FERC, in an August 19, 1993 Order, which approved YCWA's Revised Recreation Plan, directed YCWA to remove all improvements and restore the Burnt Bridge Campground to the condition it was in prior to development of the facility. YCWA consulted with the Forest Service and all that remains of Burnt Bridge Campground today is the circulation road and vehicle spurs; all other facilities were removed.

⁴ For the purpose of this Plan, "Project Vicinity" refers to the area surrounding the proposed Project on the order of United States Geological Survey (USGS) 1:24,000 quadrangles.

⁵ The FERC Project Boundary is the area that YCWA uses for normal Project operations and maintenance. The Boundary is shown in Exhibit G of YCWA's Application for New License, and may be changed by FERC with cause from time to time during the term of the new license.

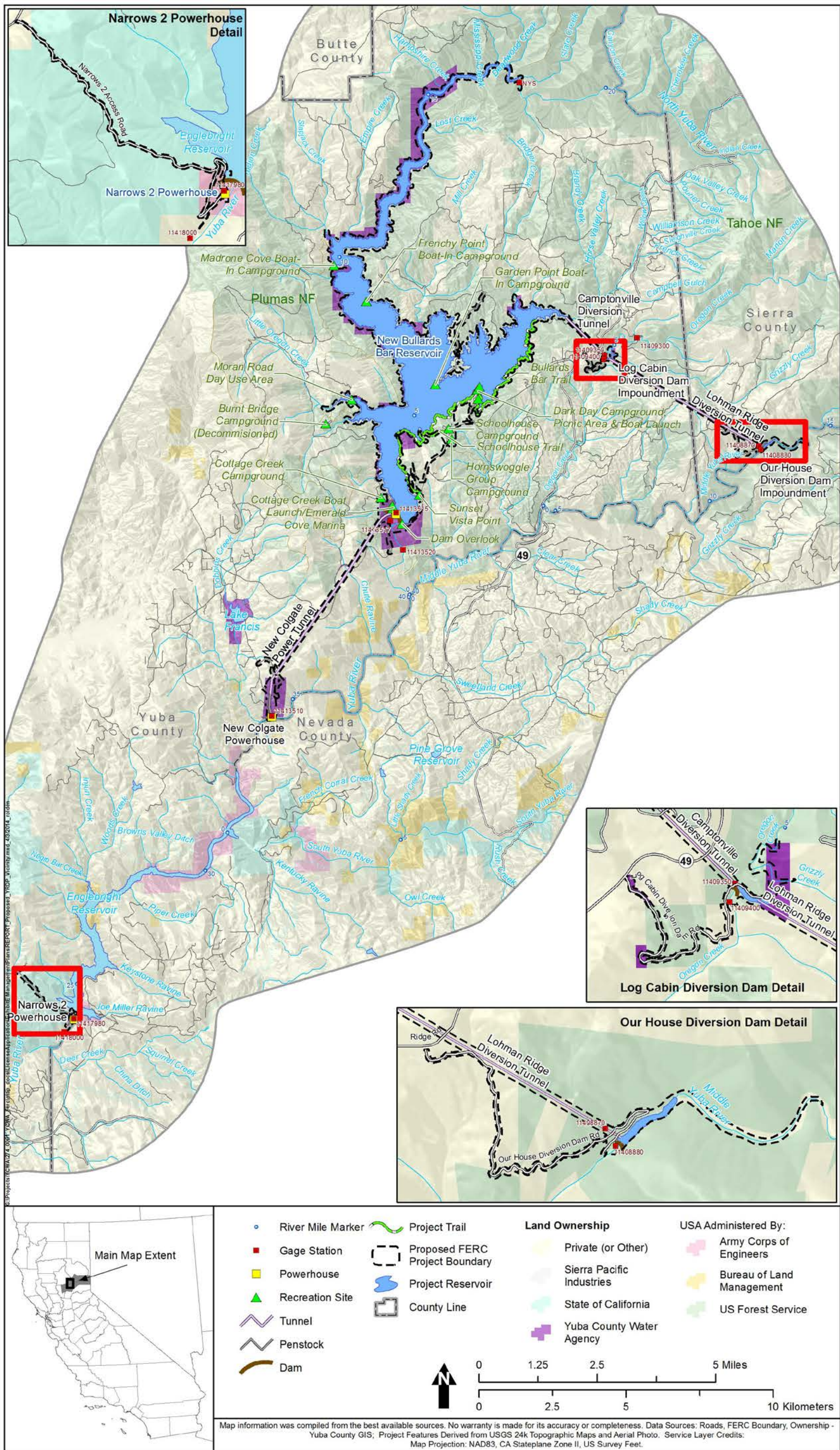


Figure 1.1-1. Yuba County Water Agency's Yuba River Development Project and Project Vicinity.

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1.2 Purpose of the Log Cabin and Our House Diversion Dams Sediment Management Plan

The purpose of this Plan is to prescribe procedures and guidelines for the management of sediment behind Log Cabin Diversion Dam and Our House Diversion Dam. The objectives of the Plan are twofold: 1) to provide for dam safety and proper functioning of Project facilities, especially the fish release and low level outlet valves; and 2) to maintain the health of the aquatic environment downstream of the dams by allowing the passage of sediments that occur behind the dams.

YCWA will coordinate, to the extent appropriate, the efforts required under this Plan with other Project resource efforts, including implementation of other resource management plans and measures included in the new license.

1.3 Goals and Objectives of the Log Cabin and Our House Diversion Dams Sediment Management Plan

The goal of the Plan is to ensure that YCWA's management of sediment in Log Cabin Diversion Dam and Our House Diversion Dam is fully protective of facility safety and operations and environmental resources.

The objective of the Plan is to provide necessary guidelines to meet the Plan goal.

1.4 Contents of the Log Cabin and Our House Diversion Dams Sediment Management Plan

This Plan includes the following:

- Section 1.0. Introduction. This section includes introductory information, including the purpose, objectives and contents of the Plan.
- Section 2.0. Description of Log Cabin and Our House Diversion Dams. This section describes Log Cabin Diversion Dam and Our House Diversion Dam, including access to the dams, and recent sediment management activities at each dam.
- Section 3.0. Sediment Management. This section describes the methods for managing sediment which occurs behind the dams over the course of their operation under the Project license.
- Section 4.0. Monitoring and Permitting. This section describes monitoring not specifically described in Section 3, and YCWA's approach to obtaining and maintaining the permits and approvals necessary to implement the Plan.
- Section 5.0. Plan Revisions. This section describes how Plan revisions will be made.
- Section 6.0. References Cited. This section lists references cited in this Plan.

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SECTION 2.0

DESCRIPTION OF LOG CABIN AND OUR HOUSE DIVERSION DAMS

This section describes the Log Cabin Diversion Dam and the Our House Diversion Dam, access to the dams, and recent sediment removal activities at each dam.

2.1 Log Cabin Diversion Dam

2.1.1 Vehicular Access

Access to Log Cabin Diversion Dam is via a gated, paved road off State Route 49, approximately 0.25 mile (mi) northeast of the intersection with Marysville Road. A gate at the intersection of Highway 49 and the access road is normally closed and locked. No other gates occur along the access road.

2.1.2 Facility Description

Log Cabin Diversion Dam, which is located on NFS land within the TNF, is a 105-ft radius, concrete arch dam located in Yuba County on Oregon Creek 4.3 mi upstream of the confluence with the Middle Yuba River. At maximum pool, the dam can impound about 90 acre-feet (ac-ft) of water. The dam is 42.5 ft high with a crest length of 300 ft, a crest elevation of 1,970 ft, and a drainage area of 29.1 square miles. The dam has a spillway, a fish release outlet valve used for releasing minimum instream flow requirements in the FERC license, and a low level (5-ft diameter) outlet valve.⁶ The uncontrolled spillway, with the spillway crest at elevation of 1,970 ft, is ungated and has a maximum capacity of 12,000 cubic feet per second (cfs). The fish release outlet valve has an invert elevation of 1,941.75 ft at the inlet and an engineer's estimated maximum capacity of 18 cfs,⁷ when the pool is at the invert (1,952 ft) of the Camptonville Diversion Tunnel, which diverts water from Oregon Creek, and water previously diverted from the Middle Yuba River via the Lohman Ridge Tunnel, to New Bullards Bar Reservoir on the North Yuba River. The outlet is controlled by a hand-operated, 18-inch valve on the downstream end of the outlet. The low level outlet has an invert elevation of 1,936.42 ft at the inlet, and an engineer's estimated maximum capacity of 348 cfs,⁸ when the pool surface elevation is at the invert of the Camptonville Diversion Tunnel. The low level outlet is controlled by a slide gate on the upstream face of the dam, which is operated by a two-person mobile gasoline powered engine.

⁶ For the purpose of this Plan, the slide gate that controls the Log Cabin Diversion Dam low level (5-foot diameter) outlet is referred to as a "valve."

⁷ YCWA plans to rate the Log Cabin Diversion Dam fish release valve as soon as reasonably possible, depending on hydrologic conditions and agency approvals.

⁸ YCWA plans to rate the Log Cabin Diversion Dam low level outlet valve as soon as reasonably possible, depending on hydrologic conditions and agency approvals.

Figures 2.1-1 and 2.1-2 show the downstream and upstream faces, respectively, of Log Cabin Diversion Dam.



Figure 2.1-1. View to the east of the downstream face of Log Cabin Diversion Dam. The majority of discharge shown in photograph is through the fish release valve. The low level outlet valve is to the right of the fish release valve.



Figure 2.1-2. View to southwest of the upstream face of Log Cabin Diversion Dam. The intake for the fish release valve is marked by an “A;” the location of the intake valve stem for the low level valve is marked with a “B.”

2.1.3 Typical Operations of the Dam Valves

As described above, the Log Cabin Diversion Dam fish release valve is operated continuously and adjusted manually to provide minimum streamflow downstream of the dam. The low level outlet valve, which would only be opened in case of an emergency, is tested (i.e., rapidly opening and closing the valve) every five years as required by FERC and the California Division of Safety of Dams. The last time the valve was tested was March 2012.

2.1.4 Past Sediment Removal

YCWA has records of sediment removals at Log Cabin Diversion Dam occurring in 1972 (approximately 40,000 cubic yards [cu yds]), 1988 (approximately 32,000 cu yds), and in 1997 (unknown amount). However, at the time this Plan is developed, YCWA has advised FERC and other agencies that sediment has again impounded near the dam and completely blocked the low level outlet valve as shown in Figure 2.1-2, and sediment is beginning to impound in front of the

fish release valve, which could potentially clog that valve. YCWA estimates that returning the impoundment to near original conditions would require removal of approximately 10,000 cu yds of sediment.

2.2 Our House Diversion Dam

2.2.1 Vehicular Access

Access to Our House Diversion Dam is from State Route 49 via Ridge Road (approximately 2 mi south of the intersection of State Route 49 and Marysville Road), east on Ridge Road, approximately 4.5 mi to Our House Diversion Dam Road, and south and east on Our House Diversion Dam Road, approximately 1.5 mi to the dam. Our House Diversion Dam Road is gated at the intersection with the Ridge Road and the access road and at a location on the access road about 500 ft uphill from the dam. The gate at Ridge Road is normally kept open, and the gate near the dam is normally closed and locked.

2.2.2 Facility Description

Our House Diversion Dam, which is located on NFS land within the TNF, is a 130-ft radius, double curvature, concrete arch dam straddling the border between Sierra County and Nevada County on the Middle Yuba River, 12.6 mi upstream of its confluence with the North Yuba River. At maximum pool, the dam can impound about 280 ac-ft of water. The dam is 70 ft high with a crest length of 368 ft and a crest elevation of 2,030 ft, and has a drainage area of 144.8 square miles. The dam has a spillway, a fish release outlet valve used for releasing minimum flow requirements in the existing FERC license, and a low level (5-ft diameter) outlet valve.⁹ The spillway, with a spill crest elevation of 2,030 ft, is ungated and has a maximum capacity of 60,000 cfs. The fish release outlet valve has an invert elevation of 1,999 ft at the inlet, and an engineer's estimated maximum capacity of 59 cfs,¹⁰ when the pool is at the invert (2,015 ft) of the Lohman Ridge Diversion Tunnel, which diverts water from the Middle Yuba River to Oregon Creek. The fish release outlet is controlled by a hand-operated 24-in valve on the downstream end of the outlet. The low level outlet has an invert elevation of 1,989.96 ft at the inlet and an engineer's estimated maximum capacity of 463 cfs,¹¹ when the pool is at the invert of the Lohman Ridge Diversion Tunnel. The low level outlet is controlled by a slide gate on the upstream face of the dam, which is operated by a two-person mobile gasoline powered engine.

Figures 2.2-1 and 2.2-2 show the downstream and upstream faces, respectively, of Our House Diversion Dam.

⁹ For the purpose of this Plan, the slide gate that controls the Our House Diversion Dam low level outlet is referred to as a "valve."

¹⁰ YCWA plans to rate the Our House Diversion Dam fish release valve as soon as reasonably possible, depending on hydrologic conditions and agency approvals.

¹¹ YCWA plans to rate the Our House Diversion Dam low level outlet valve as soon as reasonably possible, depending on hydrologic conditions and agency approvals.



Figure 2.2-1. View to east of downstream face of Our House Diversion Dam. The majority of discharge shown in photograph is through the fish release valve. A minor amount of gate leakage is occurring through the low level outlet valve, which is below the minimum flow release valve.



Figure 2.2-2. View to the south of upstream face of Our House Diversion Dam. The inlets for the low level valve and the fish release valve are located below the operator for the Low Level Valve, as indicated by the arrow above.

2.2.3 Typical Operations of the Dam Valves

As described above, the Our House Diversion Dam fish release valve is operated continuously and adjusted manually to provide minimum streamflow downstream of the dam. The low level outlet valve, which would only be opened in case of an emergency, is tested (i.e., rapidly opening and closing the valve) every 5 years, as required by FERC and the California Division of Safety of Dams. The last time the valve was tested was March 2012.

2.2.4 Past Sediment Removal

YCWA has records of four sediment removal operations at Our House Diversion Dam.

In 1986, following floods in February, YCWA implemented a two-phased dredging activity at Our House Diversion Dam. Phase I dredging began sediment removal on August 1, 1986; an unquantified amount was removed and location of disposal was not specified. Necessary permits

and approvals were obtained for dredging and sediment disposal. On August 20, 1986, between 7,333 and 15,000 cu yds were estimated to have been passed downstream through the low level release valve, along with an additional unknown amount about a month later. YCWA discontinued sluicing in the fall of 1986, though an additional 15,000 cu yds remained to be removed. In 1986, approximately 9,000 cu yds were subsequently removed from the Middle Yuba River channel downstream of Our House Diversion Dam (EBASCO Environmental 1989).

In 1992, 27,595 cu yds of sediment was excavated between August 3 and September 5. Sediments were disposed of at a site at the Sierra Mountain Mills, approximately 8 mi away from the dam (PG&E 1992). Necessary permits and approvals were obtained for dredging and sediment disposal.

In 1997, 67,894 cu yds of sediment was excavated between September 10 and October 30. Prior to removal, sediments were tested for mercury and found to be at natural background levels. Sediments were sent to a spoil disposal site on NFS land approximately 18 mi west of Our House Diversion Dam (PG&E 1997). Necessary permits and approvals were obtained for excavation and sediment disposal.

On December 31, 2005, an intense storm event carried sediments from the upstream reaches of the Middle Yuba River that partially blocked the low level outlet, tunnel intake structure, and fish release outlet. 80,000 cu yds of sediment was excavated between August 10 and September 15, 2006. Sediments were disposed of in an old quarry site on Marysville Road on NFS land, approximately 1 mi south of New Bullards Bar Dam (YCWA 2006). Necessary permits and approvals were obtained for excavation and sediment disposal.

At the time this Plan is developed, YCWA does not believe there is an imminent danger of sediment clogging either the low level outlet valve or fish release valve at Our House Diversion.

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SECTION 3.0

SEDIMENT MANAGEMENT

Sediment management at both Log Cabin and Our House Diversion dams includes four components: 1) maintenance of minimum pools; 2) passage of sediment; 3) planned mechanical removal of sediment, when needed; and 4) emergency removal of sediment. Each of these components is described below. This section also describes for each component some specific environmental protection measures that would be taken; additional environmental protection measures are described in Section 4.

3.1 Maintenance of Minimum Pool at Our House Diversion Dam

Currently, YCWA attempts to maintain a pool throughout the year at Our House Diversion Dam and will continue to do so, but is not able to operate similarly at Log Cabin Diversion Dam. As a result, at Our House Diversion Dam, much of the sediment that enters the impoundment settles at the upstream end of the impoundment, whereas at Log Cabin Diversion Dam, sediment tends to accumulate at the dam, which occasionally affects the proper operations of the low level outlet and fish release valves.

3.2 Passage of Sediment

Opening of low level outlet valves in diversion dams is an effective measure to pass sediment, that otherwise would accumulate behind the dams, to the river downstream of the dam. The original Operation and Maintenance Manuals for Log Cabin and Our House dams recommended that, “*sluicing should be done periodically to prevent the buildup of gravel and silt below the sill of the tunnel intake. This should be done during a period of high flow to insure efficient sluicing.*” However, for maximum effect, the valves must be opened when hydraulic conditions are favorable – that is in winter when conditions are such that the majority of the water would pass through the outlet – not over the dam – to maximize direction of flow and movement of sediment in the impoundment. Importantly, the valve should be opened when a high flow is expected to occur soon after the valve opening, which would continue moving sediment downstream of the dam after the pass-through event. The event is best scheduled for winter so that the high spring flows will continue to mobilize and redistribute moderate size sediment below the dam.

At Log Cabin Diversion Dam, at least once between November 1 and March 15 of each year inclusive, and when the Camptonville Diversion Tunnel intake is fully open, YCWA will open the low level outlet valve to full capacity for at least 96 continuous hours when all three of the following conditions are met: 1) instantaneous flow immediately downstream of the dam, as measured at the United States Geological Survey (USGS) streamflow gage 11409400, is equal to or greater than 540 cfs; 2) the wet period is forecast to extend for at least 48 continuous hours after opening the valve; and 3) YCWA anticipates that instantaneous flow downstream of the

dam will increase to at least 750 cfs during the period the valve is open or shortly after the valve is closed. YCWA may close the valve during the 96-hour period if daily average flow downstream of the dam, as measured at USGS Gage 11409400, drops below 540 cfs during that period. During periods when the valve is open, YCWA will inspect the valve at least once each day during business hours. If flows drop to 540 cfs after business hours, YCWA will close the valve during regular business hours the next day.

At Our House Diversion Dam, at least once between November 1 and March 15 of each year and when the Lohman Ridge Diversion Tunnel intake is fully open, YCWA will open the low level outlet valve to full capacity for at least 96 continuous hours when all three of the following conditions are met: 1) instantaneous flow immediately downstream of the dam, as measured at USGS streamflow Gage 11408880, is equal to or greater than 600 cfs; 2) the wet period is forecast to extend at least 48 continuous hours after opening the valve; and 3) YCWA anticipates that instantaneous flow downstream of the dam will increase to at least 1,500 cfs during the period the valve is open or shortly after the valve is closed. YCWA may close the valve during the 96-hour period if daily average flow downstream of the dam, as measured at Gage 1140880, drops below 600 cfs during that period. During periods when the valve is open, YCWA will inspect the valve at least once each day during business hours. If the flows drop to 600 cfs after business hours, YCWA will close the valve during regular business hours the next day.

YCWA will initiate this procedure at each dam at least once between November 1 and March 15 of each year during favorable conditions (i.e., all of above conditions met).

3.3 Planned Mechanical Removal of Sediment

Even with the benefits of maintaining a pool in Our House impoundment and periodic opening of the low level outlet valves, it is likely that YCWA may need to remove sediment from the Our House Diversion Dam impoundment or the Log Cabin Diversion Dam impoundment, or both. In those cases, mechanical sediment removal may be necessary.

When possible, YCWA may use handwork (i.e., shovels), as opposed to mechanical removal, as a remediation method for sediment buildup in front of the valves at the diversion dams.

Planned sediment removal, when needed, will occur in summer/early fall (i.e., drier months) when inflow into the impoundment is low (i.e., inflow less than or equal to minimum instream flow requirement). If sediment removal is planned, YCWA would draw down the pool in the impoundment (Section 3.1) as low as possible immediately prior to the start of work and divert inflows around the diversion so that sediment can be excavated in the dry. The water will be drained in a way to avoid aseasonal increases to instream flow downstream of the dams, such as allowing it to drain naturally through the valve or pumping it into the diversion tunnels. YCWA does not propose to perform mechanical excavation work below the waterline or suction dredge sediments in the diversion pool.

YCWA estimates that the maximum amount of sediment that would be removed at any one time from Log Cabin Diversion Dam impoundment is 30,000 cu yds and the maximum amount of

sediment that would be removed at any one time from Our House Diversion Dam impoundment is 70,000 yds³. However, YCWA anticipates that any sediment excavation would be much less than this, since the purpose of this Plan is to manage sediment in the impoundments while minimizing mechanical excavation.

If mechanical excavation is needed, it would occur in nine steps: 1) notification of appropriate agencies about planned sediment removal; 2) sediment testing for metals; 3) mobilization; 4) diversion/control of water; 5) removal of sediment; 6) stockpiling of sediment; 7) stabilization of the stockpile; 8) demobilization; and 9) issuance of a report. Each step is described below regardless of the impoundment in which the work would occur.

All work will occur in accordance with applicable local, state, and federal regulations.

Best management practices, detailed in Section 4.2, will be followed during all activities associated with mechanical removal of sediment.

3.3.1 Notification of Agencies for Planned Sediment Removal

YCWA routinely inspects the Log Cabin Diversion Dam and Our House Diversion Dam impoundments. Though no quantification of sedimentation is done, YCWA routinely makes and notes qualitative assessments of the sediment deposit extent and levels and, in particular, any potential blockage or clogging of the fish release valve and low level outlet valve.

If YCWA determines that sedimentation in either impoundment warrants implementing mechanical removal, no later than 30 days prior to when the removal is scheduled to take place, YCWA will provide a written notification (i.e., may be via e-mail) to FERC, United States Army Corps of Engineers (USACE), United States Department of Interior, Fish and Wildlife Service (USFWS), Forest Service, State Water Resources Control Board (SWRCB), Central Valley Water Quality Control Board (CVRWQCB) and California Department of Fish and Wildlife (Cal Fish and Wildlife) that YCWA intends to mechanically remove sediment from the impoundment. To the extent possible, the notification will provide: 1) a schedule to permitting agencies that includes an estimated start and end date for major activities including mobilization, clearing activities, in-channel work, fish rescue/survey, demobilization and monitoring; 2) if a water diversion and/or pumping of water will be necessary; and 3) if the work will require removal of or disturbance to any riparian vegetation. YCWA will also include reasons why mechanical removal is warranted, information on the method selected for providing flows below the construction site, estimates on how much excavated material will be removed; if any deviations from this Plan are anticipated; and results from the hazardous metal tests described in Section 3.3.2, if the results have not already been provided to the permitting agencies.

3.3.2 Sediment Testing for Metals

Prior to removing any sediment from an impoundment, YCWA will collect three to five bulk samples of the sediment to be removed from the impoundment and transport the samples to a state-certified laboratory for determination of metals¹² content. Sediments will be characterized as hazardous¹³ or non-hazardous, based on the results of the sampling. Sampling and handling procedures shall be in accordance with the United States Environmental Protection Agency's (USEPA) *Test Methods for Evaluating Solid Waste - Physical/Chemical Methods* (SW-846) (USEPA 2007). Sediment samples will be transferred to laboratory-quality sample containers and preserved by in accordance with SW-846. Each sediment sample will be recorded and transported using an approved chain-of-custody form. The results of the testing will be forwarded to FERC, USACE, USFWS, Forest Service, SWRCB, CVRWQCB and Cal Fish and Wildlife no later than 30 days prior to when the removal is scheduled to take place. If the test results show that the sediment to be removed contain hazardous metals, additional confirmatory samples may be taken and an alternate plan for sediment stockpiling or disposal will be developed in accordance with the test results and appropriate regulations. No sediment will be removed from the impoundment until the alternate plan is in place and all necessary permits and approvals have been obtained.

3.3.3 Mobilization

Once sediment testing and agency notifications and permitting, as described in Section 4.3, have been completed, mobilization will include delivery of equipment to the site, establishing laydown areas, and creating stable pads for equipment, as needed (e.g., if YCWA plans to use a mobile crane with a clam shell on the bank). Mobilization will also include the following, which YCWA anticipates will be developed by the contractor YCWA selects to perform the sediment removal:

- Work schedule describing start and completion dates of tasks required to complete the work.
- Job site security plan describing measures that will be taken to provide adequate job site security that protects the contractor's, the Forest Service's, and YCWA's property from damage and/or theft during working and non-working hours.
- Medical emergency response plan describing procedures to be followed in the event of a medical emergency and location of nearest medical facility.
- Fire prevention and protection plan describing measures that will be taken to reduce the potential for fire and the procedures to be followed in the event of fire.

¹² CCR Title 22 Section 66261.24 specifies the 17 metals that can qualify as hazardous waste.

¹³ Sediment will be characterized as Resource Conservation and Recovery Act hazardous waste, per 40 C.F.R. Parts 260 – 265, a Toxic Substances Control Act Polychlorinated Biphenyl hazardous waste, per 40 C.F.R. Part 761, or a non-Resource Conservation and Recovery Act, California hazardous waste Section 25117 of the California Health and Safety Code, pursuant to Section 25141 of the California Health and Safety Code.

- Hazardous materials management plan describing measures that will be taken to reduce the potential and control spills of hazardous materials.

3.3.4 Diversion/Control of Water

Diversion and control of water may consist of one or two methods. One approach would be to channel natural inflow into the impoundment around the planned work area and through the dam via the fish release valve or low level outlet valve, or both. The diversion would consist of installation of temporary piping to deliver the required flow of water continuously to the valve. Flow would be intercepted upstream of the planned excavation and diverted into a pipe. The pipe would be routed away from the planned excavation. The pipe would be installed in a buried trench and/or protected by steel plates to allow for movement of equipment in the impoundment without damage to the pipe.

The second approach would be pumping water around the work area. In this approach, a small temporary catchment would be constructed upstream of the work area and pumps would actively pass the water through one or more pipes routed around the outside of the work area and discharge into the stream below the dam.

3.3.5 Removal of Sediment

The amount of material to be excavated from the impoundment will vary from event to event, but the maximum amount of sediment that YCWA estimates will be removed is 30,000 cu yds from Log Cabin Diversion Dam and 70,000 cu yds from Our House Diversion Dam.

The excavation will be accomplished with track-mounted excavators located within the impoundment, or with larger mobile cranes working from the access roads above the impoundments. Stable pads will be constructed for equipment working in the impoundment. Excavated sediment will be loaded into large-capacity off-road trucks which will deliver the material to laydown areas outside the impoundments. The material, which will be clean and non-hazardous, will be temporarily (i.e., no more than 48 hours) stockpiled at the laydown area for eventual loading onto street legal trucks for hauling to the final stockpile area. After the last day of sediment removal, YCWA will clean-up the laydown area, including removing the last of the sediment, within 72 business hours. Appropriate best management practices from Forest Service's *Soil and Water Conservation Handbook* (Forest Service 2011) will be instituted to prevent erosion. During the work, the excavators and trucks will be removed from the impoundment at the end of each shift.

The laydown area for Log Cabin Diversion Dam is located adjacent to the paved dam access road, approximately 0.2 mi from the dam, and consists of a semi-cleared area (i.e., no trees, but covered with non-native low brush and grasses). The area consists of land owned by Sierra Pacific Industries and NFS land and is within the FERC Project Boundary. The laydown area is upland, away from any water.

The laydown area for Our House Diversion Dam is located just north of the impoundment on YCWA-owned land. The laydown area is upland, away from any water.

3.3.6 Disposal of Sediment

Removed sediment will be managed and disposed of in accordance with applicable local, state, and federal regulations.

The excavated sediment will be moved from the transfer areas in the street legal trucks to a sediment disposal area on YCWA-owned land (Site 1) or private land (Site 2) property.¹⁴ YCWA is currently in discussions with the land owner for use of Site 2. Site 2 is included in the Plan at this time assuming YCWA will obtain permission. If permission is not obtained, YCWA will use Site 1 exclusively.

Disposal Site 1 is located within the FERC Project Boundary behind a locked gate. It is approximately 9 miles from Log Cabin Diversion Dam, and 15 miles from Our House Diversion Dam. YCWA estimates that Site 1 could hold up to 90,000 cu yds. There are three sub-areas at Disposal Site 1 - A, B and C - which are pictured in Figures 3.3-1, 3.3-2 and 3.3-3. Portions of Site 1 are vegetated, though the majority of the vegetation is non-native. Access to Disposal Site 1C would require the reopening of an old road.

¹⁴ Large quantities of dredged material may require the use of other areas for stockpiling. At this time, YCWA anticipates using the sites described above for sediment disposal, but may use other options in the future.



Figure 3.3-1. Disposal Site 1A.



Figure 3.3-2. Disposal Site 1B.



Figure 3.3-3. Disposal Site 1C.

Disposal Site 2 is on privately owned property, approximately 4.7 miles from Log Cabin Diversion Dam and 6 miles from Our House Diversion Dam, and is not within the FERC Project Boundary. A wide gravel road provides easy access into and out of the site. Within the property, a minimal dirt road would most likely need to be watered down during Project activities.

YCWA estimates that approximately 25,000 to 30,000 cu yds of material can be disposed of at Site 2 and with little effort, the capacity could be increased significantly.

Figures 3.3-4 and 3.3-5 show Disposal Site 2.



Figure 3.3-4. Disposal Site 2 looking toward edge of property.



Figure 3.3-5. Disposal Site 2 looking toward center of site.

Figure 3.3-6 shows the location of Log Cabin Diversion Dam, and the routes that will be used to haul the sediment to Disposal Site 1 or Disposal Site 2. From the Log Cabin Diversion Dam, the haul route to the Site 1 sediment disposal location area will consist of the following: 1) an existing unimproved ramp from the impoundment up to the northern edge; 2) a gravel road along the northern edge of the impoundment to the right dam abutment; 3) a paved road, consisting of the lower portion of the dam access road to, the laydown area; 4) the upper portion of the dam access road to State Route 49; 5) south on State Route 49 to Marysville Road; 6) west on Marysville Road to a point east of New Bullard Bar Dam; and 7) south on an unpaved road to the stockpile area on YCWA property. From the Log Cabin Diversion Dam, the haul route to the Site 2 sediment disposal location area will consist of the following: 1) an existing unimproved ramp from the impoundment up to the northern edge; 2) a gravel road along the northern edge of the impoundment to the right dam abutment; 3) a paved road, consisting of the dam access road, from the dam to State Route 49; 4) south on State Route 49 to Ridge Road; 5) Ridge Road to north on Celestial Valley Road; and 6) north to the end of Celestial Valley Road. For any road use on NFS land, including “existing unimproved ramp from impoundment up to the northern edge,” Forest Service’s *Road Management* best management practices will be followed (Attachment B).

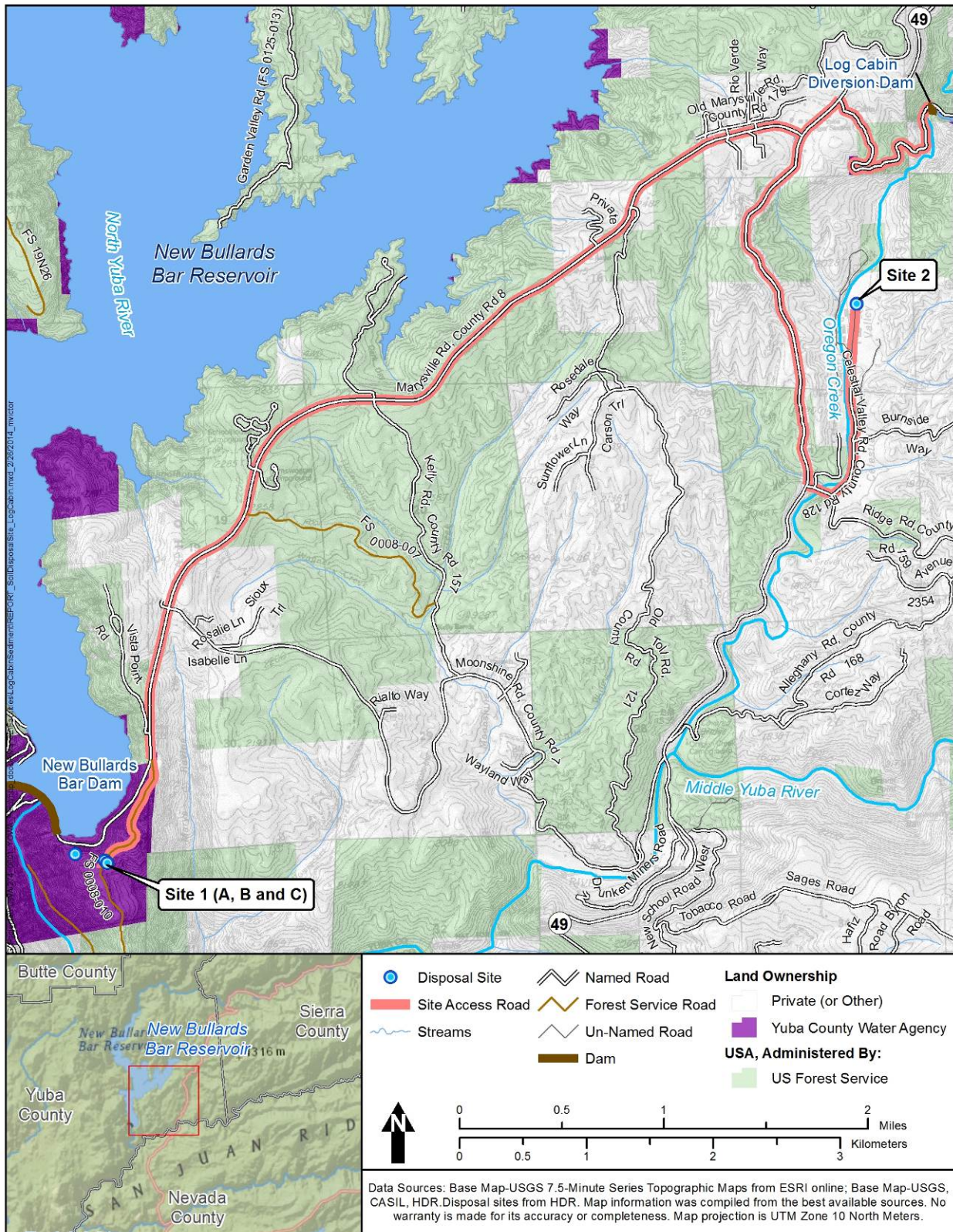


Figure 3.3-6. Location of Log Cabin Diversion Dam and haul route to Site 1 and Site 2.

Figure 3.3-7 shows the location of Our House Diversion Dam, the route that will be used to haul the sediment to Site 1, and the area where the sediment will be deposited. From the Our House Diversion Dam, the haul route to the Site 1 sediment disposal location area will consist of the following: 1) an existing unimproved, gravel ramp from the impoundment to the laydown area; 2) paved roads, consisting of Our House Dam access road, from the laydown area north of the impoundment to Ridge Road; 3) Ridge Road to State Route 49; 4) North on State Route 49 to west on Marysville Road to a point east of New Bullards Bar Dam; and 5) south on an unpaved road to the stockpile area on YCWA property. From the Our House Diversion Dam, the haul route to the Site 2 sediment disposal location area will consist of the following: 1) an existing unimproved, gravel ramp from the impoundment; 2) paved roads, consisting of Our House Dam access road, from the dam to Ridge Road; 3) Ridge Road to Celestial Valley Road; and 4) north to the end of Celestial Valley Road. For any road use on NFS land, including “existing unimproved ramp from impoundment up to the northern edge,” Forest Service’s *Road Management* best management practices will be followed (Attachment B).

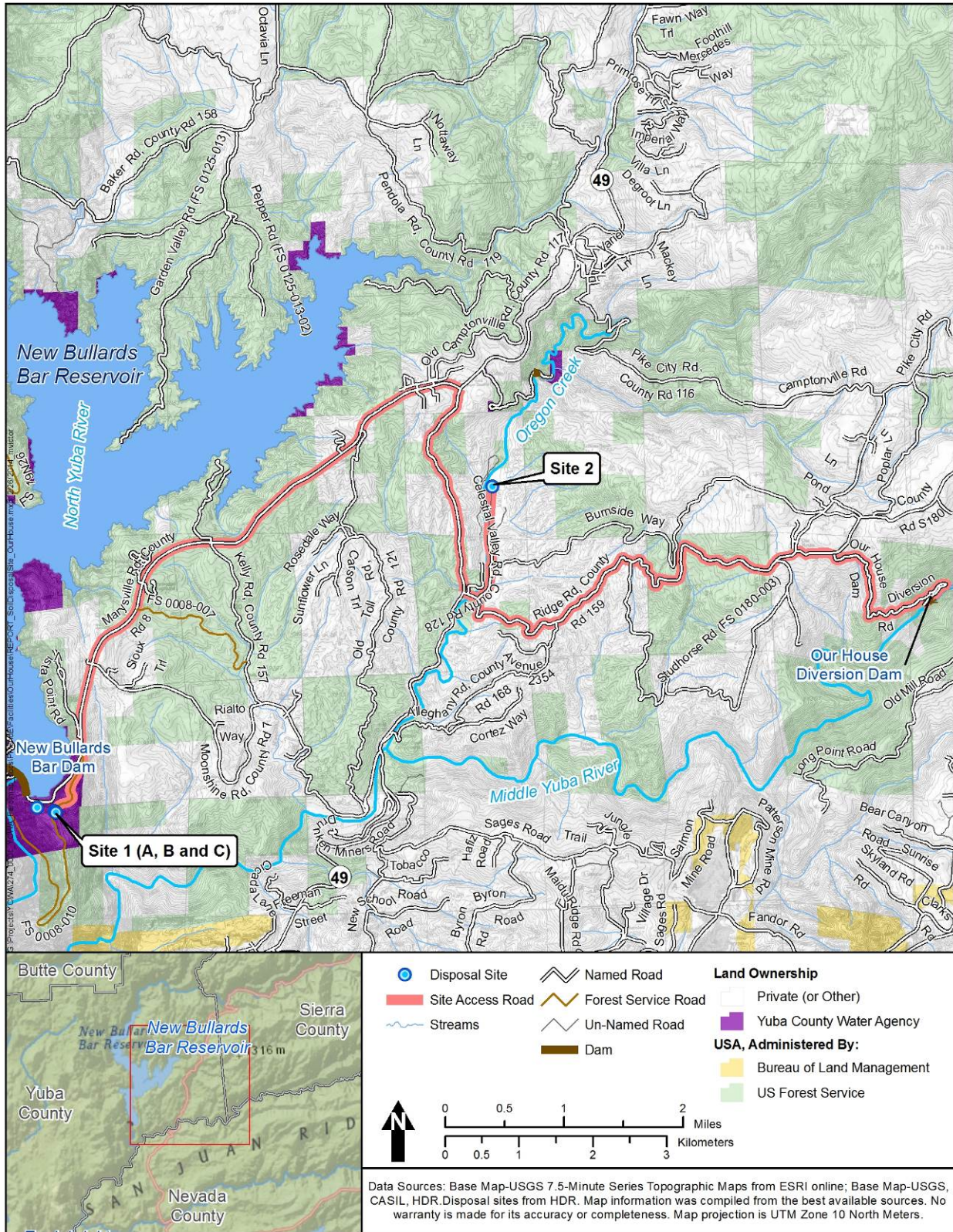


Figure 3.3-7. Location of Our House Diversion Dam and haul route to Site 1 and Site 2.

The number of round trips between the impoundment and the sediment disposal area will depend on the amount of material to be excavated. During hauling, YCWA will provide traffic control on the haul route at intersections where the haul trucks enter and leave public roads. Traffic control personnel will also be responsible for keeping the general public from getting past the diversion access road gates during work hours.

Signs will be posted during the work at the top of the access road to the impoundment warning the general public about the work underway and the associated dangers, and that they may access the site only by means other than a vehicle using caution.

3.3.7 Stockpile Stabilization

Both the Site 1 and Site 2 sediment disposal areas are generally flat with either minimal or non-native vegetation. Access to the disposal areas is on dirt roads with adequate space for turn-around by large trucks.

The excavated material will be placed as engineered fill in accordance with generally accepted geotechnical engineering practices; it will be dumped and spread out in loose lifts not exceeding 12 inches in depth and compacted to a minimum relative compaction of 90 percent based on American Society for Testing Materials D1557. The need for ground surface preparation prior to material placement, such as stripping and grubbing of existing vegetation, excavation of benches into sloping ground, and subsurface and surface drainage, will be determined after the material volume is known and the specific sediment disposal area is selected for stockpiling. The final stockpile dimensions will also be dependent on the volume of material excavated. The stockpile slope inclinations will not exceed 2 to 1 (horizontal to vertical).

YCWA will retain the services of a materials testing laboratory to perform field density testing of compacted fill to confirm that the minimum relative compaction was achieved.

Silt fencing will be installed at the perimeter of the stockpile area to mitigate the potential for migration of sediment. At the completion of the stockpiling, the surface of the stockpile will be compacted and hydro seeded for long term erosion control.

3.3.8 Demobilization

Once removal of sediment is complete, the work will demobilize by removing all equipment from the site (including the laydown areas); restoring minimum flow by gravity¹⁵ through the impoundment to the fish release valve; removing sediment control measures within the impoundment; and removing all water control (diversion) measures. The site will essentially be returned to its original state (except for the impoundment) at the end of excavation.

¹⁵ YCWA will make a good faith effort not to disrupt flow, but short periods of interruption may occur when the diversion of inflows is established and removed.

YCWA will invite FERC, USACE, USFWS, Forest Service, SWRCB, CVRWQCB and Cal Fish and Wildlife to inspect the work area when the work is complete.

3.3.9 Final Report

Within 60 days of completing the sediment removal, YCWA will provide to FERC, USACE, USFWS, Forest Service, SWRCB, CVRWQCB, and Cal Fish and Wildlife a report that summarizes the work, including the amount of material excavated, the results of field density tests, and a description of measures implemented to avoid and minimize impacts to fish, wildlife, plants, habitat, and water quality.

3.4 Emergency Mechanical Removal of Sediment

In the event of the need for emergency activities,¹⁶ YCWA will apply for and follow the terms of the appropriate permits and approvals from the responsible agencies. These may include the USACE Regional General Permit Number 60, which includes a Clean Water Act (CWA) Section 401 certification as part of its parameters (USACE 2009), or other appropriate permitting.

Pursuant to California Fish and Game Code Section 1610(a)(1) and (2), notification of lake or streambed alteration to Cal Fish and Wildlife is not necessary prior to performing: 1) immediate emergency work necessary to protect life or property; and 2) immediate emergency repairs to public service facilities necessary to maintain service as a result of a disaster in an area in which a state of emergency has been proclaimed by the Governor. Although notification is not required before beginning emergency work, notification of the emergency work must be submitted within 14 days after beginning the work (Fish and Game Code §1610(b)).

The Forest Service will be notified in writing of the emergency activities.

Where possible, the nature of the emergency activities, with the exception of permitting, will follow those described in this Plan, under Mechanical Removal of Sediment.

¹⁶ Defined by the USACE (2009) and Cal Fish and Wildlife (CDFW n.d.) as “clear, sudden, unexpected, and imminent threat to life or property demanding immediate action to prevent or mitigate loss of, or damage to, life, health, property or essential public services.” This definition may be subject to change by Cal Fish and Wildlife.

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SECTION 4.0

MONITORING AND PERMITS

This section describes channel morphology monitoring YCWA will perform and the best management practices YCWA will follow when implementing this Plan.

4.1 Channel Morphology Monitoring

Opening of a low level outlet valve in a diversion dam to pass sediment, as described in Section 3.2, could result in fine material being deposited directly downstream, although this is very unlikely because the opening would be followed immediately by high flows, which would mobilize the fine sediment. To assure this unwanted consequence does not occur, in years that the upstream low level outlet is opened for the purposes of this Plan, YCWA will perform channel morphology monitoring at a site downstream of the dam. Refer to YCWA's Upper Yuba River Aquatic Monitoring Plan, which was filed with YCWA's Application for New License, for a detailed description of the methods, locations, frequency and reporting for the channel morphology monitoring.

- Where possible, work will be timed to occur so as not to coincide with sensitive ecological times (e.g. breeding, nesting, migration or blooming) of known special-status species within or near the proposed work area.
- Prior to any work occurring, any known sensitive resources (these include, but are not limited to: cultural resources, special status species, Target non-native invasive plants and other pre-determined areas with significant sensitive resources) within or near the proposed work area will be flagged to ensure that no activities are conducted in those areas.
- Prior to and during diversion of flow and dewatering of the stream channel and work area, a qualified aquatic biologist shall remove all fish, frogs, turtles and other aquatic vertebrate species, fine mesh, soft material nets (e.g., catch-and-release nets), or another method approved by the Forest Service, USFWS and Cal Fish and Wildlife, and relocated within to an area upstream of the sediment removal activities where they will not reenter the work area. Additionally, the biologist shall monitor dewatered areas for stranded aquatic species and relocate them upstream of the work site. Handling of aquatic species shall be minimized to the greatest extent feasible.
- A qualified biologist will visit the site daily for the duration of activities that involve grading, excavation, vegetation removal, or other ground disturbing activities to ensure impacts to fish and wildlife resources are minimized. The biologist shall be familiar with fish, plant, wildlife and habitats found within and adjacent to the work site.
- If work activities require the removal of vegetation, a qualified biologist shall survey all potential nesting vegetation within the proposed removal area in the impoundment area for nesting birds no more than 5 days prior to commencing vegetation removal activities. If nesting birds are found, vegetation shall not be removed until the nest is inactive.

- Provide exclusion devices (nets, screens, etc.) on any pumps, or pipes within the reservoir and around the work area as appropriate to exclude aquatic species.
- No heavy equipment shall operate, or any excavation take place, in the portion of the stream where flowing water is present.
- Flow will be diverted in a manner that minimizes turbidity, siltation, and pollution and provides flows to downstream reaches. Normal flows shall be restored to the affected stream immediately upon completion of work at that location.
- Beginning during mobilization and through demobilization, when work is being performed in the impoundment, turbidity will be monitored thrice daily: before work starts, at noon, and at the end of the day. Turbidity will be monitored at a point upstream of work disturbance and at a point immediately downstream of the dam. The following applies: if natural turbidity is less than one Nephelometric Turbidity Unit (NTU), controllable factors shall not cause downstream turbidity of more than 2 NTU, if natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent, if natural turbidity is between 50 and 100 NTUs, increases shall not exceed an additional 10 NTUs, and if natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent (SWRCB 2011) If the difference in measured turbidity exceeds any of these limits, work will cease, and FERC, USACE, USFWS, Forest Service, SWRCB, CVRWQCB and Cal Fish and Wildlife will be contacted. Work will not resume until FERC approval is obtained.
- Beginning during mobilization and through demobilization, when work is being performed in the impoundment, dissolved oxygen (DO) will be also monitored thrice daily: before work starts, at noon, and at the end of the day. DO will be monitored at a point upstream of work disturbance and at a point immediately downstream of the dam to ensure that Project activities do not cause DO to fall below 7.0 mg/L (SWRCB 2011). If the DO falls below 7.0 mg/L downstream of Project activities, work will cease, and FERC, USACE, USFWS, Forest Service, SWRCB, CVRWQCB and Cal Fish and Wildlife will be contacted. Work will not resume until FERC approval is obtained.
- Excavation activities shall be timed with awareness of precipitation forecasts and likely increases in stream flow. Excavation activities shall cease and all reasonable erosion control measures, inside and outside of the floodplain, will be implemented prior to all storm events. No work shall occur during wet weather. Wet weather is defined as the accumulation of 0.25 in of rain in a 24-hour period. Revegetation, restoration and erosion control work is not confined to this time period.
- Work activities will be conducted in a manner that prevents the introduction, transfer, and spread of aquatic, riparian, and terrestrial invasive species, including plants, animals, and microbes (e.g., algae, fungi, parasites, mussels and bacteria), from one work site and/or waterbody to another. Prior to entering the impoundment, YCWA will inspect the equipment to be used in the impoundment for invasive species and, if any signs of invasive species are found, the equipment shall be cleaned to remove those species. All visible soil/mud, plant materials, and animal remnants on equipment will be removed prior to entering and exiting the work site and/or between each use in different waterbodies. YCWA will notify Cal Fish and

Wildlife immediately if an invasive species not previously known to occur within the work site is discovered during work activities by submitting a completed Suspect Invasive Species Report (Attachment A).

- All disturbed soils within the work site will be stabilized to reduce erosion potential, both during and upon completion of work activities. Planting and/or seeding with native species, sterile seed mix, and mulching are potential methods for stabilization. Where suitable vegetation cannot reasonably be expected to become established, non-erodible materials, such as coconut fiber matting, shall be used for such stabilization.
- Erosion control measures will be utilized throughout all phases of the work, including sediment removal and placement on adjacent lands. Precautions to minimize turbidity/siltation may require the placement of silt fencing, coir logs, coir rolls, straw bale dikes, or other siltation barriers so that silt and/or other deleterious materials are not allowed to pass to downstream reaches. Water trucks will be used to wet the unpaved roads to prevent excess dust. All vegetative erosion control measures utilized within the work site shall be free of non-native plant materials.
- No debris, soil, silt, sand, rubbish, construction waste, cement or concrete or washings thereof, asphalt, paint, oil or other petroleum products or any other substances which could be hazardous to aquatic life, or other organic or earthen material from any logging, construction, or other associated work related activity shall be allowed to contaminate the soil and/or enter into or be placed where it may be washed by rainfall or runoff into waters. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 ft of the high water mark.
- Leaks and spills into water bodies will be prevented by ensuring that all vehicles and equipment are in good working order (no leaks); placing drip pans or absorbent materials under vehicles and equipment when not in use; ensuring that all construction areas have proper spill clean up materials (e.g., absorbent pads, sealed containers and booms) to contain the movement of any spilled substances; preventing any other substances which could be hazardous to aquatic life from contaminating the soil and/or entering the waters of the state; and if maintenance or refueling of vehicles or equipment must occur on-site, using a designated area and/or a secondary containment, located away from drainage courses, to prevent the runoff of storm water and the runoff of spills.
- During the entire work period, standard fire equipment will be kept readily available and an emergency contact will be established between the contractor and the TNF to prevent the start and spread of fires.
- Adhere to all Limited Operating Periods in areas with sensitive wildlife species.

4.3 Permits and Approvals

Implementation of this Plan will require YCWA to obtain the following permits and approvals:

- USACE CWA Section 404 Individual Permit with term of 5-10 years

- CVRWQB CWA Section 401 Permit and Waste Discharge Requirement¹⁷
- Cal Fish and Wildlife Fish and Game Code section 1605 Lake or Streambed Alteration Agreement –Long-term Routine Maintenance
- SWRCB Storm Water Pollution Prevention Plan
- USFWS Endangered Species Act Section 7 consultation
- State Historic Preservation Officer National Historic Properties Act Section 106 consultation
- Tahoe National Forest, Forest Supervisor Approval (after District Ranger review). A Forest Service Special Use Permit may also be needed if any work is to be conducted outside of the FERC Project Boundary.
- YCWA, California Environmental Quality Act compliance
- County permits – grading, etc.

To effectively implement this Plan, YCWA intends to obtain the above permits and approvals, and maintain the permits and approvals through the term of the new license.

¹⁷ YCWA may apply under Order No. R5-2009-0085 for a long-term permit for Waste Discharge.

SECTION 5.0

PLAN REVISIONS

YCWA, in consultation with USACE, USFWS, Forest Service, SWRCB, CVRWQCB and Cal Fish and Wildlife will review, update, and/or revise the Plan, as needed, when significant changes in existing conditions occur, or if monitoring results demonstrate that additional monitoring can be reduced in scope or frequency, as the effectiveness of the operations and effects to resources are within acceptable parameters. Any updates to the Plan will be prepared in coordination and consultation with the above agencies. Sixty days will be allowed for the above agencies to provide written comments and recommendations before YCWA files the revised plan with FERC, including relevant documentation of coordination and consultation with the above agencies, for FERC's approval. If YCWA does not adopt a particular recommendation by the above agencies, the filing will include the reasons for not doing so. YCWA will implement the Plan as approved by the Commission.¹⁸

If the Plan is revised, YCWA understands that it may need to obtain or modify existing permits and approvals to implement the Plan as revised.

¹⁸ The Plan will not be considered revised until FERC issues its formal approval.

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SECTION 6.0

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**Log Cabin and Our House Diversion Dams
Sediment Management Plan**

Attachment A

Suspect Invasive Species Siting Report

**Yuba River Development Project
FERC Project No. 2246**

April 2014

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Suspect Invasive Species Sighting Report

You may not be able to provide all of the information requested below, but please fill in as much as you can.

General type of organism (plant, shellfish, snake, etc) and its name if known

Date of Sighting

Description of organism (size, color, shape and other distinguishing characteristics)

The county in California where the sighting took place

Directions to the location of the sighting

If any photographs were taken, please include them when you submit this form.

Landowner or Land Manager (if known)

First and Last name of person who sighted the suspect invasive species

Best phone number to reach this person (include area code): _____

Best time to reach this person:

Day: 8am-noon

Noon-5pm

Eve: 5pm – 9pm

E-Mail address: _____

Mailing Address: _____

When completed, please mail this form and any pictures and/or samples to:

**Invasive Species Program
Habitat Conservation Branch
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814**

**Log Cabin and Our House Diversion Dams
Sediment Management Plan**

Attachment B

Forest Service's Road Best Management Practices

**Yuba River Development Project
FERC Project No. 2246**

April 2014

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12. 2 - Road Management Activities

The purpose of this set of BMPs is to control nonpoint source pollution that may occur as a result of road (and motorized trail) management activities on NFS lands in the Pacific Southwest Region. Activities associated with road (and motorized trail) management include travel route planning, design, construction, operation, maintenance, reconstruction, storage, and decommissioning.

Considering the proportion of the landscape that they occupy, roads are a prevalent cause of hydrologic and geomorphic process alteration on NFS lands. Highly compacted road surfaces generate infiltration-excess overland flow, even during small precipitation events. In addition, cut slopes can intercept transient hillslope groundwater (that is, subsurface stormflow) when the height of the cut slope exceeds the depth to the water table. This runoff is laterally redistributed and often concentrated along inside ditches or the running surface, where it is discharged to hillslopes below the road or trail prism or routed directly into streams. These hydrologic process and pathway alterations largely drive the water-quality impacts associated with roads.

When roads and associated drainage-control features contribute flow directly to a natural waterbody, they become part of the drainage network and are said to be hydrologically connected. These drainage systems may further increase hydrologic connectivity if they deteriorate because of use, weather, or inadequate maintenance. Drainage facilities may be inadequate after wildfires or extreme precipitation events, due to increased surface runoff, loss of vegetative cover, and stream bulking, and can increase the length of road hydrologically connected to the stream network. Furthermore, many slope disturbances are spatially linked to the road network, and roads are often the pathway for transporting pollutants from these other types of disturbances (for example, dispersed recreation). Hydrologically disconnecting roads is a fundamental practice for eliminating chronic water-quality impacts from roads and other disturbances.

Location and design strongly influence the risk and degree of road and trail impacts on water, aquatic and riparian resources, as can maintenance practices. Roads located adjacent to unstable slopes, streams, lakes, wetlands, springs, and other waters are particularly susceptible to causing adverse impacts. Proper road and trail design, construction, maintenance, and operation can reduce impacts to natural hydrogeomorphic functions and water resources.

Stream crossings are the most frequent location of adverse road and trail impacts to water, aquatic, and riparian resources. Road surfaces typically drain toward crossings, so the likelihood of connectivity of road surface with channels is greatest. Crossings comprised of fine-grained native materials may erode and deliver sediment to channels. Culverts may be inadequately sized to properly pass flow, bedload and debris and, due to size and/or gradient, may present barriers to fish and aquatic organism movement. Crossings also present the risk of catastrophic failure if flood flows exceed crossing capacity. In such cases the crossing fill may be lost. In the worst case scenario, crossing failure results in diversion of flows from the channel onto the adjacent roadway. For these reasons, management activities conducted at crossings are vitally important to water, aquatic, and riparian resources, and are emphasized in the BMPs that follow.

The following BMPs are to be applied as needed to prevent adverse impacts of road management activities on water, aquatic, and riparian resources to the extent possible. BMPs range from suggested practices to prohibitions, as required by Forest Service directives.

Section 404 permits, so named because they were created under section 404 of the Clean Water Act, are required for discharges of dredged or fill materials to waters of the United States, including wetlands. They are administered by the U.S. Army Corps of Engineers. Section 401 Water Quality Certifications are completed for section 404 permits and any other permit issued by a Federal agency for a project with potential to affect water quality. In California, Regional Water Boards administer section 401 Water Quality Certifications. Each section 404 permit needs a section 401 Water Quality Certification UNLESS the section 404 permit is obtained under a nationwide permit that has a “blanket” Water Quality Certification.

National Pollutant Discharge Elimination System (NPDES) permits may also be required. Forest Service engineers and hydrologists shall work together during the permitting process.

12.21 - Road Management BMPs-

- 2.3 Road Construction and Reconstruction
- 2.4 Road Maintenance and Operations
- 2.5 Water Source Development and Utilization
- 2.6 Road Storage
- 2.7 Road Decommissioning
- 2.10 Parking and Staging Areas
- 2.11 Equipment Refueling and Servicing
- 2.12 Aggregate Borrow Areas
- 2.13 Erosion Control Plans (roads and other activities)

12.21 Exhibit 03
BMP 2.3 - Road Construction and Reconstruction

Objective: Minimize erosion and sediment delivery from roads during road construction or reconstruction, and their related activities.

Explanation: During road construction and reconstruction activities, vegetation and ground cover are removed, often exposing both the surface and subsurface soil to erosion. Temporary and long-term erosion-control measures are necessary to reduce erosion and maintain overall slope stability. These erosion-control measures may include vegetative and structural techniques to ensure the area's long-term stability. The risk from road construction and reconstruction activities can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation: Enforcement of the techniques is the responsibility of the inspector and contracting officer's representative for public works contracts, the inspector and engineering representative for timber sale roads, and the permit administrator for roads constructed or reconstructed under administrative operations (that is, Road Use Permit, Special Use Permit, and so forth). If roads are constructed or reconstructed by force account crews, the project manager and foreman are responsible for adherence to project drawings, specifications, and erosion control plan.

1. Implement the approved erosion control plan that covers all disturbed areas, including borrow areas and stockpiles used during road management activities (see BMP 2.13- Erosion Control Plan). Include the forest's wet weather operations standards (WWOS).
2. Maintain erosion-control measures to function effectively throughout the project area during road construction and reconstruction, and in accordance with the approved erosion control plan (see BMP 2.13- Erosion Control Plan).
3. Set the minimum construction limits needed for the project and confine disturbance to that area.
4. Locate and designate waste areas before operations begin.
 - a. Deposit and stabilize excess and unsuitable materials only in designated sites.
 - b. Do not place such materials on slopes with a high risk of mass failure, in areas subject to overland flow (for example, convergent areas subject to saturation overland flow), or within the SMZ.
 - c. Provide adequate surface drainage and erosion protection at disposal sites.

12.21 Exhibit 03 -- Continued
BMP 2.3 - Road Construction and Reconstruction

- d. Comply with BMP 2.5 - Water Source Development and Utilization.
5. Comply with BMP 2.11 - Equipment Refueling and Servicing.
6. Do not permit sidecasting within the SMZ. Prevent excavated materials from entering water ways or SMZs.
7. Develop and follow blasting plans to move materials when necessary.
 - a. To the extent possible, restrict blasting in sensitive areas and those sites with high landslide potential.
 - b. Restrict blasting after intense storms when soils are saturated.
 - c. Prevent damage from fly rock and overshoot by not overloading shots, installing blasting mats, or avoiding setting charges through variable rock strata.
8. Schedule operations when rain, runoff, wet soils, snowmelt or frost melt are less likely. Follow seasonal restrictions of the forest's WWOS, and notification protocols, as outlined in an approved erosion control plan.
 - a. Optimally, schedule construction during dry periods, while still adhering to other seasonal restrictions (wildlife breeding, spawning, fire activity levels, and so forth), consistent with local ordinances.
 - b. Stabilize project area during normal operating season when the National Weather Service predicts a 30 percent or greater chance of precipitation, such as localized thunderstorm or approaching frontal system.
 - c. Keep erosion-control measures sufficiently effective during ground disturbance to allow rapid closure when weather conditions deteriorate.
 - d. Complete all necessary stabilization measures prior to predicted precipitation that could result in surface runoff.
9. To the extent possible, construct new stream crossings when streams are dry or when stream flow is at its lowest. Install sediment controls.
10. Comply with BMP 2.8- Stream Crossings.

12.21 Exhibit 03 -- Continued
BMP 2.3 - Road Construction and Reconstruction

11. Limit operation of equipment when ground conditions could result in excessive rutting, soil compaction (except on the road prism or other surface to be compacted), or runoff of sediments directly to streams.
12. On slopes greater than 40 percent, the organic layer of the soil shall be removed prior to fill placement, according to project specifications.
13. Waste organic material, such as uprooted stumps, cull logs, accumulations of limbs and branches, and unmerchantable trees, shall not be buried in logging road or landing fills. Dispose of waste organic material according to project specifications, in locations designated for waste disposal. Assure compliance with the project erosion control plan.
14. Construct fills and keyways according to design drawings and specifications, not exceeding specified lift thickness and moisture content. Ensure uncompacted materials are prevented from leaving disturbance limits.
15. Stabilize all disturbed areas with mulch, erosion fabric, vegetation, rock, large organic materials, engineered structures, or other stabilization measures according to the Erosion Control Plan, and project specifications and drawings for permanent controls (that is, crib walls, gabions, riprap placement, and so forth).
16. Scatter construction-generated slash on disturbed areas to help control erosion.
 - a. Ensure ground contact between slash and disturbed slopes.
 - b. Windrow slash at the base of fill slopes to reduce sedimentation.
 - c. Ensure that windrows are placed along the contour and that there is ground contact between slash and disturbed slope.
17. Remove large limbs and cull logs to designated sites outside the SMZ or relocate within the SMZ to meet aquatic resource management objectives.
18. Monitor contractor's plans and operations to assure contractor does not open up more ground than can be substantially completed before expected winter shutdowns, unless erosion-control measures are implemented.
19. If snow/rainy season operations are proposed, specifications for snow/ice depth or soil operability conditions must be described. Include these specifications in the erosion control plan (see BMP 2.13- Erosion Control Plans).

12.21 Exhibit 03 -- Continued
BMP 2.3 - Road Construction and Reconstruction

20. Install erosion-control measures on incomplete roads prior to precipitation events or the start of the winter period (November 16 through March 31) and in accordance with the approved erosion control plan:

- a. Remove ineffective temporary culverts, culvert plugs, diversion dams, or elevated stream crossings, leaving a channel at least as wide as before construction and as close to the original grade as possible.
- b. Install temporary culverts, side drains, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, dikes, debris racks, pipe risers, or other facilities needed to control erosion.
- c. Remove debris, obstructions, and spoil material from channels, floodplains, and riparian areas.
- d. Do not leave project areas for the winter with remedial measures incomplete.
- e. Plant vegetation, mulch, and amendments, or provide other protective cover for exposed soil surfaces.

21. When pioneer roads are necessary:

- a. Confine construction of pioneer roads to the planned roadway limits unless otherwise specified or approved.
- b. Locate and construct pioneering roads to prevent undercutting of the designated final cut slope.
- c. Avoid deposition of materials outside the designated roadway limits.
- d. Dewater live streams where crossed by pioneer roads with appropriate diversion devices.
- e. Accommodate drainage with adequate temporary crossings.

12.21 Exhibit 04
BMP 2.4 - Road Maintenance and Operations

Objective: To ensure water-quality protection by providing adequate and appropriate maintenance and by controlling road use and operations.

Explanation: Appropriate maintenance and control of road use and operations can protect water quality, aquatic and riparian resources, and capital investments. Maintenance needs and operational controls are informed by periodic inventory and assessment that determine road condition and the potential impacts the road has on water quality.

Properly designed and maintained road surfaces and drainage systems can reduce adverse effects to water resources by facilitating natural hydrologic function. Roads and drainage systems normally deteriorate because of traffic, weather, and effects of maintenance. In addition, roads occasionally become saturated by new groundwater springs and seeps after a wildfire or unusually wet periods. Many such conditions can be corrected by timely maintenance. However, while routine maintenance may be needed to ensure the road performs as designed, it can also be a source of soil disturbance and therefore, sediment production. In particular, the grading of inside ditches and road surfaces can significantly increase sediment production rates. Less aggressive maintenance may be desired to minimize disturbance of stable sites.

Road management objectives include the level and type of maintenance that a road is expected to receive. Assigned road maintenance levels vary from 1 to 5, and are directly linked to the operational objectives for the road. Maintenance Level 1 is assigned to roads closed to all motorized vehicles for a year or more; they should be left in a stable condition, and by definition, require less maintenance. Maintenance Levels 4 and 5 are assigned to roads that are typically double-lane, aggregate-surfaced or paved, and passenger vehicle traffic is “encouraged.” They are well maintained to provide a moderate to high degree of user comfort and convenience.

Operational objectives and activities are also defined by the road management objectives, and depend upon the amount of maintenance a road is expected to receive. Road operations also include permit, contract, and agreement administration, control of seasonal use, sustaining roads in closed status and revising maintenance levels and seasonal closures, as needed. Road closures and restrictions are necessary because many forest roads are designed for dry-season use. Most local roads are not surfaced, while others have some surfacing or spot stabilization. Roads without stabilized surfaces or adequate base can be damaged by use during wet periods or by loads heavier than the road was designed to convey.

Road maintenance plans are implemented through contract, cooperators, force account, and active timber sale or other authorized activities. Contract, timber sale, and other authorized or permitted operations are bound by specifications and drawings. BMPs are incorporated as specifications, contract or sale clauses, operating plan requirements, permit clauses, and are often

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

shown in the drawings. The contracting officer's representative is responsible for assuring compliance by contractors; engineering representative, TSA, or FSR assures compliance by cooperators, purchaser or permitted operator. Project manager and crew supervisor assures compliance for force account work. Optimally, the forest hydrologist works with the forest quality assurance personnel to determine if approved maintenance tasks are completed with minimal resource impacts. Adjustments to future maintenance plans and methods are considered when previous methods do not provide the needed protection to water quality.

Risk from road maintenance activities can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation

Inspection:

1. Periodically inspect system travel routes to assess condition and linkage to water quality. This information assists in setting maintenance and improvement priorities.
 - a. Provide training to the engineering personnel performing condition surveys to successfully identify and assess linkage to water quality.
 - b. Conduct condition surveys jointly with engineering and hydrology personnel, to more accurately assess potential of road to impact water quality.
 - c. Prioritize inspections to roads at high risk of failure, followed by road segments that are hydrologically connected to the stream network, to reduce risk of diversions and cascading failures.
 - d. Identify diversion potential on roads, and prioritize for treatment.
2. Inspect drainage structures and runoff patterns after major storm events and snowmelt, and perform any necessary maintenance. Major storm events include all storm events for which the National Weather Service issues a local flood watch, advisory, or warning.
 - a. Determine the extent of hydrologic connectivity during and/or just after major storm events, including the connectivity of disturbed areas directly adjacent to the road network. Use this information to prioritize and plan improvements to road drainage.
 - b. Immediately clean out, repair or reconstruct waterbars, inside ditches, culverts, and other features that are not functioning in order to hydrologically disconnect roads

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

from surface waters and prevent discharges of sediment and other pollutants to water bodies.

3. Regularly inspect roads during all operations.
4. Keep roads closed to public use, but open for administrative use, in hydrologically functional condition. If waterbars are breached, forest personnel will promptly repair them.
5. Encourage field personnel of all disciplines to observe road deterioration or damage commensurate with travel to field activities, and report to engineering, for immediate action, if necessary.
 - a. Restrict operations if impact or imminent threat of impact to water quality is occurring.
 - b. Consider restricting operations if road damage such as surface displacement or active rutting is occurring.

Maintenance Planning:

1. Incorporate the forest's Wet Weather Operations Standards and notification protocols in maintenance and operations.
2. Develop and implement an erosion control plan commensurate with the complexity and scale, and duration of the activity. See BMP 2.13.
3. Develop and implement annual maintenance plans that prioritize road maintenance work for the forest or district.
 - a. Include roads identified as needing maintenance from field condition surveys, and roads identified through roads analysis and travel analysis that negatively impact water quality.
 - b. Determine method of accomplishment (contract, force account, permit, and cooperative) and define responsibilities and maintenance timing in the plan.
4. Planning for emergency interim/temporary erosion controls to protect water quality is considered for roads that may require immediate maintenance, but are beyond capability of annual maintenance plan.
5. Identify roads with potential to improve water quality by modifying road prism and drainage patterns through maintenance operations.

- a. Analyze roads in an interdisciplinary manner to identify other impacts that may occur due to changes in road prism or drainage patterns. Consider local conditions and site characteristics.
 - b. Implement diversion potential method per Forest Service Publication 9777.1814P-SDTDC Diversion Potential at Road-Stream Crossings.
 - c. Consider user safety and protection of other forest resources.
 - d. Provide training and reference materials for forest road managers, road maintenance operators, and road maintenance contract preparation personnel to work with hydrologists in identifying appropriate roads for revised maintenance procedures.
6. Evaluate road management objectives when an inspection indicates road design is not meeting current transportation and/or resource needs. Road management objectives support forest LRMP prescriptions.

Maintenance Activities:

1. Maintain road surfaces to dissipate intercepted water in a uniform manner along the road by outsloping with rolling dips, insloping with drains, or crowning with drains. Where feasible and consistent with protecting public safety, utilize outsloping and rolling the grade (rolling dips) as the primary drainage technique.
2. Adjust surface drainage structures to minimize hydrologic connectivity by:
 - a. Discharging road runoff to areas of high infiltration and high surface roughness.
 - b. Armoring drainage facility outlet as energy dissipater and to prevent gully initiation.
 - c. Increasing the number drainage facilities with SMZs.
3. Clean ditches and drainage structure inlets only as often as needed to keep them functioning. Prevent unnecessary or excessive vegetation disturbance and removal on features such as swales, ditches, shoulders, and cut and fill slopes.
4. Minimize diversion potential by installing diversion prevention dips that can accommodate overtopping runoff.

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

- a. Place diversion prevention dips downslope of crossing, rather than directly over the crossing fill, and in a location that minimizes fill loss in the event of overtopping.
 - b. Armor diversion prevention dips when the expected volume of fill loss is significant.
5. Address risk and consequence of future failure at the site when repairing road failures. Use vegetation, rock, and other native materials to help stabilize failure zones.
 6. Maintain road surface drainage by removing berms, unless specifically designated otherwise.
 7. Install and preserve markers to identify and protect drainage structures that can be damaged during maintenance activities (that is, culverts, subdrains, and so forth)
 8. When grading roads or cleaning drainage structure inlets and ditches, avoid undercutting the toe of the cut slope.
 9. Grade road surfaces in accordance with road management objectives and assigned maintenance level. Grade only as needed to maintain a stable running surface and adequate surface drainage.
 10. Accompany grading of hydrologically connected road surfaces and inside ditches with erosion and sediment control installation.
 11. Identify additional road maintenance measures to protect and maintain water; aquatic, and riparian resources including: surfacing and resurfacing, outsloping, dips and cross drains, armoring of ditches, spot rocking, replacing culverts, and installing new drainage features.
 12. Effectively maintain roads in storage to eliminate all motorized vehicle use. Maintain physical closure devices, if present, to be safe and effective. For roads where physical closure methods are not feasible, install signing to inform of road closure.
 13. Enforce pre-haul maintenance, maintenance during haul, and post haul maintenance (putting the road back in storage) specifications when maintenance level 1 roads are opened for use on commercial resource management projects. Require the commercial operator to leave roads in a satisfactory condition when project is completed.
 14. Opened for use on commercial resource management projects. Require the commercial operator to leave roads in a satisfactory condition when project is completed.

12.21 Exhibit 04 -- Continued
BMP 2.4 - Road Maintenance and Operations

Operations:

1. Restrict or prohibit road use during periods when such use would likely damage the roadway surface or road drainage features are identified through Travel Analysis and Travel Management, and implement through enforcement of motor vehicle use map. Changes in road management are supported by appropriate analysis. Follow the forest's WWOS. See BMP 2.13.
2. Require users to obtain permit(s) when proposed operations involve use of roads by vehicles larger than the design vehicle, or beyond typical operation period or season of use (that is, timber purchasers, mining operations, oversize vehicle movement, and so forth. Conditions of the permitted use may require:
 - a. Strengthening the road surface by adding rock, dust palliatives, pavement, or armor, particularly in areas where surfaces are vulnerable to movement such as corners and steep sections.
 - b. Considering short-term road surface stabilization by dust abatement methods, such as watering.
 - c. Upgrading drainage structures.
 - d. Restricting use to low-ground-pressure vehicles or frozen ground conditions.
 - e. Strengthening the road base if roads are tending to rut.
 - f. Using a base course of rock and/or geotextile fabric to provide subsurface stability.
 - g. Intensifying maintenance to handle the traffic without creating excessive erosion and damage to the road surface.
 - h. Repairing damage to road and forest resources associated with use by permittee.
 - i. Restoring the road to original standard of features, such as restoring waterbars.
3. To the extent possible, ensure drainage features are fully capable of preventing pollutant discharges to surface waters before the start of the local winter season (such as November 16 to March 31) or before the start of runoff-inducing precipitation events.
4. Permits to oversize or overweight loads require that damage by such loads be repaired by the permit holder. Damage includes impacts to water quality.
5. Cooperative maintenance agreements follow Forest Service direction for use, maintenance, repairs, and responsibilities.

6. Roads under easement are subject to terms of conditions for operation and maintenance.

12.21 Exhibit 05
BMP 2.5 - Water Source Development and Utilization

Objective: To supply water for road construction, maintenance, dust abatement, fire protection, and other management activities, while protecting and maintaining water quality.

Explanation: Water source development is needed to supply water for road construction and maintenance, dust control, and fire control. In-stream water drafting can substantially affect water flow and/or configuration of the bed, bank, or channel of streams. Aquatic species present could be at risk due to rapid changes or sustained reductions in flow, reduced dissolved oxygen, and/or increased water temperature. Exposed surfaces of water holes or other developments could erode and discharge sediment back into the waterway. In addition to direct hydrogeomorphic (forming and shaping landform by water) disruption to the channel and subsequent impacts to aquatic species, water-quality impacts can occur from road approaches that access the water drafting site. Many water drafting sites have steep approaches and in the absence of adequate drainage or surfacing, these approaches can become chronic sources of sediment and runoff to the channel. Water trucks often leak oil, and sometimes fuel, onto drafting pads, becoming a source of petroleum product contamination to surface waters. Regular monitoring of water supply developments, during construction and use, and enforcement of contract and sale clauses, specifications, and restrictions is the responsibility of inspectors, contracting officer representatives, engineering representatives, sale administrators, and force account crew foreman.

Implementation

Location and Development:

Critical to the effectiveness of this practice is the coordination of engineering representatives, hydrologists, fishery biologists, and permit and sale administrators. Locate existing developments, or proposed streams, and evaluate for feasibility of use; determine scope and scale of environmental risks; select techniques for mitigating disturbance to water quality; and compare with the economics of development and use:

1. Water sources designed for permanent installation, such as piped diversions to off-site storage, are preferred over temporary, short-term-use developments.
2. If off-site storage is not an option then the following locations shall be considered.
 - a. Locations where flowing side channels rather than the main thread of the channel can be used for drafting.
 - b. Areas with existing pools that can be partially blocked, rather than in-channel excavation are preferred.

12.21 Exhibit 05 -- Continued
BMP 2.5 - Water Source Development and Utilization

- c. Sites where road approaches can be hydrologically disconnected from streams.
 - d. Sites where the drafting pad can be placed above the bankfull elevation of the channel with little or no excavation and/or fill placement.
3. Develop and implement Erosion Control Plan for water supply site construction and use.
 4. Follow the forest's wet weather operations standards and guidelines. See BMP 2.13.
 5. Excavation of streambed or bank materials for approaches, drafting pads, and water drafting intakes are subject to local or regional restrictions on ground-disturbing activities.
 - a. Excavations should not occur during peak runoff season.
 - b. Federally listed threatened and endangered species, sensitive (including State-listed) species, management Indicator species, and aquatic organisms of interest may impose further restrictions.
 - c. Other restrictions such as spawning season may be applicable
 6. Basins shall not be constructed at culvert inlets for the purpose of developing a waterhole, as these can exacerbate plugging of the culvert.
 7. Access approaches are located as close to perpendicular as possible to prevent stream bank excavation.
 8. Access approaches are stabilized with appropriate materials, depending on expected life and use frequency of the developed water source.
 9. Fish-bearing streams that are temporarily dammed to create a drafting pool shall provide fish passage for all life stages of fish.
 10. Temporary dams shall be removed when operations are complete.
 11. Removal shall be done gradually so that released impoundments do not discharge sediment into the streamflow.
 12. When diverting water from streams, bypass flows shall be maintained that ensure continuous surface flow in downstream reaches, and keep habitat in downstream reaches in good condition.

12.21 Exhibit 05 -- Continued
BMP 2.5 - Water Source Development and Utilization

Drafting Operations:

1. For fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs).
2. Below 4.0 cfs, drafting rates should not exceed 20 percent of surface flows.
3. Water drafting should cease when bypass surface flows drop below 1.5 cfs.
4. For non-fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cfs.
5. Drafting rate should not exceed 50 percent of surface flow for non-fish-bearing streams.
6. Water drafting should cease from non-fish-bearing streams when bypass surface flow drops below 10 gallons per minute.
7. Intakes, for trucks and tanks, shall be placed parallel to the flow of water and screened, with opening size consistent with the protection of aquatic species of interest.
8. Drafting from gravity-fed storage tanks shall utilize the following
9. Water storage tanks shall be fitted with properly sized pipes designed to cleanly return the tank overflow to the source stream.
10. Outflow pipes shall be sized to fully contain the tank overflow and prevent it from overflowing onto the drafting pad or road surface.
11. Water storage tank return pipes at the water outfall area shall be armored to prevent erosion of the streambed, bank, or channel.
12. At the end of drafting operations, intake screens shall be removed and drafting pipes plugged, capped, or otherwise blocked or removed from the active channel to terminate water drafting during the winter season.
13. Trucks directly drafting from the channel shall utilize the following practices.
14. Water drafting by more than one truck shall not occur simultaneously

12.21 Exhibit 05 -- Continued
BMP 2.5 - Water Source Development and Utilization

Approaches and Drafting Pads:

1. Road approaches and drafting pads shall be treated to prevent sediment production and delivery to a watercourse or waterhole.
2. Road approaches shall be armored as necessary from the end of the approach nearest a stream for a minimum of 50 feet, or to the nearest drainage structure (for example, waterbar or rolling dip) or point where road drainage does not drain toward the stream.
3. Areas subject to high flood events shall be armored to prevent erosion and sediment delivery to water courses.
4. Where overflow runoff from water trucks or storage tanks may enter the stream, effective erosion control devices shall be installed (for example, gravel berms or waterbars).
5. All water-drafting vehicles shall be checked daily and shall be repaired as necessary to prevent leaks of petroleum products from entering SMZs.
6. Water-drafting vehicles shall contain petroleum-absorbent pads, which are placed under vehicles before drafting.
7. Water-drafting vehicles shall contain petroleum spill kits. Dispose of absorbent pads according to the Hazardous Response Plan.

12.21 Exhibit 06
BMP 2.6 - Road Storage

Objective: Ensure that roads placed in storage are maintained to so that drainage facilities and runoff patterns function properly, and damage to adjacent resources is prevented. Stored roads are managed to be returned to service, at various intervals.

Explanation: Road maintenance needs on NFS lands typically exceed maintenance budgets. As a result, many low-standard, closed roads receive no maintenance and may go years without being inspected for maintenance needs. Plans for and design of such roads should reflect long intervals between maintenance activities, but provide protection to resources and investments. This approach reduces the risk of adverse impacts to water, aquatic, and riparian resources and reduces long-term maintenance costs.

Road storage is not an alternative to road decommissioning (BMP 2.7). As described in BMP 2.1, each national forest will designate its minimum road network. Roads not included in the minimum road network will eventually be decommissioned. Only roads that are needed in the future will be considered for storage.

A primary reason for putting roads into Intermittent Stored Service is to reduce maintenance needs while limiting the risk of adverse effects to hydrologic function from stream crossing failures, fill failures, surface water routing, and modified drainage patterns. Roads placed in Intermittent Stored Service have the roadway retained to the extent practicable while meeting the watershed objectives of reducing sediment delivery and restoring natural flow patterns. These are achieved by reducing sediment delivery from the road surface and fills, and reducing the risk of crossing failure and stream diversion.

The risk from roads in Intermittent Stored Service condition can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions. Project crew leaders and supervisors are responsible for ensuring that force account projects meet road closure procedures standards. Contracted projects are implemented by the contractor, or operator. Compliance with plans, specifications, and operating plans is ensured by the contracting officer's representative, engineering representative, or Forest Service representative. Permitted use of stored roads requires restoring the road to its previous stable condition after use by the permittee, as enforced by the permit administrator.

Implementation:

1. Roads that are placed in storage, but open as trails, motorized and non-motorized, will need to provide for the safety of the intended users. As such, pulling culverts may not be warranted.

12.21 Exhibit 06 -- Continued
BMP 2.6 - Road Storage

2. In an interdisciplinary manner, prepare and implement an erosion and sediment control plan for roads to be placed in storage.
3. The forest watershed staff will work with the forest engineering staff to identify which culverts pose a threat to water quality and must be removed before a road is placed in storage.
4. Road-stream crossings deemed safe to leave in stored roads will be treated to remove the potential for streamflow diversions in the event of a crossing failure or blockage, and will have rock armor added to downstream crossing fill where needed to prevent erosion.
5. Existing crossings in low-risk situations where the culvert is sized appropriately, is stable, and does not impede aquatic passage remain in place. Prior to storing, ensure that the road, culvert, and all hydrologically connected drainage structures are cleaned, and sediment and erosion controls are intact and functioning.
6. Only structures that have a long planned storage period and present a significant risk to stream channels are removed, due to increased disturbance and exposure. The removal of drainage structures is tied to the length of period of storage, as well as the ability to access structures that are not removed.
7. The risk of increased sedimentation from ground disturbance and exposed surfaces associated with drainage structure removal is weighed carefully against the benefits of restoring long-term hydrologic functionality.
8. Lay back the streambanks at the crossing-site at a width and angle that allows flows from infrequent events to pass without scouring or puddling.
9. Armor the crossing-site, if needed to prevent scour and erosion.
10. Maintain the same size and gradient at the crossing-site as the channel above and below the removed crossing-site.
11. Angle the banks such that undercutting and slumping is not expected, and revegetation has a strong chance of success.
12. Avoid concentrated flow in ditches by outsloping or using frequent waterbars or other means of cross draining the road.

12.21 Exhibit 06 -- Continued
BMP 2.6 - Road Storage

13. Outslope the road template where appropriate to disperse runoff, prevent concentrated flow, and avoid overly steep fills.
14. Remove unstable material at unstable sites, seeps, slumps or where fills are failing. Place removed materials in stable locations where the stored material will not present a future risk to water, aquatic, or riparian resources.
15. Depending on the extent of anticipated closure period, the following are performed in direct proportion to that time period:
 - a. Scarify or de-compact the road surface to promote vegetation growth and/or infiltration of runoff and intercepted flow.
 - b. Consider re-contouring highly unstable portions of road.
 - c. Re-vegetate disturbed areas, particularly at or near stream crossings. Coordinate type and species of vegetation, along with any amendments, with the forest botanist.
16. Closure method at the entrance to the stored road is commensurate with the terrain, alternate uses, and extent of time road is expected to be stored. Stored roads are not shown on the motor vehicle use map, thereby prohibiting motor vehicle use. Use gates or barriers as appropriate for the site. Sign the closure as necessary to inform the public.
17. Regularly perform condition surveys to monitor and evaluate the effectiveness of the closure measures.

12.21 Exhibit 07
BMP 2.7 - Road Decommissioning

Objective: Stabilize, restore, and vegetate unneeded roads to a more natural state as necessary to protect and enhance NFS lands, resources, and water quality. The end result is that the decommissioned road will not represent a significant impact to water quality by:

1. Reducing erosion from road surfaces and slopes and related sedimentation of streams;
2. Reducing risk of mass failures and subsequent impact on water quality;
3. Restoring natural surface and subsurface drainage patterns;
4. Restoring stream channels at road crossings and where roads run adjacent to channels.

Explanation: Roads no longer needed are identified during transportation planning activities (see description of Travel Management subpart A in BMP 2.1) at the forest, watershed or project level. The unneeded road may be decommissioned, or converted to a trail or other use as appropriate. Temporary roads constructed for a specific short-term purpose (for example, ski area development, minerals exploration, or vegetation extraction) are decommissioned at the completion of their intended use, and vegetation reestablished within 10 years.

Road decommissioning terminates the use of the road as a road, and as such, treatments can range from simply blocking the road entrance, to totally eliminating the road prism and structures, and restoring the land to original contours. Treatment method is carefully chosen to minimize negative impacts to water quality, reestablish vegetation, and restore ecological processes. More aggressive techniques may include greater and longer term risks to water quality through exposure of larger disrupted soil surfaces. Road decommissioning can be accomplished by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation:

1. Engineering and hydrology personnel conduct field review of road selected for decommissioning to determine site characteristics: aspect, soil type(s), topography, surrounding vegetation, proximity to water sources, and so forth.
2. Optimize treatments that will achieve long-term watershed protection goals on individual roads to stretch the available funds for road decommissioning over as many miles as practicable.

12.21 Exhibit 07 -- Continued
BMP 2.7 - Road Decommissioning

3. Weigh benefits and costs of treatments against alternative of placing road in storage and costs for continuing to maintain for hydrologic functionality. See BMP 2.1.
4. Prepare and implement an approved erosion and sediment control plan for both temporary and long-term recovery of the site as specified.
5. Outslope road by pulling back unstable or perched fill. Remove berms.

12.21 Exhibit 07
BMP 2.7 - Road Decommissioning

1. Restore stream courses and floodplains where feasible, to natural grade and configuration.
2. Remove drainage structures determined as necessary to protect water quality:
3. Re-contour disturbed fill material, and compact minimally to allow filtration.
4. Re-contour the road surface cut and fill slopes to restore natural hillslope topography where specified.
5. De-compact areas with stable fill but reduced infiltration and productivity.
6. Haul excess fill to stable disposal areas outside of the SMZ.
7. Provide effective soil cover (such as mulch, woody debris, rock, vegetation, blankets) to exposed soil surfaces for both short- and long-term recovery.
8. Revegetate disturbed areas, particularly at or near stream crossings.
9. Block vehicle access to prevent motorized traffic, in conjunction with signing, publication, and enforcement of the forest's motor vehicle use map.

12.21 Exhibit 10
BMP 2.10 - Parking and Staging Areas

Objective: Construct, install, and maintain an appropriate level of drainage and runoff treatment for parking and staging areas to protect water, aquatic, and riparian resources.

Explanation: Designated parking and staging areas on NFS lands may be permanent or temporary and are associated with a variety of uses including administrative buildings, developed recreation sites, trailheads, off-highway vehicle (OHV) areas, and management projects. These parking facilities sometimes constitute large areas with little or no infiltration capacity. Runoff from these areas can create rills or gullies, and carry sediment, nutrients, and other pollutants to nearby surface waters. The risk from parking and staging areas can be managed by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation:

1. Design and locate parking and staging areas of appropriate size and configuration to accommodate expected vehicles and prevent damage to adjacent water, aquatic, and riparian resources.
 - a. Avoid sensitive areas such as riparian areas, wetlands, meadows, bogs, fens, inner gorges, overly steep slopes, and unstable landforms to the extent practicable.
 - b. For staging areas, designate specific locations for fueling so that water-quality impacts are minimized.
2. Consider the number and type of vehicles to determine parking or staging area size.
 - a. Calculate the expected runoff generated using the appropriate design storm to determine necessary drainage based on the size of the parking or staging area.
 - b. Consider run-on from any contributing areas.
3. Provide signage to designate parking, staging, and refueling areas, and to minimize impacts to sensitive areas.
4. Use permeable pavements where possible, and integrate vegetative islands to trap and filter runoff.
5. Infiltrate as much of the runoff as possible using permeable surfaces and infiltration ditches or basins in areas where groundwater contamination risk is low.

12.21 Exhibit 10 -- Continued
BMP 2.10 - Parking and Staging Areas

6. Pave parking areas that experience heavy use and those that are used during wet periods.
7. Install curbs and gutters to direct and capture surface flow from these paved surfaces.
8. Install and maintain oil and grease separators in larger parking lots with high use and where drainage discharges directly to streams.
9. Plan for necessary clean out and disposal of material collected in these vaults.
10. Connect drainage system to existing stormwater conveyance systems where available and desirable.
11. Conduct maintenance activities commensurate with parking or staging area surfacing and drainage requirements as well as precipitation timing, intensity, and duration.
12. Limit the size and extent of temporary parking or staging areas.
13. Take advantage of existing openings, sites away from waterbodies, and areas that are apt to be more easily restored.
14. Rehabilitate temporary parking or staging areas immediately following use.
15. Effectively prevent access to the area once site restoration activities have been completed.
16. Consider the need to upgrade roads that access parking areas such as OHV parking areas or snow play areas.

12.21 Exhibit 11
BMP 2.11 - Equipment Refueling and Servicing

Objective: Prevent fuels, lubricants, cleaners, and other harmful materials from discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources.

Explanation: Many activities require the use and maintenance of petroleum-powered equipment in the field: vegetation harvest and regeneration; road, trail, and facility construction, reconstruction, and maintenance. The activities often employ equipment that uses or contains gasoline, diesel, oil, grease, hydraulic fluids, antifreeze, coolants, cleaning agents, and/or pesticides. These petroleum and chemical products may pose a risk to surface water and groundwater during refueling and servicing the equipment.

Sale administrators, contracting officer's representatives, engineering representatives, inspectors, permit administrators, and force account crew supervisors are responsible for enforcing requirements of equipment fueling and servicing activities. They can manage the risk from fuel and chemical spills during equipment refueling or servicing by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation:

1. Plan for appropriate equipment refueling and servicing sites during project planning and design.
2. Allow temporary refueling and servicing only at approved locations, which are well away from water or riparian resources.
3. Develop or use existing fuel and chemical management plans (for example, spill prevention control and countermeasures (SPCC), spill response plan, emergency response plan) when developing the management prescription for refueling and servicing sites.
4. Locate, design, construct, and maintain petroleum and chemical delivery and storage facilities consistent with local, State and Federal regulations.
5. Install contour berms and trenches around vehicle service and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills.
6. Use liners as needed to prevent seepage to groundwater.
7. Provide training for all personnel handling fuels and chemicals in their proper use, handling, storage, and disposal.
8. Avoid spilling fuels, lubricants, cleaners, and other chemicals during handling and transporting.

12.21 Exhibit 11 -- Continued
BMP 2.11 - Equipment Refueling and Servicing

9. Prohibit excess chemicals or wastes from being stored or accumulated in the project area.
10. Remove service residues, waste oil, and other materials from NFS land and properly dispose them following completion of the project.
11. Clean up and dispose of spilled materials according to specified requirements in the appropriate guiding document.
12. Report spills and initiate appropriate clean-up action in accordance with applicable State and Federal laws, rules and regulations. The forest hazardous materials coordinator's name and phone number shall be available to Forest Service personnel who administer or manage activities utilizing petroleum-powered equipment.
13. Remove contaminated soil and other material from NFS lands and dispose of this material in a manner according to controlling regulations.
14. Prepare a certified SPCC Plan for each facility, including mobile and portable facilities that have oil storage capacity of at least 1,320 gallons in containers 55 gallons or greater.
 - a. Install or construct the containment features or countermeasures called for in the SPCC Plan to ensure that spilled oil does not reach groundwater or surface water.
 - b. Ensure that each SPCC Plan includes a spill contingency plan at each facility that is unable to provide secondary spill containment.
 - c. Ensure that clean-up of spills and leaking tanks complies with Federal, State and local regulations and requirements.
15. Prepare a contingency plan when quantities of petroleum products are capable of violating Basin Plan water-quality objectives.
16. Section H clauses for Public Works Construction include a standard clause for Spill Plan when project or activity includes oil or oil products storage exceeding 1,320 gallons, or a single container exceeding 660 gallons. Section H clauses also require designation of contractor's key personnel, including authorized on-site representative and phone number(s).

12.21 Exhibit 12
BMP 2.12 - Aggregate Borrow Areas

Objective: Minimize disturbance to water, aquatic, and riparian resources when developing and using aggregate borrow sites.

Explanation: Materials deposited along channels and in floodplains during high flows and storm runoff can provide a source of aggregates such as gravels, cobbles, and boulders for some management activities. Many of these aggregate deposits also include finer materials such as sand, silt, clay, and organic debris that can be mobilized during or following desired material-extraction operations. Additionally, the location of these deposits may require equipment to pass over or through water courses or riparian areas, increasing the potential for bed, bank, riparian, and aquatic habitat disturbance.

Adequate planning is necessary to minimize adverse impacts on water, aquatic, and riparian resources; natural geomorphic processes; and existing infrastructure while removing aggregate deposits. The size and location of the deposit, as well as the amount and duration of need for materials, are commonly the key factors to consider when evaluating and designing an appropriate strategy to remove the materials and stabilize the site following extraction. Project crew leaders and supervisors are responsible for implementing force account projects; contracted projects are implemented by the contractor or equipment operator, and compliance is ensured by Forest Service engineering representative, contracting officer's representative, inspector, or Forest Service representative. They can manage the risk to water-quality impacts from aggregate borrow activities by using the appropriate techniques from the following list adapted as needed to local site conditions.

Implementation:

1. Determine the limits of disturbance for extraction such that water and adjacent water-dependent resources are protected.
2. Determine safe periods of use and limit extraction to those periods.
3. Install temporary barriers between the extraction area and surface waters to prevent sedimentation.
4. Provide for appropriate soil and stream crossings, as necessary, while working in the SMZ and waterbodies.
5. Develop detailed mitigation measures to stabilize and restore the borrow area to desired conditions for the site.
6. Ensure that areas restored within active channels and floodplains will be stable and function as expected under higher flows.

12.21 Exhibit 12--Continued
BMP 2.12 - Aggregate Borrow Areas

Special use permits issued for gravel bar excavation will follow the above techniques, and will require an approved operating plan and reclamation plan. District Ranger or permit administrator is responsible for ensuring compliance.

12.21 Exhibit 13
BMP 2.13 - Erosion Control Plan

Objective: Effectively limit and mitigate erosion and sedimentation from any ground-disturbing activities, through planning prior to commencement of project activity, and through project management and administration during project implementation.

1. Provide seamless transition between planning-level (NEPA) mitigation descriptions and on-the-ground implementation of erosion-control measures tailored to site conditions.
2. Ensure that all disturbance-related mitigation requirements and provisions for field revisions or modifications are accurately captured in one comprehensive document for each project or activity.
3. Activities include, but are not limited to: timber sale harvest; facility site, road, bridge, trail and appurtenance construction, reconstruction, and maintenance; watershed improvement; road and trail decommissioning; legacy site restoration, administratively permitted activities; and vegetation and fuels management activities.
4. Comply with overarching area plans, such as Northwest Forest Plan and Sierra Nevada Framework Plan Amendment.

Explanation: Ground-disturbing activities can result in erosion and sedimentation. By effectively planning for erosion control, sedimentation can be controlled or prevented. Engineering and hydrology personnel jointly develop mitigation recommendations and preliminary BMPs using an interdisciplinary team during the project planning process and environmental analysis phase. Erosion control plans are not be confused with design features whose primary objective is to provide or improve water quality, such as a bridge; reinforced earth retaining wall; or landscaping. The long-term mitigation objectives are typically described in the NEPA document for the project, and then refined in project drawings and specifications as design features. Short-term mitigation measures to prevent erosion and sedimentation are described in detail in the project's erosion control plan.

Project mitigations are conceptually described in NEPA analyses but are typically generic. Detailed mitigation measures are based on site-specific surveys, conditions, and characteristics, and are developed in the project design phase. They are ultimately displayed in the project document's design documents (specifications and drawings) based on site-specific surveys, conditions, and characteristics. Furthermore, field personnel have the responsibility to make refinements or additional recommendations to adjust to actual current and predicted future conditions.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

This flexibility is a necessary and desirable component of project implementation, but must ultimately result in implementation of requirements to protect soil and water quality. To ensure that all required and relevant mitigation measures are documented and implemented, an environmental control plan will be prepared to complement design (design addresses required mitigations specified in NEPA documents), site-specific prescriptions, and amended to include changes made in the field. Detailed and accurate environmental control plan will allow Forest Service and Water Board staff to conduct efficient, meaningful inspections of ground-disturbing projects, and will provide a needed check to ensure that mitigation measures for addressing impacts from the activities are accurately communicated to field staff.

Implementation: Ground-disturbing activities will be exempt from the requirement to prepare an erosion control plan under any of the four exemption categories below:

1. Area-based - less than 50 square feet in riparian area; less than 10,000 square feet in a non-riparian area;
2. Activity-based - activities conducted under a categorical exclusion with no wheeled or tracked equipment, or included under North Coast Regional or State waiver Category A;
3. Site-condition criteria - project locations that are: outside of riparian areas and on soils with high infiltration rates (more than 2 inches per hour) and on slopes less than 15 percent.
4. Flexibility criteria - any activity approved by the forest hydrologist with documentation explaining the rationale for the exemption.

BMP checklists will be prepared for all projects (see section 16) even if an erosion control plan is not necessary.

Erosion control plans for any ground-disturbing activity not meeting the exemption categories above will be reviewed and recommended by the forest hydrologist, and approved and signed by the District Ranger. The hydrologist's recommendation and signature indicates that all mitigation measures prescribed in environmental documents and project plans, or resource specialist's recommendations are included on the environmental control plan. The Forest Supervisor will approve and sign the environmental control plan for forestwide ground-disturbing activities, such as annual road maintenance.

All forests shall develop wet weather operations standards (WWOS). The purpose of the WWOS is to provide guidance with the end result of preventing significant adverse impacts to water quality from wet weather operations on NFTS roads and trails. Such operations may include

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

winter hauling, fuelwood gathering, public access for hunting or Christmas tree cutting, administrative access on closed roads for springtime burning of slash piles, reforestation activities, snow plowing, or other ground disturbance outside normal operating season. WWOS must include notification protocols for informing resource specialists (hydrologists, biologists, soil scientists) as well as line officers prior to initiation or continuation of a project or activity into wet weather season.

Project field operations cannot begin until the District Ranger approves and signs the plan. The erosion control plan will be kept on site during project activity and made available for review upon request of a representative of the Water Board or any local storm water management agency which receives the storm water discharge. The erosion control plan shall be amended if there is a change in control practices, site conditions, or BMPs that may result in less water-quality protection than specified in the project's environmental document, project plan, accepted erosion control plan, or permit/waiver. The amendment must include: name of person requesting the change; a description of the change, including revised BMPs or control practices to mitigate the effects of the change; and why the change is needed.

Even the best erosion and sediment control plan cannot cover the specifics of each situation that will arise on a site during the life of a project. All parties involved in the project have a role and responsibility to ensure the activity complies with the goals or intent of the erosion control plan at all times. All temporary erosion and sediment control practices must be maintained and repaired as needed to assure continued performance of their intended function.

Erosion Control Plan Contents

1. Erosion and Sediment Control shall include:
 - a. List of anticipated ground-disturbing actions associated with the project (for example, stream diversion; exposed cut slopes; stripped and stockpiled topsoil; water source development or use)
 - b. Checklist which includes mitigation measures required by project NEPA, and in some cases CEQA documents, requirements to meet BMPs, project plans, specifications, and permits, if any. The selection of erosion and sedimentation control measures shall be based on assessments of site conditions and how storm events may contribute to erosion. Control measures will be selected from the references provided in the On-Line Library at the end of section 12, or will be of equivalent effectiveness as the measures described in those references.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

- c. Illustrations of control practices designed to prevent erosion and sedimentation. Illustrations must show construction and installation details for control practices, and must be included in the erosion control plan. (for example, California Stormwater Quality Association BMP standard specifications CASQA at <http://www.cabmphandbooks.com>, or Caltrans Stormwater and Water Pollution Control guides at <http://www.dot.ca.gov/hq/construc/stormwater/stormwater1.htm>)
- d. Map/drawing(s) showing soil or water buffer zones, RCAs, RCHAs, SMZs or other soil or water protection areas to be protected from project activities. Project boundary extends beyond disturbance limits.
- e. A description of the color and/or pattern of flagging or marking for soil or water buffer zones, RCAs, RCHAs, SMZs or other soil or water protection areas for each unit.
- f. Relevant sections from the forest's WWOS that apply to activity/activities. The WWOS will provide guidance to prevent significant adverse impacts to water quality from wet weather operations on NFTS roads and trails.
- i. Forest motor vehicle use map will be used to determine seasonal closures for all NFTS routes that are not under permit or for administrative use only.
- (1) A storm preparedness plan that describes additional control practices to be implemented when the National Weather Service predicts a 50 percent or greater chance of precipitation.
- (2) A winterization plan that describes additional control practices to be implemented to stabilize the site during periods of seasonal inactivity. The dates vary by locality, and may be determined by the individual RWQCB (for example, October 15 through May 1). "Winterized" means that the site is stabilized to prevent soil movement permanently if project activities are complete, or temporarily in a manner which will remain effective until end of the stabilization period.
- (3) If winter activity, including over-snow operation is proposed, specifications for snow/ice depth or soil operability conditions must be described.
- g. Control practices to reduce the tracking of sediment onto paved roads. These roads will be inspected and cleaned as necessary.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

- h. Control practices to reduce wind erosion and control dust.
 - i. A proposed sequential schedule to implement erosion and sediment control measures, in addition to the general construction schedule.
 - j. Location information, including directions to access the project area. Include a scaled map, with road names/numbers.
 - k. Contact information of project personnel, including name and cell phone number (that is, sale administrator, contracting officer's representative, project manager, project supervisor, contractor, site superintendent, hydrologist, permit administrator and so forth)
2. Maps requirements: Maps must be clear, legible, and of a scale such that depicted features are readily discernable. For example, sale area maps may be used to satisfy the mapping requirements outlined in b.ii, below, if they meet this intent.
- a. As a means of determining BMPs and erosion control measures, a topographic map should be in the project file. The map should extend beyond the boundaries of the project site, showing the project site boundaries, and surface and subsurface water bodies (ephemeral and intermittent waters, springs, wells, and wetlands) that could be at risk of water-quality impacts from project activities.
 - b. For timber harvest activities, unit-specific map(s) shall be scaled no smaller than 1 inch equals 1,000 feet (1:12,000). For all other activities, maps shall be scaled to provide legible interpretation of requirements shown above. All maps shall include:
 - (1) Specific locations of storm water structures and controls used during project activities.
 - (2) Erosion hazard ratings for each unit, specified down to 20 acres if different EHRs exist within each unit.
 - (3) Locations of existing and proposed haul roads, watercourse crossings, skid trails, and landings.
 - (4) Locations of post-project storm water structures and controls.
 - (5) Equipment access, storage, and service areas.

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

3. Diversion of Live Streams: If the project involves stream diversions for crossing construction, the erosion control plan must include detailed plans for these activities, including storm contingencies. See BMP 2.8 - Stream Crossings.
4. Non-Storm Water Management: The erosion control plan shall include provisions which eliminate or reduce the discharge of materials other than storm water to the storm sewer system and/or receiving waters. Such provisions shall ensure that discharged materials shall not have an adverse effect on receiving waters. Materials other than storm water that are discharged shall be listed, along with the estimated quantity of the discharged material.
5. Waste Management and Disposal: The erosion control plan shall describe waste management and disposal practices to be used at the project site. All wastes (including equipment and maintenance waste) removed from the site for disposal shall be disposed of in a manner that is in compliance with Federal, State, and local laws, regulations, and ordinances. Include plan for project-specific activities that produce waste products, such as concrete truck/chute/pump washout, equipment servicing, equipment washing, and so forth.
6. Maintenance, Inspection, and Repair: The erosion control plan shall include inspection, maintenance and repair procedures to ensure that all pollution-control devices identified in the erosion control plan are maintained in good and effective condition and are promptly repaired or restored. A qualified person shall be assigned the responsibility to conduct inspections. The name and telephone number of that person shall be listed in the erosion control plan. A tracking and follow-up procedure shall be described to ensure that all inspections are done by trained personnel and that adequate response and corrective actions have been taken in response to the inspection. This procedure may be in the form of a written checklist, with inspections signed and dated. Photo documentation is encouraged.
7. Other Plans: This erosion control plan may incorporate, by reference, the appropriate elements of other plans required by local, State, or Federal agencies. A copy of any requirements incorporated by reference shall be kept in the project file.
8. Post-Project Storm Water Management: The erosion control plan shall describe the storm water control structures and management practices that will be implemented to minimize pollutants in storm water discharges after project activity phases have been completed at the site. It shall also specify controls to be removed from the activity site(s) and methods for their removal. The discharger must consider site-specific factors and

12.21 Exhibit 13 -- Continued
BMP 2.13 - Erosion Control Plan

seasonal conditions when designing the control practices that will function after the project is complete.

9. Preparer: The erosion control plan shall include the title and signature of the person responsible for preparation of the erosion control plan, the date of initial preparation, and the person and date responsible for any amendments to the erosion control plan.

10. Template: The Forest Service will develop sample templates for erosion control plans based on activity type. Complexity of the template will be commensurate with the degree of risk to impact water quality by the activity.