Water Resources Protection Plan

For fulfillment of

Order No. 2015-0023

Waiver of Waste Discharge Requirements

and

General Water Quality Certification for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or operations with Similar Environmental Effects in the North Coast Region

Prepared for:

Tristan Strauss

and

North Coast Regional Water Quality Control Board

Prepared by:

Manhard
CONSULTING LTD
611 I Street Suite A Eureka, CA 95501

August 2016

General Information

OWNER:	Tristan Strauss P.O. Box 38 Samoa, CA 95564
SITE ADDRESS:	12019 Wilder Ranch Road Whitethorn, CA 95589
PARCEL:	Assessor Parcel Number: 108-012-010 General Plan: Timber Production (T) Zone: Agriculture Exclusive (AE); Timber Production (TPZ)
ACRES:	Approximately 85.8875 acres (per Humboldt County WebGIS) Disturbed Area: Approximately 1.2 acres

INTRODUCTION

This Water Resources Protection Plan (Plan) was developed to satisfy conditions of the Tier 2 enrollment in the State Water Resource Control Board (SWCRB) Order No. 2015-0023 (Order). The purpose of this Order is to provide a water quality regulatory structure to prevent and/or address poor water quality conditions and adverse impacts to water resources associated with cannabis cultivation on private land. Under this Order, any landowner or operator cultivating cannabis that results in a discharge of waste to an area that could affect waters of the State may elect to enroll and comply with this Order to ensure their discharges are authorized and receive a conditional waiver for the discharges and associated activities described in Finding 4 of the Order. Using data from an onsite assessment, this Plan includes measures to be implemented to meet "Standard Conditions" listed in the Order Provision I.A for cannabis cultivation and associated activities to fulfill the waiver requirement.

SITE LOCATION

The Site occurs in the Mattole River watershed in Southern Humboldt County approximately 2.5 mile north of the town of Ettersburg. To reach the site from Eureka take US-101 south for 63 miles to exit on 642-S onto Redwood drive to Redway. From Redway head east on Briceland Thorn Road for approximately 10 miles and turn right on Ettersburg Road and follow for 5 miles. Take the slight right onto Wilder Ridge Road and follow Wilder Ridge Road for 2.5 miles. The entrance to property is on the right had side, 12019 Wilder Ridge Road. The site is located in Section 25, Township 3 South, Range 1 East, H.B. & M. and can be seen on the Honeydew South East 7.5' USGS quadrangle map. Furthermore, the Site is located at Latitude 40.1667 and Longitude -124.0149. The subject parcel is approximately 85.8875 acres in size (per Humboldt County WebGIS).

SITE DESCRIPTION

The property is located on a ridge with an elevation of approximately 900 ft above mean sea level, surrounded by a landscape that hosts dense hardwood forest intermixed with oak and other species. The terrain has mild to extreme slopes that drains towards the south-east region of the property into the Mattole River. The surrounding landscape is steep, rugged, mountainous terrain. The climate is characterized by a pattern of high-intensity rainfall in winter and warm, dry summers. Mean annual precipitation is approximately 69 inches. The soils within the area are Water and Fluvents (0 to 2 percent slopes), Crazycoyote-Sproulish-Caperidge complex (15 to 50 percent slopes), Crazycoyote-Windynip-

Caperidge complex (15 to 50 percent slopes), Canoecreek-Sproulish-Redwohly complex (50 to 75 percent slopes, dry), and Crazycoyote-Sproulish-Canoecreek complex (30 to 50 percent slopes) *(Appendix C - Custom Soil Resource Report for APN 108-012-010).*

The property has the Mattole River running through the east side of the parcel, which has been listed as an impaired waterbody for excessive sediment and temperature under Section 303(d) of the Clean Water Act. The Mattole River provides habitat for five endangered salmonid species, and has been identified as an important population of Coho salmon for the region. The river enters the ocean approximately 4 miles west-southwest of Petrolia at the Mattole Estuary.

The Site has a Land Use Designation of Timber Production (T) as described in the Humboldt County General Plan – Volume 1, Framework Plan (FWRK). The site is zoned as Agriculture Exclusive (AE) and Timberland Production Zone (TPZ). The majority of the surrounding parcels are planned Agriculture Exclusive (AE), Unclassified (U), and zone Timberland Production Zone (TPZ).

INVENTORY AND ASSESSMENT

Office analysis and a field inventory were used to assess the property for compliance with the Standard Conditions as listed in Order Provision I.A. Pre-field inspection, an air photo analysis (google earth and air photos) was used to identify existing infrastructure, watercourses, and general layout of the property. Geomorphic information was evaluated and a soils report generated to assess potential erosivity of the site. The field inventory was conducted by the engineering staff of Manhard Consulting. The inventory included GPS mapping of structures, water tanks, ponds, roads, agricultural sites and other infrastructure features. GPS was also used to map watercourse features including: extent of streams, riparian zones, ponds, ditches, and wetlands.

Information on the current and planned use of buildings was collected. Structures that contained fertilizers, petroleum products, or pesticides associated with cannabis cultivation were inventoried to assess proper storage. Buildings were assessed in office for compliance with local building ordinances.

Water systems were evaluated for their source, storage, and use. Points of diversions were mapped and photographed, with data collected for analysis regarding stream type and the diversion method. Elements of the water storage system were mapped and data collected on the number and size of tanks and ponds, pumping system, efficiency, stability, and potential for catastrophic failure. All aspects of the water system were evaluated for existing erosion and the potential for sediment delivery to the stream network. Assessment of seasonal: diversion rates, storage, and water use were calculated in the office (Attachment C). Upgrade and treatment recommendation for the water system were developed using field observation and office analysis.

Roads were evaluated to identify and prescribe treatment for discharges and controllable sediment delivery sites. The road network was examined for opportunities to discontinued use and restoration of high sediment risk roads. Road surfaces, cutbanks, and fillslopes were examined for rills, gullies and surface erosion delivering sediment to the stream network. Road drainage was evaluated for effectiveness in routing water away from watercourse and maintaining road stability. Stream crossings were evaluated for ability to pass the 100-year storm event (in office), potential for plugging, and erosion of the fill slopes. Location of treatment recommendations were mapped and incorporated into the design plan set in the office.

Cannabis cultivation sites were evaluated for controllable sediment delivery sites, irrigation runoff, waste disposal, and storage of petroleum, fertilizers, and other chemicals used in the cultivation process. Proximity of cultivation areas to riparian zones, wetlands, and streams was recorded. Owners were consulted for information on the rate and application method of fertilizers, and other compounds, used in cultivation.

CURRENT SITE CONDITIONS

The site is currently being used for cannabis cultivation. Buildings on the site include a residence/processing building, an open air work building, shipping trailer, three sided storage shed, and generator shed. Current agricultural consists of three 14 ft x 100 ft greenhouses, one 30 ft x 80 ft greenhouse, one 20 ft x 80 ft greenhouse, one 10 ft x 80 ft greenhouse, one 12 ft x 80 ft greenhouse, one 12 ft x 60 ft greenhouse, and ~1,600 ft^2 of outdoor cultivation totaling 12,280 ft^2 of cannabis cultivation. There is a class II stream on the west edge of the property with short class III tributaries extending towards the cultivation area. The cultivation area is located midslope on mountain and is ~ 100 ft from the class III streams, separated by the main property road. There are three more class III streams below the cultivation site that extend to the Mattole River. Soils are well drained but erosive turning to thick dust layers on untreated roads. There three roads: road association (RA) road, main property road and old logging road on the property totaling ~ 0.92 mile in length. The RA road is hard pack native surface with four stream crossings. Drainage pattern is mixed, but there is very little surface erosion. This road was recently graded. The main property and old logging road are native surface and in need of drainage work (see Measures to Meet Standard Conditions - Site Maintenance, Erosion Control and Drainage Features). Water for the site is currently drawn from the class II stream and routed to a tanks near the cultivation area and gravity fed to the greenhouses (see section Measures to Meet Standard Condition – Water Storage and Use).

Overall, the property is in good shape and not a significant threat to water quality. While the RA road network receives regular maintenance it would benefit from outsloping, rocking the surface, and the installation of rolling dips. The main property road would benefit from the similar treatments. The old logging road extends down the hillslope towards the Mattole River. Runoff from the road has eroded the streambank of one of the class II streams and needs work (Table 1). There was a minor amount garbage on the site that needs to be collected and transported to an appropriate waste disposal site. Some petroleum products need to be collected and placed in proper storage facilities. Greenhouses have been constructed away from riparian zones and streams. Fertilizers and pesticides are currently stored in the shipping trailer with secondary containment. Sites have been identified for storage/disposal of spoils and cultivation waste (WRPP map – Attachment A).

The property owner is in the application process for a commercial cultivation license through Humboldt County Ordinance No. 2455, *the Commercial Medical Marijuana Land Use Ordinance (CMMLOU)*. They have submitted a Notification of Lake or Streambed Alteration with California Department of Fish and Wildlife, and a Grading Plan with the County of Humboldt to construct an ~80,000-gallon water storage pond near the cultivation site. These permits are under review. There are tentative plans to move the outdoor cultivation to a grassland ~ 500 upslope from the present location and relocate the lower property road to the east side of the current greenhouses to reduce road slope and proximity to the proposed pond and streams.

DESCRIPTION OF CANNABIS ACTIVITIES

Onsite cultivation in the greenhouses consist of "light deprivation" cultivation. Light deprivation is a cultivation technique that manipulates the amount of light a plant receives to induce flowering, even

during the elongated daylight hours of summer months. This technique can shorten the growing and flowering stages of a plant producing a larger quantity of smaller crops. With greenhouses grows, 2 – 3 cycles are possible from spring to fall. Four of the greenhouses will have two cycles with three on three cycles. Starts are propagated onsite. Harvested plants will be dried and processed in the residence/processing building. Transportation and sale of the final product are addressed in the property owner's application for commercial cultivation under Humboldt County Ordinance No. 2455, *the Commercial Medical Marijuana Land Use Ordinance (CMMLOU)*.

Greenhouse plants are grown in beds and outdoor in 200 - 300 gallon geopots pots. All plants are grown with a soil mix supplemented with amendments and fertilizers (Attachment D). Fertilizers and water will be mixed into a tank and applied ~ twice a week. Greenhouse plants will be watered with a drip system twice a week throughout the summer. Water meters will be installed at the greenhouse to monitor water use for cultivation and reported with the end of year monitoring report. Outdoor plants will be watered by hand with records kept for reporting. Application rates of soil amendments and fertilizers will be recorded as well.

CORRECTIVE ACTIONS

Based on field investigations, corrective actions were developed to treat areas on the property that were not compliant with the Standard Conditions as listed in Order No. 2015-0023 Provision I.A (Table 1). Each location was recorded on the Water Resources Protection Plan Map (Attachment A) with a unique Map ID that relates back to Table 1. The current condition was evaluated and an appropriate treatment selected based Best Management Practices (BMPs) outlined in Appendix B of the Order. A priority was attached to each corrective action based on threat to water quality and multi-year treatment planning. Some treatments will require the issuance of permits before work can commence. Areas that receive corrective actions will be monitored to evaluate the success of the treatment.

TABLE 1. Identified Sites for Corrective Action at Strauss Parcel Number: 108-012-10.

Map ID	Description	Associated Standard Condition	Current Condition	Corrective Action	*Priority for Action (1 = High)	Permanent BMP Time Schedule
CW-1	Disposal of roots, stems, and leaves from Cannabis cultivation and processing	I.A.10	N/A	Cannabis waste will be composted at a designated location on site	1	Oct-16
CD-1	Critical Dip	I.A.1.c	No Critical Dip at site STX-5	Install Critical Dip to prevent diversion in case of culvert failure	1	Oct-17
DR-1	Drainage Ditch	I.A.1.c	No road drainage along short steep section of road	Install rolling dip to route runoff to French drain along landing	1	Oct-16
DR-2	Drainage Ditch	I.A.1.c	No road drainage along section of road	Install drainage ditch to route road runoff across landing to hillslope	1	Oct-16
DR-3	Drainage Ditch	I.A.1.c	Drainage across saturated flat eroding class III channel	Install drainage ditch across flat to route water to moderate hillslope. Site will be converted to pond in the future	1	Oct-16
EC-1	Erosion Control	I.A.1.c I.A.1.d	Bare soil on cultivation site (landings) East of road	Apply seed and straw to bare soil	2	Oct-16
EC-2	Erosion Control	I.A.1.c I.A.1.d	Gully erosion at headwaters of class III stream	Install 4" – 10" rock at headwater of gully to prevent headcutting of channel	2	Oct-16
EC-3	Erosion Control	I.A.1.c I.A.1.d	Bare soil on cultivation site West of road	Apply seed and straw to bare soil	2	Oct-16
EC-4	Erosion Control	I.A.1.c I.A.1.d	Gully erosion on steep road fillslope (Road Association Road)	Outslope road to disperse runoff, install filter fabric and rock gully with ¼ ton rock	2	Oct-17

TABLE 1. Identified Sites for Corrective Action at Strauss Parcel Number: 108-012-10.

Map ID	Description	Associated Standard Condition	Current Condition	Corrective Action	*Priority for Action (1 = High)	Permanent BMP Time Schedule
EC-5	Erosion Control	I.A.1.c I.A.1.d	Road fillslope/ streambank erosion on old logging road	Install water bar to redirect road runoff away from erosion site. Rock gully with ¼ ton and smaller rock. Road is good candidate for decommissioning	2	Oct-17
OS (all)	Outslope Roads	I.A.1.a I.A.1.c I.A.1.e	Roads currently have no distinct drainage pattern	Outslope and rock roads where identified to disperse runoff	2	Oct-17
RD (all)	Rolling Dips	I.A.1.a I.A.1.b I.A.1.d	Roads currently have no distinct drainage pattern	Install rolling dips as identified and according to standard drainage spacing	2	Oct-17
SC-1	Erosion Control	I.A.1.c I.A.1.d	Potential for runoff of cultivation area to leave landing	Install fiber rolls at edge of landing	2	Oct-16
SM-1	Spoils Management	I.A.4.a I.A.4.b I.A.4.c	N/A	Spoils from grading shall be stored in a designated location	1	Oct-16
SS-1	Septic System	I.A.11.a	N/A	Property owner is in the process of applying for permits to install a septic system for new development on site	2	Oct-17
STX-3	New and Existing Stream Crossings	I.A.2.a I.A.2.b I.A.2.d I.A.2.e I.A.2.f	Spring/hillslope runoff with no drainage	Install 18" x 30 ft long CMP with downspout. Rock outlet.	2	Subject to issuance of LSA by DFW
STX-4	New and Existing Stream Crossings	I.A.2.a I.A.2.b I.A.2.d I.A.2.e I.A.2.f	Undersized 12" diameter CMP	Install 18" x 30 ft long CMP with downspout. Rock outlet.	1	Subject to issuance of LSA by DFW

TABLE 1. Identified Sites for Corrective Action at Strauss Parcel Number: 108-012-10.

Map ID	Description	Associated Standard Condition	Current Condition	Corrective Action	*Priority for Action (1 = High)	Permanent BMP Time Schedule
STX-5	New and Existing Stream Crossings	I.A.2.a I.A.2.b I.A.2.d I.A.2.e I.A.2.f	24" diameter CCP with no Critical Dip	Install Critical Dip (see CD-1)	1	Oct-17
SW-1	Disposal of soils from Cannabis cultivation	I.A.10	N/A	Soils from cannabis cultivation will be stored at a designated location on site	2	Oct-16
WS -1	Water Storage	I.A.5.c	Needs additional 80,000 gallons of water for cannabis cultivation	Build rain catchment pond to store water for cultivation needs	1	Oct-17

* Priority based on potential sediment delivery to stream system. 1 = High Priority, 2 = Medium Priority, 3 = Low Priority.

MEASURES TO MEET STANDARD CONDITIONS

Site Maintenance, Erosion Control and Drainage Features

There are three roads on the property: road association (RA) road, main property road, and old logging road. The main road is native surface with a mixed drainage pattern routing some water to inboard ditches and some down the center of the road. This road has base rock and is generally compact and in good condition. It is located midslope in steep terrain and some of the road surface runoff is causing erosion of the fillslope and hillslope. One erosion site (EC-4) is a fillslope failure located near STX-5. This road would benefit from outsloping and rocking with ¾" quarry base. There are four stream crossings that are discussed below (Stream Crossing Maintenance). The main property road is native soil surface that has not been treated. It is steep in places and is heavily used grinding the soil into a powdery dust. This road needs to be outsloped with rolling dips (see WRPP map). It also needs to be rocked with 2"- 3" base rock with a 2" layer of ¾" quarry base rock compacted on top. The property owner is investigating moving the road to the East edge of the cultivation site adding distance between the road and the existing stream system and proposed pond. The old logging road is steep, native soil, and blocked by few fallen trees. It runs along the bank of a class II stream for ~ 200 ft causing streambank erosion (EC-5) and delivering road surface sediment to the stream network. Water bars need to be installed to divert runoff away from the streambank gully. The gully then needs to be rocked with ¼ ton minus rock to the stabilize bank. The road continues down the hillslope to a landing above the Mattole River. The section of road needs to have water bars installed at intervals appropriate for the slope (Attachment B - BMP package). The best solution for this road is to be decommissioned.

Stream Crossing Maintenance

There are four stream crossings on the property, all on the road association road. Stream crossing STX-1, STX-2, and STX-5 are all adequately sized and generally in good repair. They are not set at grade, but have rocked outlets all the way to the channel preventing fillslope erosion. The inlet of all these pipes need be cleared of vegetation and sedimentation in the inlet basin. STX-5 needs a critical dip installed to prevent diversion from a culvert failure during a storm event. STX-4 is an undersized 12" diameter pipe that needs to be replaced following typical design specifications including installation of a critical dip (Attachment B). Between STX-2 and STX-4, a stream crossing (STX-3) needs to be installed to capture flow from a spring/hillslope runoff. This pipe should be an 18" or greater CMP installed to typical design specifications (Attachment B).

Riparian and Wetland Protection and Management

Currently cultivation activities and associated structures from the two sites are > 100 ft from the nearest respective watercourse.

Spoils Management

There are no dirt spoil piles currently existing or anticipated. Future spoils will be placed in designated area where they cannot be transported to surface water (WRPP Map – Attachment A). The spoils will also be contained or stabilized with erosion and sediment control BMPs to prevent sediment mobilization and potential delivery to surface waters.

Water Storage and Use Plan

Water Rights

The primary water source is a point of diversion (POD) on a Cistern located in a Class II stream, which is a tributary to the Mattole River. This point of diversion (POD) has been registered with the SWRCB under a riparian right (S025417). With riparian rights established, a Small Irrigation Use Registration (SIUR) is in

the process of being filed. The registration will prescribe additional storage to meet a proposed 150-day forbearance period.

Water Storage and Use

Water for cultivation and incidental domestic use is diverted from one POD on a cistern which is a tributary to the Mattole river. Current storage consists of 15 tanks and one water bladder for a total storage amount of 134,000 gallons. Direct diversion and diversion from storage for cannabis are restricted to the specified dates in the table below. Domestic uses are not as restrictive to prescribed forbearance period. Riparian rights may be exercised to meet strictly domestic demands if needed. Cannabis cultivation will remain at agronomic rates using conservative irrigation systems.

Currently the property owner is diverting 25,000 gallons during the forbearance period. A proposed storage increase of 80,000 gallons for cultivation has been prescribed in order to withhold during the designated forbearance period. This increase will consist of one 80,000-gallon pond. The storage increase would replace the 20,000-gallon water bladder that will be removed. Annual water use on the property is summarized below.

TABLE 2. Dates of Water Diversion and Quantities Diverted.

Purpose of Use	Start Date	End Date	From Diversion (gal)	From Storage (gal)
Divert to Storage	Dec. 15	Mar. 31	134,000	
Domestic (Direct)	Nov. 13	Jun. 14	10,000	
Cannabis Cultivation (Direct)	Oct. 1	Nov. 12	25,000	
Domestic (Storage)	Jun. 15	Nov. 12		5,000
Cannabis Cultivation (Storage)	Apr. 1	Sep. 30		129,000
Total	---	---	**169,000**	**134,000**

TABLE 3. List of Current Water Storage Vessels on Site.

Type	Quantity (gal)	Number	Total Storage (gal)
Water Bladder	20,000	1	20,000
Pioneer Tank	50,000	1	50,000
Plastic Tank	5,000	12	60,000
Plastic Tank	3,000	1	3,000
Plastic Tank	1,000	1	1,000
Total Storage on Site	---	**16**	**134,000**

Irrigation Runoff

No evidence of water movement and erosion in the cultivation area was observed during the inventory. The current greenhouses on the sites are over 100 ft from the nearest stream course. Water conservation and containment measures will prevent irrigation runoff from leaving the greenhouses. To further prevent connectivity the property owner will:

- implement water conservation measures;
- irrigate at agronomic rates;
- apply fertilizers/chemicals according to label specifications;

- maintain stable vegetated buffer between cultivation area and riparian zone; and
- install water, erosion, and sediment BMPs as required.

As per the Standard Conditions, future cultivation areas and associated facilities will not be located or occur within 100 ft of any Class I or II watercourse or within 50 ft of any class III watercourse or wetlands.

Fertilizer and Soil Amendments

The fertilizer/soil amendments being used on site are listed in Attachment D (Fertilizers/Pesticides). Also included in Attachment D is a list of all pesticides, fungicides, and herbicides used on site. The onsite inventory found no fertilizers or soil amendments stored in locations that could leach or be transported to the stream system. Fertilizers and soil amendments are currently being stored in the shipping trailer (WRPP Map – Attachment A). Liquid fertilizers have been placed in bins, or other container for secondary containment. Property owner will apply and use fertilizers and soil amendments per packaging instructions and/or at proper agronomic rates. Application rates will be tracked and reported with the end of the year monitoring.

Pesticides/Herbicides

The property owner will be using insecticide/fungicides permitted for use on cannabis by the Order (Appendix B). The use of these products will be consistent with product labelling and it will be stored in the enclosed trailer or processing house along with the fertilizers and soil amendments (Attachment D). Application rates will be tracked and reported with the end of the year monitoring report (Attachment F).

Petroleum Product and other Chemicals

There are two generators for the site. The generator is stored in its own shed with a wooden floor and requires secondary containment. Gasoline and other chemicals are stored in the shipping trailer with secondary containment.

Cultivation and Waste

Vegetation matter such as root balls and large branches will be burned while smaller material will be composted at a designated area. (WRPP Map – Attachment A). Spent potting soil will be stored in the beds in the greenhouses with a nitrogen fixing cover crop planted. (WRPP Map – Attachment A). All packaging from soil amendments and fertilizers will be collected and disposed at an appropriate facility.

Refuse and Human Waste

The property owner is in the process of permitting a new septic system (Attachment E). The system will be installed once the application is approved in 2017. The property is clean and generally free of garbage. The small amount of garbage on the site will be collected and transported to an approved disposal area. Future garbage will be stored in a location and manner that prevents its discharge to receiving waters and prevents any leachate or contact water from entering or percolating to receiving waters until it is disposed at an appropriate waste disposal location.

Remediation/Cleanup/Restoration

There is no restoration or remediation required of this property.

MONITORING AND REPORTING

Monitoring

Monitoring will be conducted to confirm the effectiveness of corrected measures listed in the Water Resource Protection Plan and determine if the site meets all Standard Conditions. Inspections will include

photographic documentation of any controllable sediment discharge sites as identified on the site map. Visual inspection will occur at those locations on the site where pollutants or wastes, if uncontained, could be transported into receiving waters, and those locations where runoff from roads or developed areas drains into or towards surface water. The inspection will also document the progress of any plan element subject to a time schedule, or in the process of being implemented. A monitoring plan is included in Attachment F with photo points identified on WRPP map (Attachment A). Onsite monitoring shall occur:

- Before and after any significant alteration or upgrade to a given stream crossing, road segment, or other controllable sediment discharge site. Inspection should include photographic documentation, with photo records to be kept on site;
- Prior to October 15 to evaluate site preparedness for storm events and stormwater runoff;
- By December 15; and,
- Following any rainfall event with an intensity of 3 inches precipitation in 24 hours. Precipitation data can be obtained from the National Weather Service by entering the site zip code at *http://www.srh.noaa.gov/forecast*.

Reporting

A Monitoring and Reporting Form (Order No. 2015-0023 Appendix C) will be submitted upon initial enrollment in the Order (NOI) and then annually by March 31 to the Regional Water Board. The annual report will include data from the monitoring reports (Attachment F).

ATTACHMENTS

A. Water Resources Protection Plan Set
B. Design Plans
C. Water Rights Documentation
D. Cultivation Fertilizer and Pesticide List
E. Septic System Documentation
F. Monitoring Plan
G. RWQCB Order No. 2015-0023 and Appendices
H. RWB Enrollment Documents

ATTACHMENT A. WATER RESOURCES PROTECTION PLAN MAP

ATTACHMENT B. WRPP DESIGN PLANS

STRAUSS
WATER RESOURCE PROTECTION PLAN

APN: 108-012-010

VICINITY MAP
NOT TO SCALE

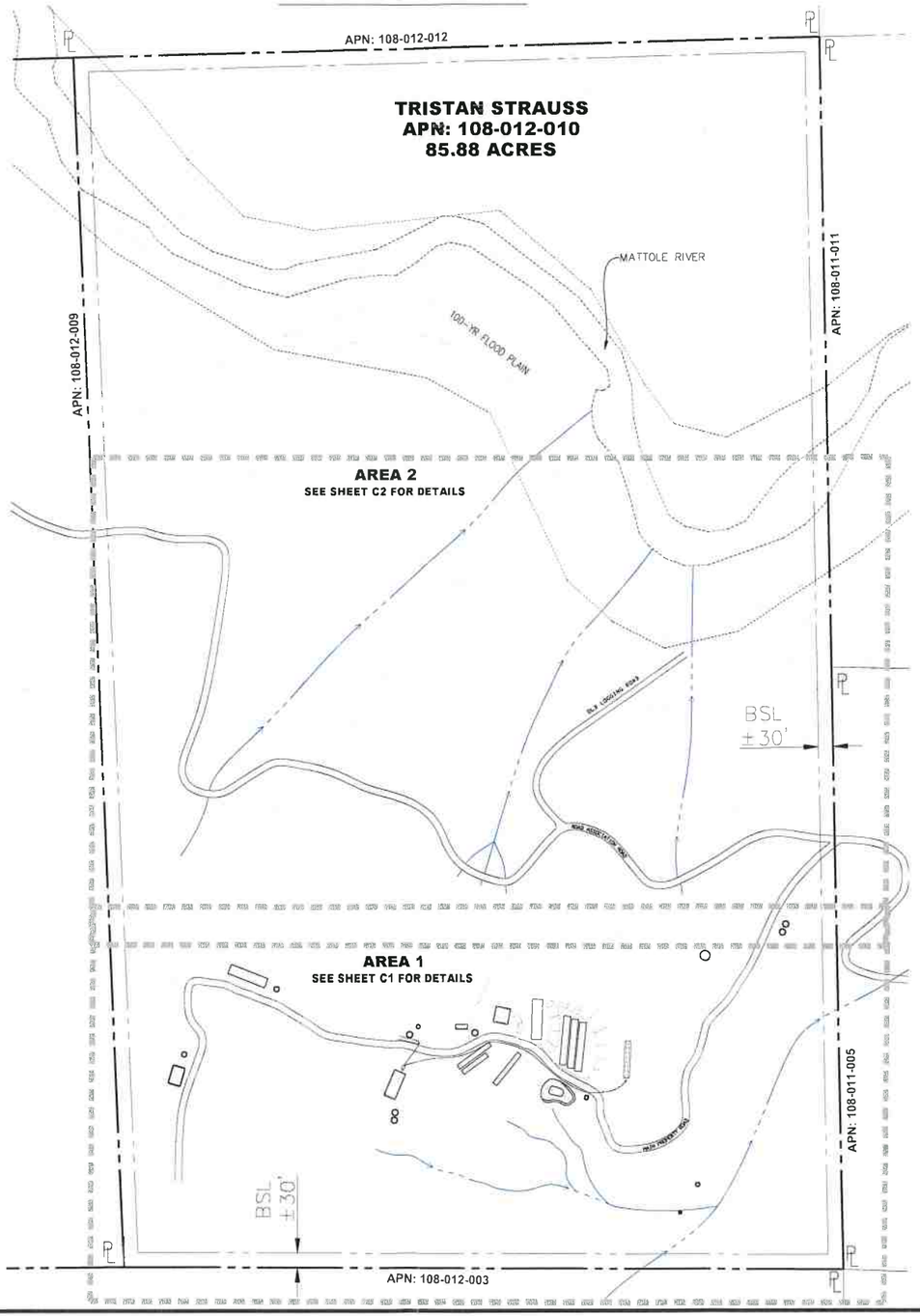
DIRECTIONS TO SITE:
FROM EUREKA, CA
- HEAD SOUTH ON US-101
- TAKE EXIT 642 TOWARDS REDWAY.
- CONTINUE ON REDWOOD DRIVE AND TURN RIGHT ON ETTERSBURG ROAD TOWARD ETTERSBURG.
- CONTINUE ON ETTERSBURG ROAD ACROSS THE MATTOLE RIVER AS IT TURNS TO WILDER RIDGE RD.
- CONTINUE ON WILDER RIDGE RD. AND TURN RIGHT AT THE TWO MAILBOXES NUMBERED 12035 AND 12031.
- CONTINUE ON DIRT ROAD AND TAKE SECOND LEFT TURN.

PROJECT INFORMATION:

CLIENT:
TRISTAN STRAUSS
P.O. BOX 38
SAMOA, CA 95564
760-601-6070

OWNERS AGENT:
MANHARD CONSULTING
611 "I" STREET, SUITE A
EUREKA, CA 95501
(707) 444-3800

SITE ADDRESS:
12019 WILDER RIDGE RD.
WHITETHORN, CA 95589



PLOT PLAN
11x17 SHEET: 1"=300'
0 75 150 300
NORTH

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
C0	PLOT PLAN, SITE PLAN, VICINITY MAP, & PROJECT NOTES
C1	AREA 1 MAP
C2	AREA 2 MAP

NOTE: LOCATIONS OF PROPERTY BOUNDARY LINES ARE APPROXIMATE

REVISIONS | DATE | DRAWN BY

Manhard CONSULTING
611 I Street, Suite A, Eureka, CA 95501 tel (707)444-3800 fax (707)444-3900 www.manhard.com
Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

TRISTAN STRAUSS: APN 108-012-010
12019 WILDER RIDGE RD. WHITETHORN, CA 95589
WRPP PLOT PLAN

PROJ. MGR: POW
PROJ. ASSOC.: TL
DRAWN BY: NAH/TJS
DATE: 08/02/2016
SCALE: AS SHOWN

SHEET
C0
STRWTCA 16-013

PRELIMINARY; FOR REVIEW ONLY

August 23, 2016 - 11:02 Dwg Name: P:\Strauss01\Dwg\Eng\Engr Drawings\Plan Set\STRWTCA - WRPP.dwg Last Modified By: tlewis

STRAUSS
AREA 1
APN: 108-012-010

LEGEND
- OVERLAND FLOW
- DRAINAGE
- WATERCOURSE
- 200' USGS CONTOUR
- ARMORED SECTION OF ROAD
- ROLLING DIP
- GRAVEL CHECK DAM
- <P> PROPOSED
- <E> EXISTING
- OUTSLOPE
- (A) PHOTO POINT
- CUT/FILL SLOPE

<E> 20'X80' GREENHOUSE
<E> 5K GAL WATER TANK, TYP. (7 TOTAL)
<P> WATER TANK
<E> TEMPORARY WATER BLADDER ±30K GAL
OS-1 OUTSLOPE AND ROCK ROAD
<P> RELOCATION OF POTTED CULTIVATION
<E> 5K GAL WATER TANK, TYP. (7 TOTAL)
<E> SHIPPING TRAILER STORAGE FOR FERT/PEST, TO BE REMOVED
<E> 1K GAL WATER TANK
<E> 5K GAL WATER TANK, TYP. (7 TOTAL)
SM-1 SPOILS
CW-1 CULTIVATION WASTE
SS-1 SEPTIC
DR-2 DRAINAGE DITCH
<E> BREEZEWAY SHED AND DECK PLATFORM/ PETROLEUM STORAGE
<E> 20'X80' GREEN HOUSE
DR-1 FRENCH DRAIN
EC-1 EROSION CONTROL STRAW
SW-1 SOIL WASTE
<E> (3) 14'X100' GREEN HOUSE
<E> SINGLE STORY PROCESSING W/ BATHROOM
<E> 12'X80' GREENHOUSE
<E> OUTDOOR CULTIVATION
<E> (2) 5K GAL WATER TANKS, TYP. (7 TOTAL)
<E> 12'X60' GREENHOUSE
EC-3 EROSION CONTROL SEED AND STRAW
EC-2 ROCK HEADWALL OF CHANNEL
SC-1 FIBER ROLLS
<P> POND
DR-3 DRAINAGE DITCH (TEMP)
SC-2 INSTALL SEDIMENT/ CONTAINMENT BASIN
SS-1 SEPTIC
OS-1 OUTSLOPE AND ROCK ROAD
MAIN PROPERTY ROAD
<E> 10'X80' GREENHOUSE
<E> OUTDOOR CULTIVATION
1,000'
960'
920'
880'
<E> UNNAMED STREAM /DRAINAGE
<E> POD
<E> 1K GAL WATER TANK
<P> 50K GAL WATER TANK
<E> (2) 5K GAL WATER TANKS, TYP. (7 TOTAL)
RD ROLLING DIP
<E> UNNAMED STREAM/DRAINAGE

AREA 1
11x17 SHEET: 1"=100'
0 25 50 100
NORTH

NOTE: LOCATIONS OF PROPERTY BOUNDARY LINES ARE APPROXIMATE

Manhard CONSULTING
511 1st Street Suite A, Eureka, CA 95501 tel: (707)444-3900 fax: (707)444-3903 www.manhard.com
Civil Engineers • Surveyors • Water Resources Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

REVISIONS | DATE | DRAWN BY

TRISTAN STRAUSS: APN 108-012-010
12019 WILDER RIDGE RD. WHITETHORN, CA 95589
WRPP AREA 1

PROJ MGR: POW
PROJ ASSOC: TL
DRAWN BY: NAH/TJS
DATE: 08/02/2016
SCALE: AS SHOWN

SHEET
C1
STRWTCA 16-013

PRELIMINARY: FOR REVIEW ONLY

August 23, 2016 - 15:02 Dwg Name: P:\Strwtca01\dwg\Eng\Final Drawings\Plan Set\STRWTCA - WRPP.dwg Updated By: rawh

STRAUSS
AREA 2
APN: 108-012-010

LEGEND

- OVERLAND FLOW
- DRAINAGE
- WATERCOURSE
- 200' USGS CONTOUR
- ARMORED SECTION OF ROAD
- ROLLING DIP
- GRAVEL CHECK DAM
- <P> PROPOSED
- <E> EXISTING
- OUTSLOPE
- (A) PHOTO POINT
- CUT/FILL SLOPE

OS–1
OUTSLOPE AND ROCK ROAD

U

T

STX–1
32" CPP
L=40'

<E> KEEP CROWNED ROAD SURFACE

RD
ROLLING DIP

S

STX–2
18" CMP

STX–3
INSTALL 18" CMP AT CHANNEL

STX–4
INSTALL 18" CMP AND CRITICAL DIP

R

Q

N

EC–5
ROCK ROAD/ STREAM BANK FAILURE WITH 1/4 TON AND SMALLER ROCK

O

OLD LOGGING ROAD

P

WB
WATER-BAR

<E> REMOVE BERM

OS–1
OUTSLOPE AND ROCK ROAD

ROAD ASSOCIATION ROAD

STX–5
24" CPP

EC–4
ROCK FILLSLOPE FAILURE WITH 1/4 TON RIPRAP

M

CD–1
INSTALL CRITICAL DIP

RD
ROLLING DIP

<E> (2) 5K GAL WATER TANKS, TYP. (7 TOTAL)

NOTE: LOCATIONS OF PROPERTY BOUNDARY LINES ARE APPROXIMATE

AREA 2
11x17 SHEET: 1"=100'
0 25 50 100

NORTH

DRAWING	REVISIONS	DATE

Manhard CONSULTING
Civil Engineers · Surveyors · Water Resource Engineers · Water & Wastewater Engineers
Construction Managers · Environmental Scientists · Landscape Architects · Planners

TRISTAN STRAUSS: APN 108-012-010
12019 WILDER RIDGE RD. WHITETHORN, CA 95589
WRPP AREA 2

PROJ. MGR.	POW
PROJ. ASSOC.	TL
DRAWN BY	NAH/TJS
DATE	06/02/2016
SCALE	AS SHOWN

SHEET
C2
STRWTCA 16–013

PRELIMINARY: FOR REVIEW ONLY

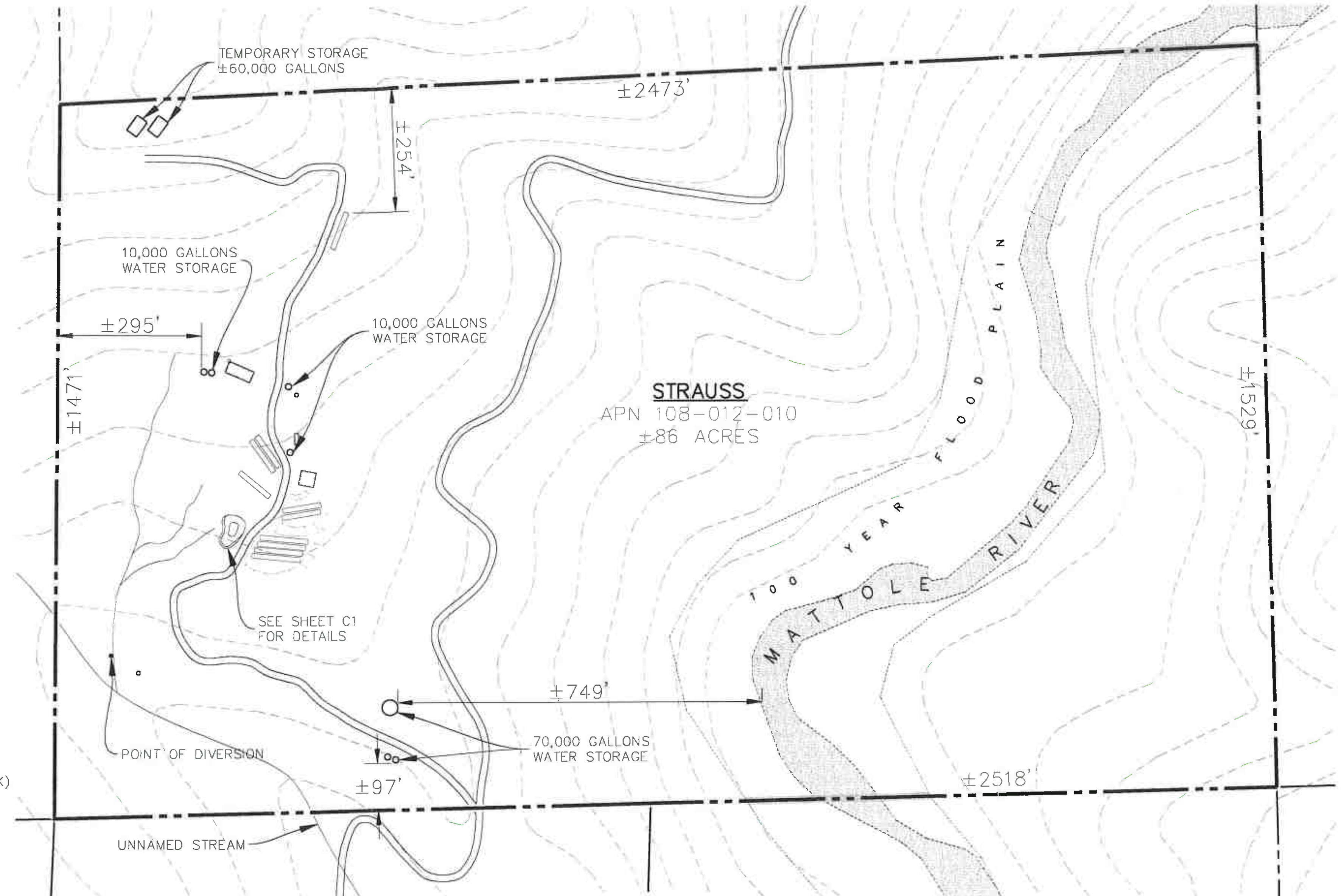
August 23, 2016 - 15:02 Dwg Name: P:\Strauss01\dwg\Civil\Final Drawings\Plan Set\STRWTCA - WRPP Area 2.dwg Updated By: tswift

STRAUSS

APN: 108-012-010

DIRECTIONS TO SITE:

FROM EUREKA, CA
- HEAD SOUTH ON US-101
- TAKE EXIT 642 TOWARDS REDWAY.
- CONTINUE ON REDWOOD DRIVE AND TURN RIGHT ON ETTERSBURG ROAD TOWARD ETTERSBURG.
- CONTINUE ON ETTERSBURG ROAD ACROSS THE MATTOLE RIVER AS IT TURNS TO WILDER RIDGE RD.
- CONTINUE ON WILDER RIDGE RD. AND TURN RIGHT AT THE TWO MAILBOXES NUMBERED 12035 AND 12031.
- CONTINUE ON DIRT ROAD AND TAKE SECOND LEFT TURN.



PLOT PLAN

11x17 SHEET: 1"=300'

0 75 150 300

GENERAL NOTES:

1. THESE NOTES SHALL APPLY TO ALL DRAWINGS U.O.N. OR SHOWN.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE ALTERNATIVE OWNER BUILDER PERMIT REQUIREMENTS OF HUMBOLDT COUNTY PLANNING AND BUILDING DEPARTMENTS AND APPLICABLE SECTIONS OF THE 2013 CALIFORNIA BUILDING CODE (CBC), AND THE LATEST CORRESPONDING EDITIONS OF THE FOLLOWING CALIFORNIA CODES: MECHANICAL (CMC), ELECTRICAL (CEC), PLUMBING (CPC), ENERGY (CEC), AND THE CALIFORNIA FIRE CODE (CFC).
3. FEATURES OF CONSTRUCTION SHOWN ARE TYPICAL AND SHALL APPLY GENERALLY THROUGHOUT SIMILAR CONDITIONS. SPECIFIC NOTES AND DETAILS ON STRUCTURAL DRAWINGS SHALL TAKE PRECEDENCE OVER GENERAL NOTES AND TYPICAL DETAILS.
4. DRAWING SCALE AS NOTED. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
5. ALL WORK SHALL BE PERFORMED BY A STATE OF CALIFORNIA LICENSED CONTRACTOR/OWNER.
6. THE CONTRACTOR/OWNER SHALL SECURE ALL NECESSARY PERMITS FROM THE HUMBOLDT COUNTY PUBLIC WORKS AND OTHER APPLICABLE AGENCIES.
7. ENGINEER MAY MODIFY LOCATION, QUANTITY, AND TYPE OF EROSION CONTROL MEASURES AT TIME OF GRADING DEPENDING ON SITE CONDITIONS AS THE PROJECT PROCEEDS.
8. PARCEL BOUNDARIES AND BUILDING LOCATIONS ARE APPROXIMATE.

PROJECT DESCRIPTION:

1. THE PROPOSED PROJECT IS CONSTRUCTION OF A WATER STORAGE POND FOR IRRIGATION USE UNDER A PENDING SMALL IRRIGATION USE REGISTRATION. THE ANTICIPATED STORAGE VOLUME OF THE POND IS ±70,000 GALLONS. ALL PROPOSED IMPROVEMENTS ARE AS SHOWN.

THIS APPLICATION ALSO INCLUDES REVIEW AND PERMITTING OF AN EXISTING POINT OF DIVERSION UNDER FISH AND GAME CODE 1602.

TREES TO BE REMOVED	=	0
EARTHWORK QUANTITIES	=	±234 CY
WATER	=	PRIVATE
SEWER	=	PRIVATE
PARCEL SIZE	=	±86 ACRES
ZONING:	=	AE; TPZ TIMBER (T)(FWRK)
BUILDING SETBACKS:		
FRONT	=	20'
SIDE	=	5'
REAR	=	10'
MAX. BLDG. HT.	=	NONE
MAX GROUND COVERAGE	=	40%
SRA AREA:	=	YES
IN COASTAL ZONE:	=	NO
IN 100 YR FLOOD ZONE:	=	YES

CONTRACTOR/OWNER NOTES:

1. THE CONTRACTOR/OWNER SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF PROJECT CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, AND THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS.
2. THE CONTRACTOR/OWNER SHALL DEFEND, INDEMNIFY, AND HOLD THE BUILDING DESIGNER/ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE BUILDING DESIGNER/ENGINEER.
3. THE CONTRACTOR/OWNER SHALL VERIFY ALL DIMENSIONS AND CONDITIONS DEPICTED HEREON PRIOR TO ORDERING ANY MATERIALS AND PRIOR TO COMMENCING CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED TO THE BUILDING DESIGNER/ENGINEER PRIOR TO PROCEEDING WITH WORK.

UNAUTHORIZED CHANGES & USES:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL AND THE COUNTY OF HUMBOLDT HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONALS.

PROJECT INFORMATION:

CLIENT:
TRISTAN STRAUSS
P.O. BOX 38
SAMOA, CA 95564
760-601-6070

OWNERS AGENT:
MANHARD CONSULTING
611 "I" STREET, SUITE A
EUREKA, CA 95501
(707) 444-3800

SITE ADDRESS:
12019 WILDER RIDGE RD.
WHITETHORN, CA 95589

TABLE OF CONTENTS:

NORTH

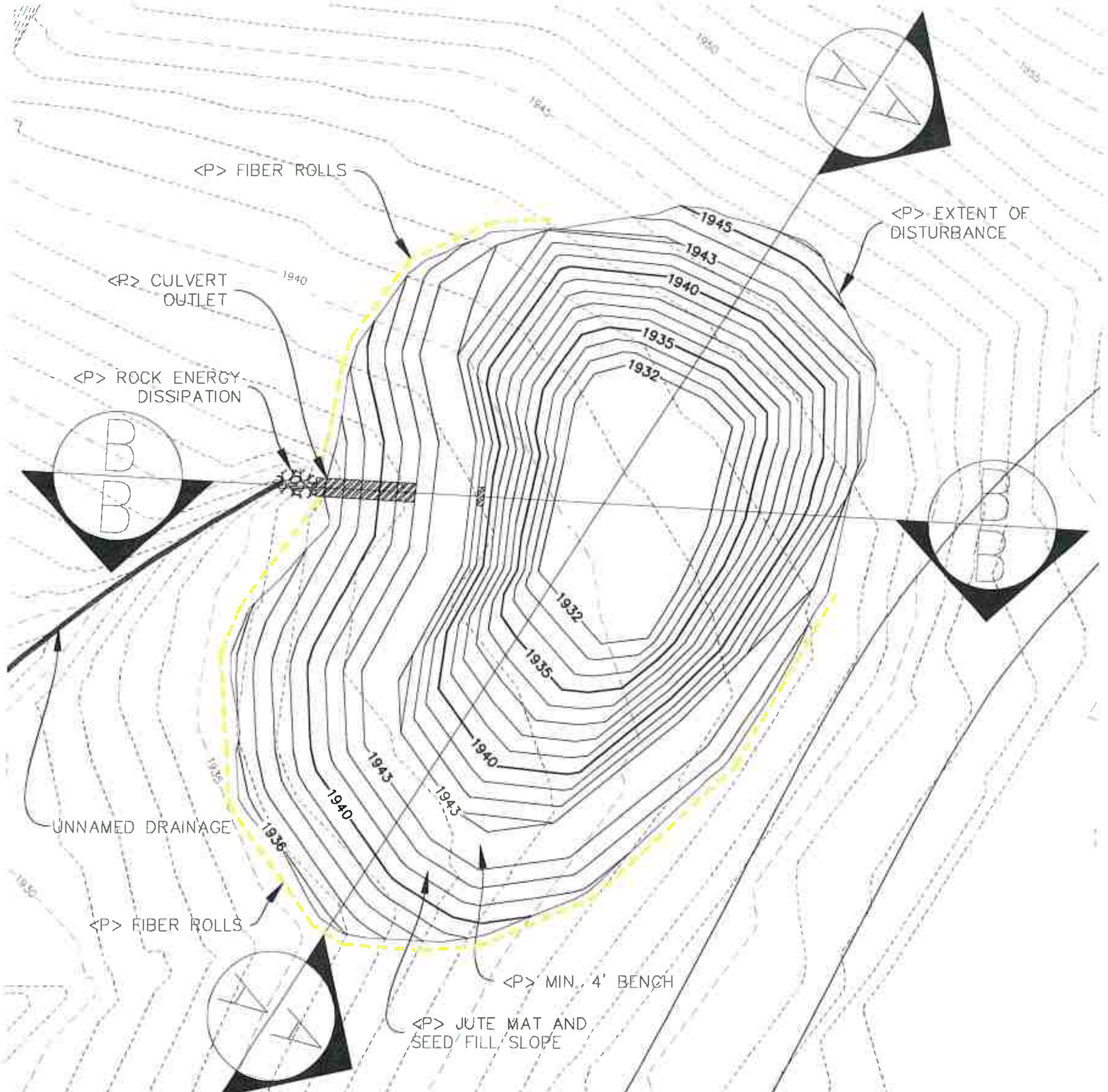
Manhard CONSULTING

TRISTAN STRAUSS: APN 108-012-010
12019 WILDER RIDGE RD. WHITETHORN, CA 95589
PLOT PLAN, VICINITY MAP & NOTES

PROJ. MGR:	PDW
PROJ. ASSOC:	MP
DRAWN BY:	STP
DATE:	4/1/2016
SCALE:	AS SHOWN

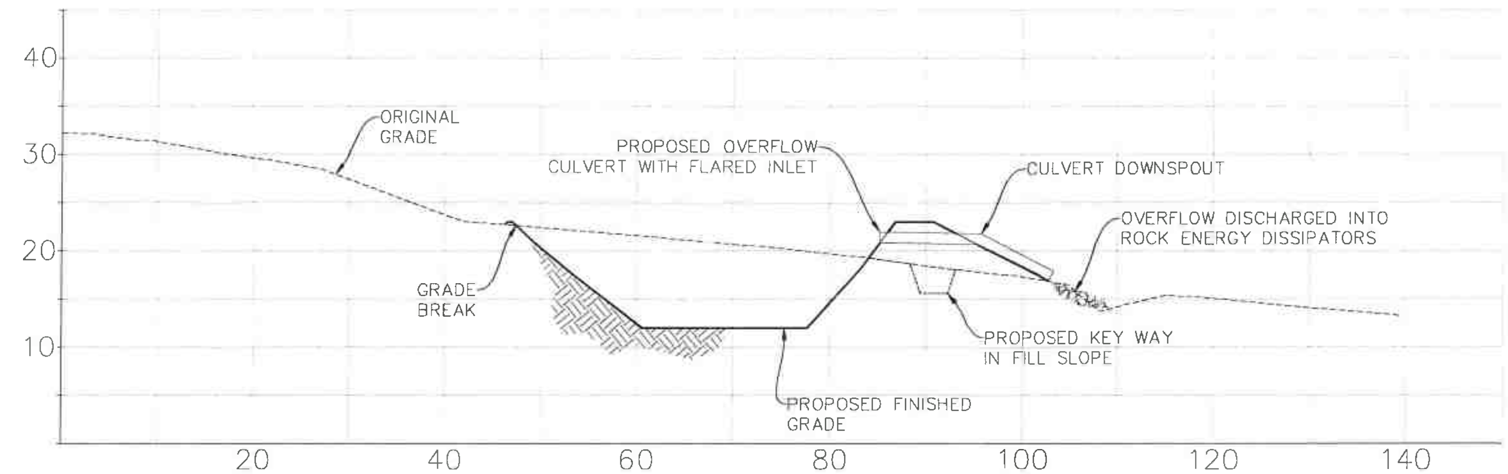
SHEET
C0
STRWTCA01

PRELIMINARY; FOR REVIEW ONLY



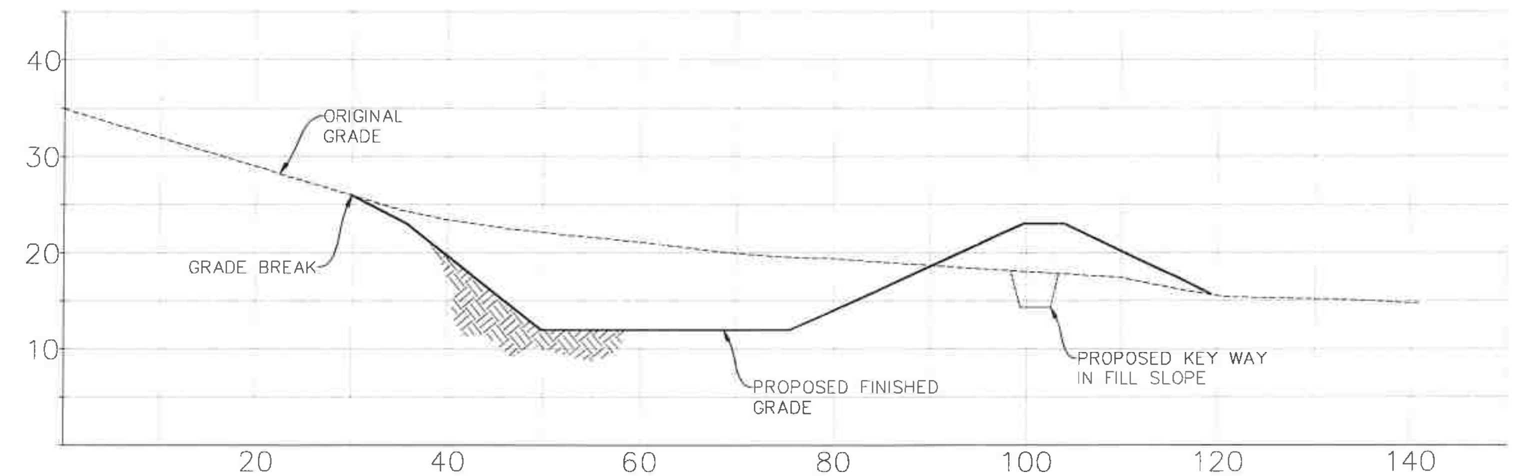
DETAIL VIEW

11x17 SHEET: 1"=20'



PROFILE B-B

11x17 SHEET: 1"=20'



PROFILE A-A

11x17 SHEET: 1"=20'

CULVERT INSTALLATION BMP'S:

- CULVERT INLET SHALL BE FLARED TO EFFECTIVELY CONVEY HIGH FLOWS DURING STORM EVENTS.
- OVERFLOW CULVERTS SHALL BE INSTALLED WITH ANTI SEEP COLLARS TO PROTECT THE STABILITY IF FILL SLOPES.
- CULVERT BEDS SHOULD BE COMPOSED OF ROCK-FREE SOIL AND EVENLY DISTRIBUTED ALONG THE LENGTH OF THE PIPE. BED AND SIDEWALL MATERIAL SHALL BE COMPACTED BEFORE PLACING PIPE.
- ALIGN CULVERTS WITH THE NATURAL STREAM CHANNEL ORIENTATION TO ENSURE PROPER FUNCTION, PREVENT BANK EROSION, AND MINIMIZE DEBRIS PLUGGING.
- PLACE CULVERTS AT BASE OF FILL WHEN POSSIBLE AND AT GRADE OF THE NATURAL STREAMBED AND PLACE ROCK ENERGY DISSIPATION AND/OR INSTALL A DOWNSPOUT TO ORIGINAL CHANNEL BED BEYOND TOE OF FILL. DOWNSPOUTS SHOULD ONLY BE USED WHEN NECESSARY AND SHALL BE ANCHORED ALONG FILL SLOPES.
- INITIAL COVER FOR BENCH SHOULD OCCUR AT CULVERT ENDS PRIOR TO FILLING THE CENTER LENGTH OF THE CULVERT. BACKFILL SHALL BE COMPACTED USING WATER AS NECESSARY THROUGHOUT PROCESS. BACKFILL COMPACTING SHALL BE DONE IN 0.5-1.0 LIFTS UNTIL FILL ABOVE THE CULVERT IS AT LEAST 1/3 THE DIAMETER OF THE CULVERT.
- POOR BASAL COMPACTION WILL CAUSE SETTLING OR DEFLECTION IN THE PIPE AND CAN RESULT IN A SPRING LINE ALONG THE LENGTH OF CULVERT POTENTIALLY RESULTING IN RUPTURE/FAILURE.

GENERAL CONSTRUCTION NOTES:

- ALL NOTES ON THESE PLANS SHALL APPLY TO NEW CONSTRUCTION.
- DRAWING SCALE AS NOTED. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
- FOLLOW MANUFACTURERS INSTALLATION REQUIREMENTS FOR ALL SPECIFIED HARDWARE, FIXTURES, AND MANUFACTURED ITEMS.
- ALL MATERIALS AND WORKMANSHIP SHALL BE ACCORDING TO PROVISIONS OF THE STANDARD SPECIFICATIONS AND STANDARD PLANS, CALIFORNIA DEPARTMENT OF TRANSPORTATION, 2010 OR CURRENT VERSION. EROSION & SEDIMENT CONTROL SHALL BE PERFORMED IN ACCORDANCE WITH THE HUMBOLDT COUNTY LAND USE AND DEVELOPMENT ORDINANCE, SECTION 331-12 LAND USE AND DEVELOPMENT.
- ALL WORK SHALL BE PERFORMED BY A STATE OF CALIFORNIA LICENSED CONTRACTOR.
- THE CONTRACTOR SHALL SECURE ALL NECESSARY PERMITS FROM HUMBOLDT COUNTY, NORTH COAST REGIONAL WATER QUALITY CONTROL BOARD (NCRWQCB), DEPARTMENT OF FISH AND WILDLIFE (DFW) AND OTHER APPLICABLE AGENCIES.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES AT JOB SITE BEFORE PRECEDING, AND SHALL CONTACT THE ENGINEER IMMEDIATELY WITH ANY DISCREPANCIES.
- UNDERGROUND SERVICE ALERT (USA) - CALL TOLL FREE 1-800-642-2444 AT LEAST 48 HOURS PRIOR TO EXCAVATION.
- PRIOR TO PERMIT CLOSE OUT HCBD REQUIRES A CERTIFICATION LETTER FROM ENGINEER. THE CERTIFICATION LETTER WILL STATE ACCEPTANCE OF EROSION CONTROL MEASURES, CERTIFICATION OF PLACEMENT AND COMPACTION OF FILL MATERIAL, AND COMPLETION OF WORK.
- ENGINEER MAY MODIFY LOCATION, QUANTITY, AND TYPE OF EROSION CONTROL MEASURES AT TIME OF GRADING DEPENDING ON SITE CONDITIONS AS THE PROJECT PROCEEDS.
- CONTRACTOR SHALL HOLD ON-SITE PRE-CONSTRUCTION MEETING WITH ENGINEER PRIOR TO ANY WORK. THROUGHOUT CONSTRUCTION, ENGINEER SHALL REVIEW AND APPROVE PROPOSED CONSTRUCTION REVISIONS AS REQUESTED BY CONTRACTOR AND AS REQUIRED BY THE HUMBOLDT COUNTY BUILDING DEPARTMENT.
- THE CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF PROJECT CONSTRUCTION, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, AND THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND SHALL NOT BE LIMITED TO NORMAL WORKING HOURS.
- HOURS OF CONSTRUCTION FOR ON AND OFF-SITE IMPROVEMENTS SHALL BE RESTRICTED TO MONDAY THRU FRIDAY FROM 7AM TO 6PM, SATURDAY FROM 9AM TO 5PM, WITH NO CONSTRUCTION ACTIVITY ON SUNDAY. ALL PROPOSED USES MUST COMPLY WITH THE NOISE STANDARDS IDENTIFIED IN FIGURE 3-2 OF THE GENERAL PLAN.
- NO CONSTRUCTION SHALL OCCUR BETWEEN OCTOBER 15TH AND APRIL 15TH WITHOUT PRIOR APPROVAL OF THE COUNTY OF HUMBOLDT.
- AN ENCROACHMENT PERMIT IS REQUIRED BY THE DEPARTMENT OF PUBLIC WORKS FOR ALL IMPROVEMENT WORK WITHIN THE HUMBOLDT COUNTY RIGHT OF WAY.
- TOPOGRAPHIC SURVEY PROVIDED BY MANHARD CONSULTING, DATED 3/2016.
- THE CONTRACTOR SHALL REMOVE FROM THE SITE AND LAWFULLY DISPOSE OF ALL DELETERIOUS MATERIAL (BROKEN CONCRETE, ASPHALT PAVEMENT, BASE MATERIAL, ROCKS, STUMPS, ROOTS, LIMBS, ETC.) TO AN APPROVED DISPOSAL SITE.
- UNLESS SPECIFICALLY AGREED TO OTHERWISE BETWEEN THE CONTRACTOR AND THE OWNER, THE OWNER IS RESPONSIBLE FOR PAYING FOR ALL SOIL COMPACTION TESTS AND OR OTHER TESTS THAT ARE REQUIRED BY THESE PLANS.
- SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE DURING CONSTRUCTION.

Manhard CONSULTING

TRISTAN STRAUSS: APN 108-012-010

12019 WILDER RIDGE RD. WHITETHORN, CA 95589

SITE GRADING DETAILS AND PROFILES

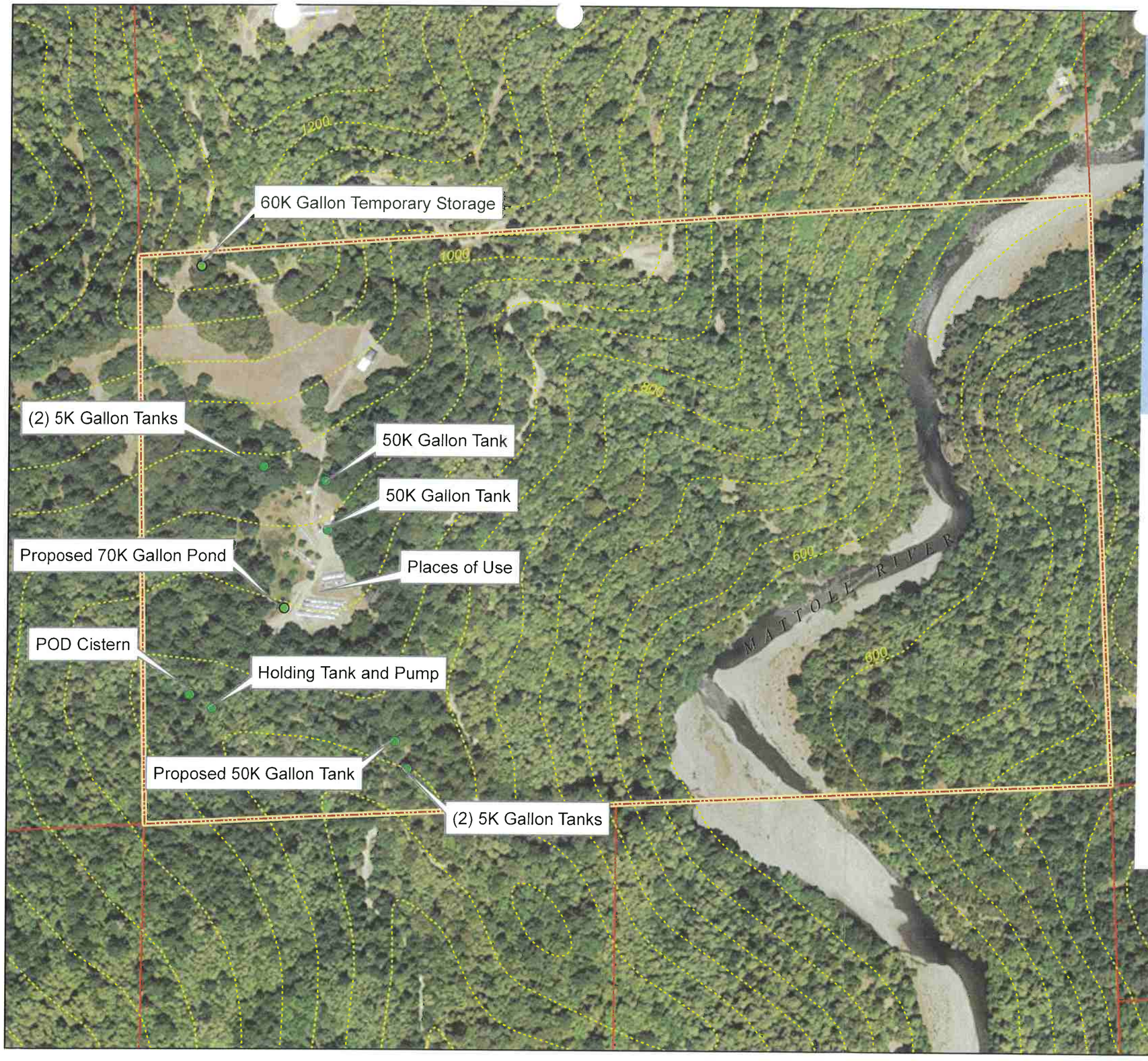
PROJ MGR:	PDW
PROJ ASSOC:	MR
DRAWN BY:	STP
DATE:	4/1/2016
SCALE:	AS SHOWN

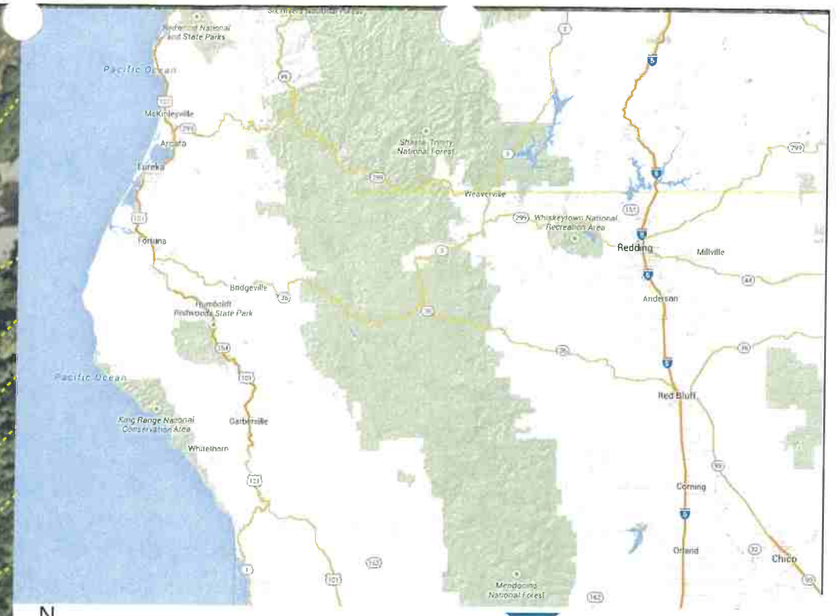
SHEET

C1

STRWTCA01

PRELIMINARY: FOR REVIEW ONLY





N

Manhard CONSULTING

Tristan Strauss
Humboldt County APN 108-012-010
86 Acres

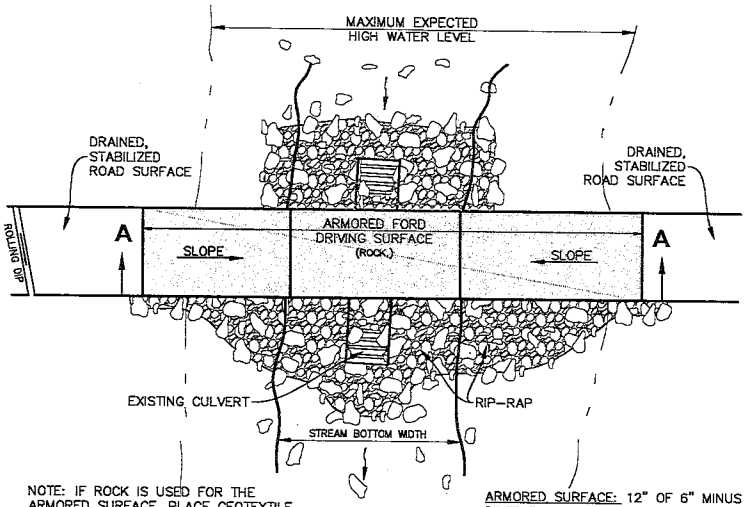
SITE DESCRIPTION:
Rural property development located off Wilder Ranch Road near Ettersburg, CA. The Registrant uses an instream cistern as the primary point of diversion. Water is diverted to storage during winter months to a proposed storage amount of 0.7 acre feet under a pending Small Irrigation Use Registration. 60,000 gallons are temporarily stored in bladders until more appropriate means can be installed.

POD COORDINATES:
40.165478°
-124.019022°

700 350 0 700 Feet

Table of Contents

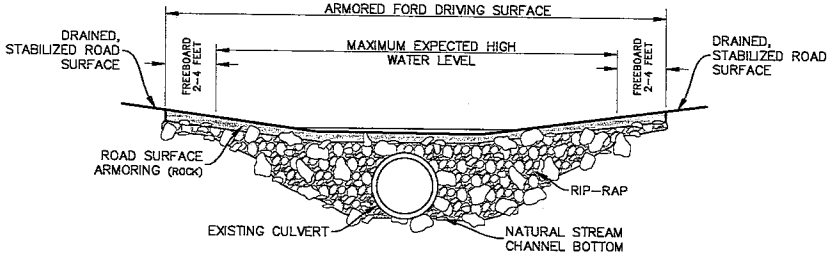
RD-1.1 MODIFIED LOW WATER ROCK FORD



NOTE: IF ROCK IS USED FOR THE ARMORED SURFACE, PLACE GEOTEXTILE FABRIC AMOCO 2002, OR EQUAL PRIOR TO ROCK INSTALLATION.

PLAN VIEW

ARMORED SURFACE: 12" OF 6" MINUS RIVER RUN ROCK
RIP-RAP: 12" OF TYPE NO. 1 BACKING ROCKS (0-5% 200 LBS, 50-100% 75 LBS, AND 90-100% 25 LBS)



SECTION A-A

RD-1.2 FORDS

DESCRIPTION

Fords work well on small to medium sized streams where there is a stable stream bottom and traffic is light. However, "construction" of fords and other unimproved stream crossings on well traveled roads should be avoided where water is flowing because of their potential to impact water quality. In certain situations, where flash floods, high seasonal flood peaks or floating debris are problems, fords may be a practical answer for crossing a poorly incised, shallow stream.

BEST MANAGEMENT PRACTICES

- Fords in flowing streams, called "wet fords," are typically composed of streambed gravels, fill, or concrete structures built in contact with the streambed so that vehicles can cross the channel (Figure 1).
- Fords should be designed to allow low summer flows seep through the fill, and high water discharges flow over the top (Figure 2).
- Paving fords across flowing streams may be necessary to maintain water quality if there is to be regular traffic. Paving consists of a concrete, slightly dish-shaped slab across the watercourse, and a discharge apron or energy dissipater on the downstream side to prevent scour during high flows.
- On small, poorly incised, ephemeral or intermittent streams a ford may be needed if there is insufficient channel depth to install a culvert. In fact, a rock lined rolling dip with a rock apron face is generally desirable to permanent culverts on these swales and small watercourses. Fords have the advantage, over culverted fills, of never plugging.
- Fords on small streams should be rock armored to prevent erosion of the road surface and fill during periods of runoff. The fill face on the downstream side of the fill can either be protected with rock armor or fitted with a large overside drain (berm drain) to prevent erosion (Figure 3).
- Unimproved fords, which consist of a stream channel that has been filled with a substantial quantity of soil and left unprotected by armor or surfacing is a hazard to water quality and should not be constructed.

Figure 1. Wet ford on Class II perennial stream. Clean rock aggregate has been imported for the travelling surface and coarse rock armor protects the outer edge of the road bed. It is important that rock aggregate used in a ford be large enough to resist transport during winter flows. Fords should not be used if high winter flows would cut off access to inspect and maintain drainage structures further out the road. From Weaver and Hagans (1994).

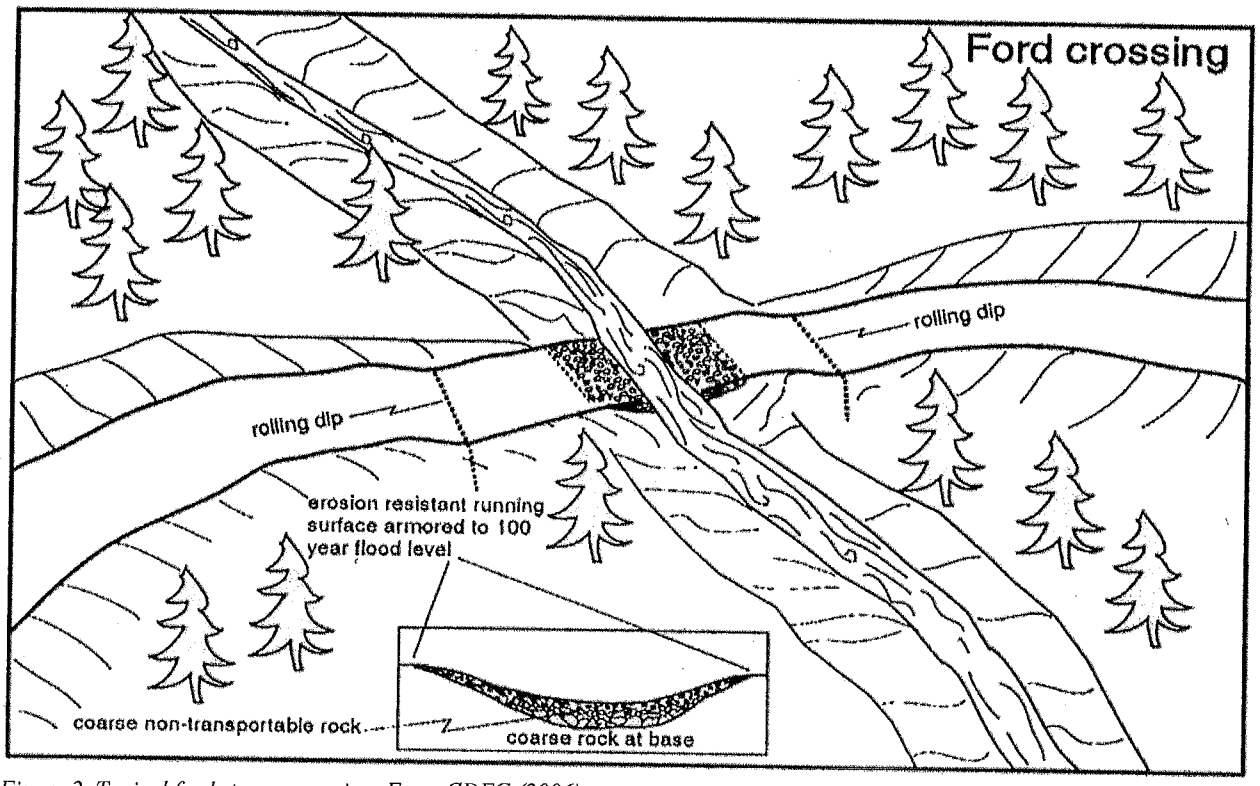


Figure 2. Typical ford stream crossing. From CDFG (2006).

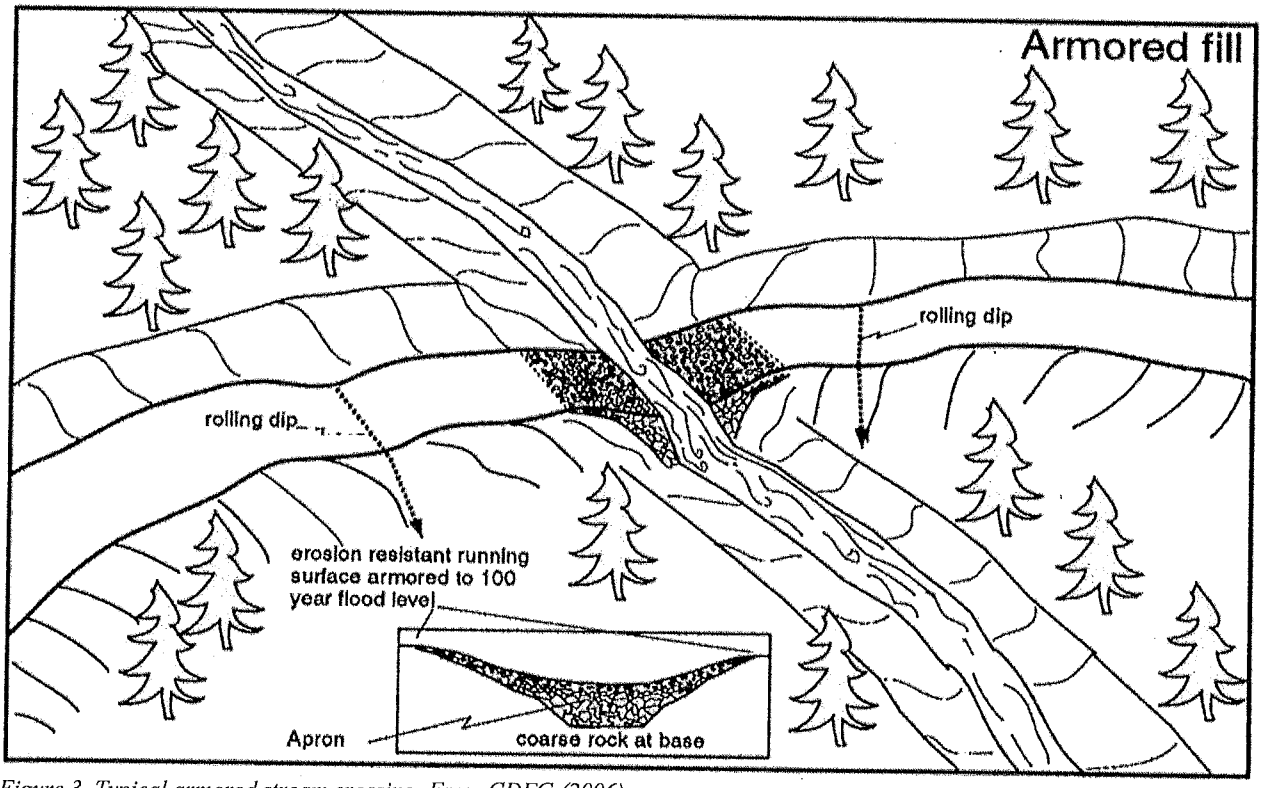


Figure 3. Typical armored stream crossing. From CDFG (2006).

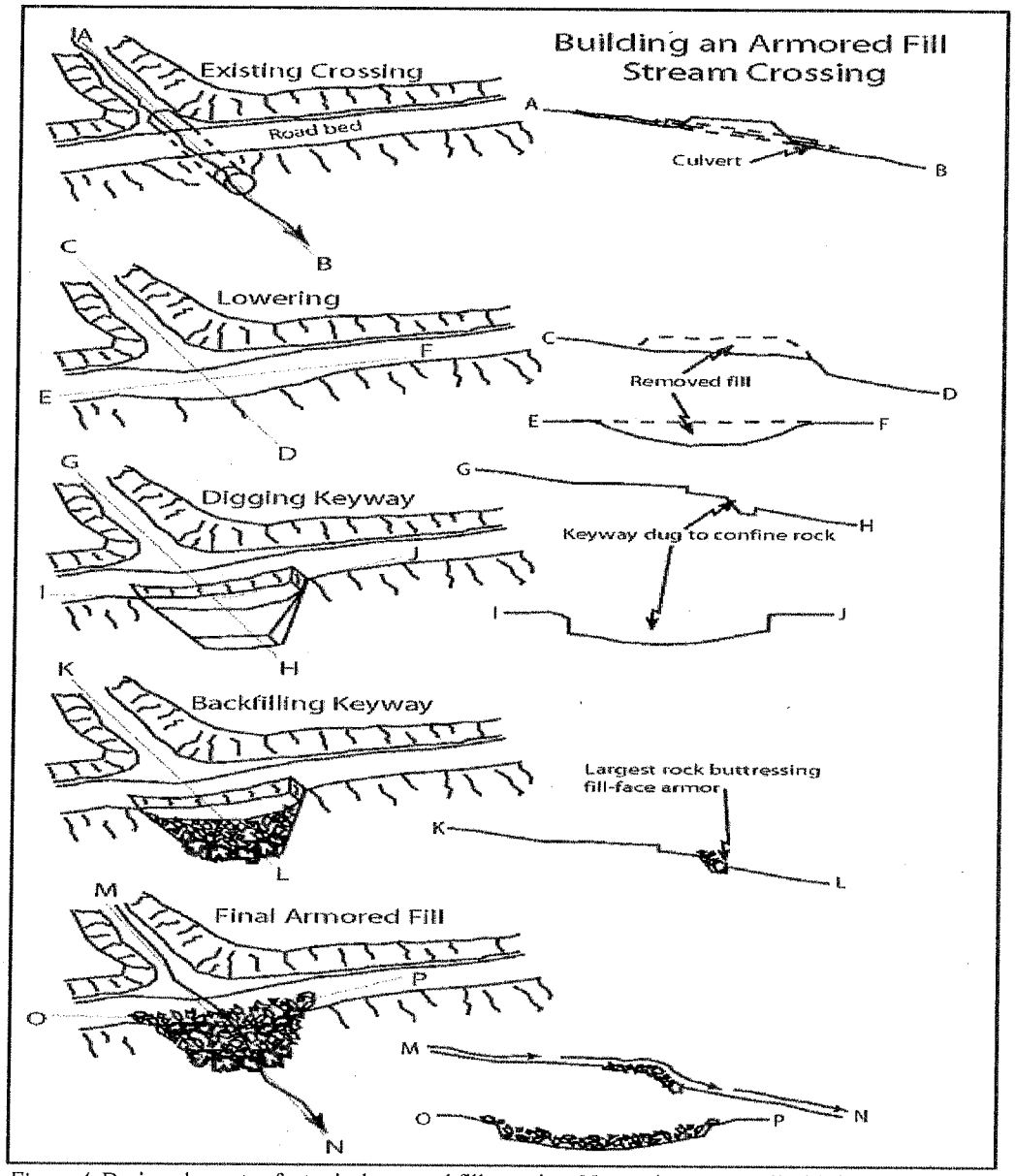


Figure 4. Design elements of a typical armored fill crossing. Note: where geotextile fabric may interfere with passage of amphibians in any Class 2 or 3 crossing, bury geotextile fabric with at least 6 inches of rock. Do not expose geotextile fabric in the bed of fish-bearing stream channels. From CDFG (2206).

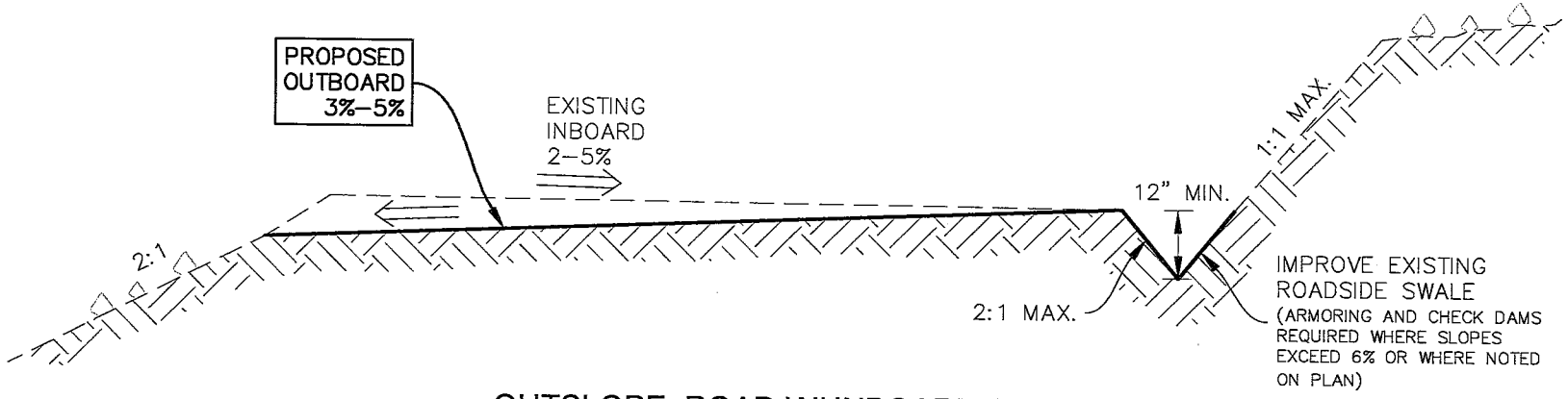
Source Material for Road BMP RD-2.7 Fords

2006. California Department of Fish and Game. Part X - Upslope Erosion Inventory and Sediment Control Guidance, California Salmonid Stream Habitat Restoration Manual.

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.3 OUTSLOPED ROAD W/ INBOARD SWALE

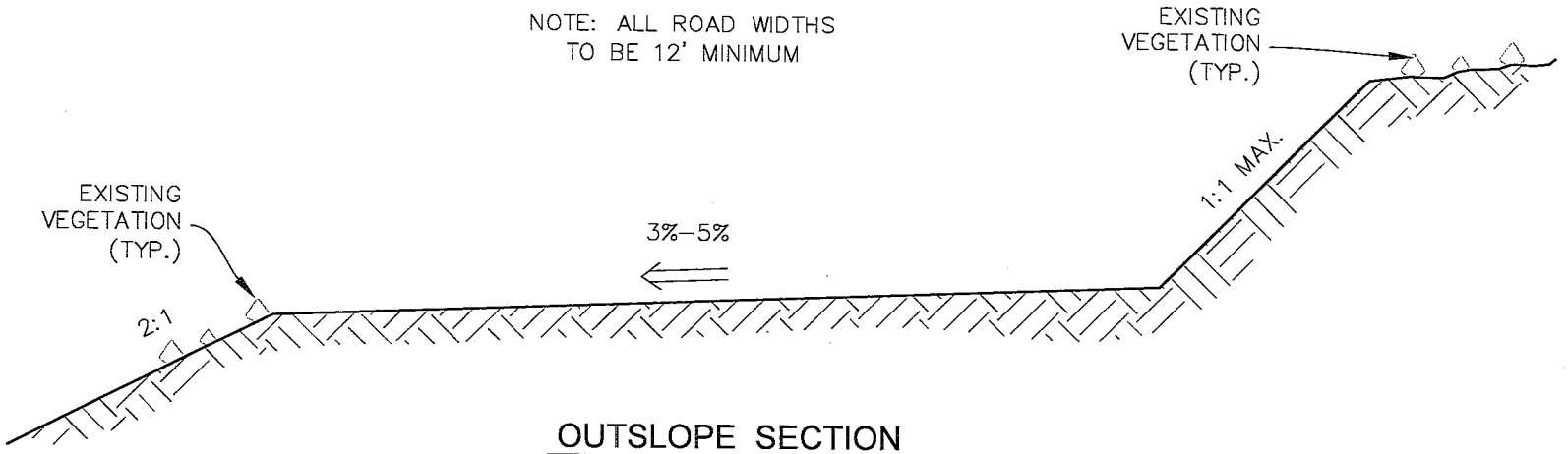
NOTE: ALL ROAD WIDTHS TO BE 12' MINIMUM AND ROCKED/REINFORCED WITH 2"MINIMUM AGG. BASE FROM ON SITE SOURCE



OUTSLOPE ROAD W/ INBOARD SWALE

RD-1.4 OUTSLOPED ROAD

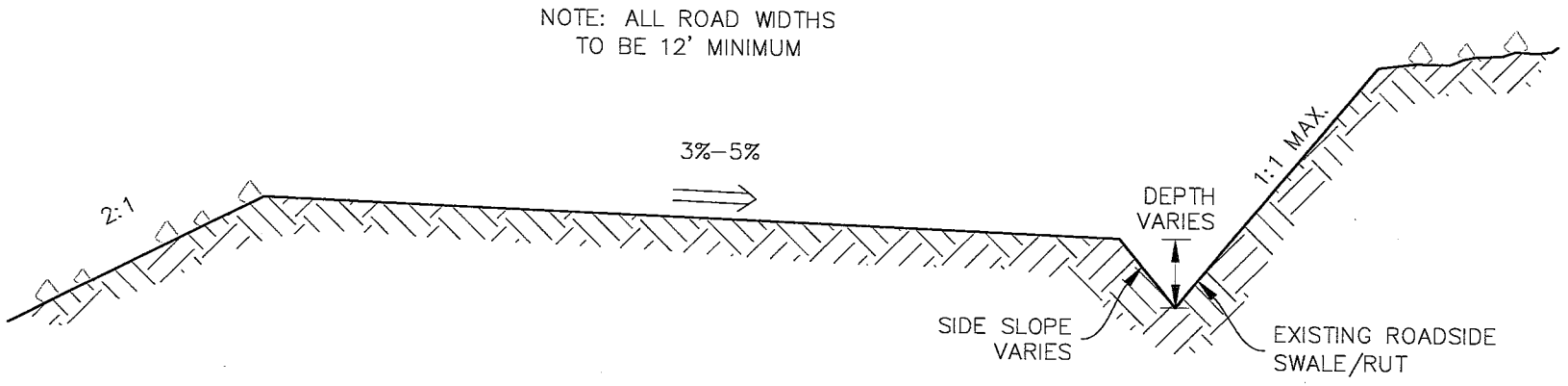
NOTE: ALL ROAD WIDTHS TO BE 12' MINIMUM AND ROCKED/REINFORCED WITH 2"MINIMUM AGG. BASE FROM ON SITE SOURCE



OUTSLOPE SECTION

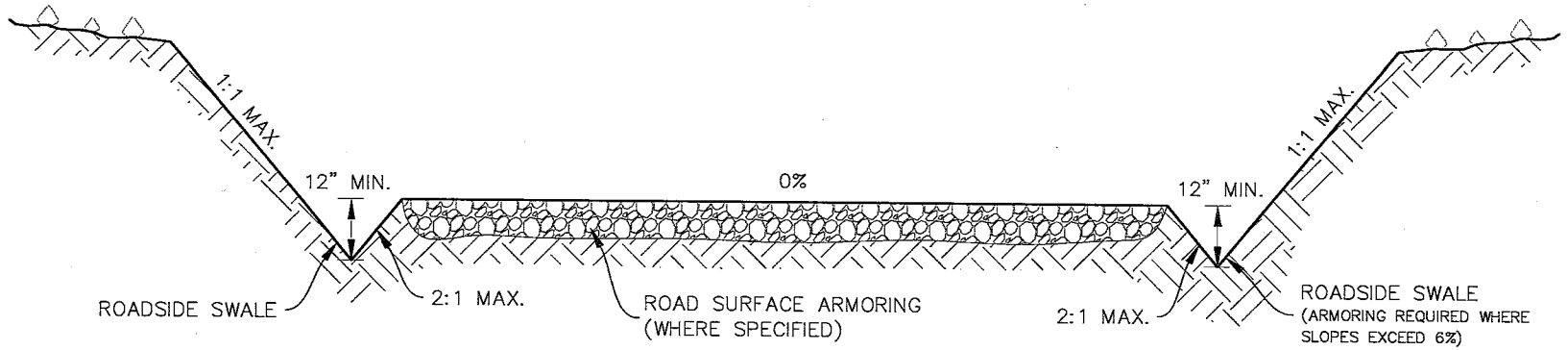
RD-1.5 INSLOPE ROAD

NOTE: ALL ROAD WIDTHS TO BE 12' MINIMUM AND ROCKED/REINFORCED WITH 2"MINIMUM AGG. BASE FROM ON SITE SOURCE



INSLOPE SECTION

RD-1.6 THRU CUT ROAD



NOTE: IF ROCK IS USED FOR THE ARMORED SURFACE, PLACE GEOTEXTILE FABRIC AMOCO 2002, OR EQUAL PRIOR TO ROCK INSTALLATION.

ARMORED SURFACE: 12" OF CLASS 2 AGGREGATE BASE (3" MINUS, WELL GRADED AND LESS THAN 5% CLAYS)

RD-1.7 CRITICAL DIPS

DESCRIPTION

A critical dip is a rolling dip constructed on or close to the down-road hinge-line of a stream crossing, displaying a diversion potential. Build a critical dip at all stream crossings in order to prevent stream diversions when a culvert plugs and water flows out onto the road. Construction may be similar to Road BMP RD-1.8 Rolling Dips.

BEST MANAGEMENT PRACTICES

- Stream crossings should be constructed to prevent diversion of flood overflow if the culvert were to become plugged. This can be done by designing the road to dip into and out of the stream at the crossing site or by installing a broad rolling dip on the down-road side of the crossing. This will allow the overflow to be directed back into the natural stream channel (Figure 1).
- Critical dips should be designed to handle the 100-year flow event for the stream it is installed at.
- Road surface and fill slopes at the critical dip should be rocked or otherwise stabilized.
- Must be deep enough that it is not obliterated by normal grading, but not so deep that it is difficult to negotiate or a hazard to normal traffic (Table 1).
- See Road BMP RD-1.8 Rolling Dips for more details.

Road grade %	Upslope approach (distance from up-road start of rolling dip to trough) (ft)	Reverse grade (distance from trough to crest) (ft)	Depth below average road grade at discharge end of trough (ft)	Depth below average road grade at upslope end of trough (ft)
<6	55	15-20	0.9	0.3
8	65	15-20	1.0	0.2
10	75	15-20	1.1	.01
12	85	20-25	1.2	.01
>12	100	20-25	1.3	.01

Table 1. Table of rolling dips dimensions. Design principles apply to critical dip. From CDFG (2006).

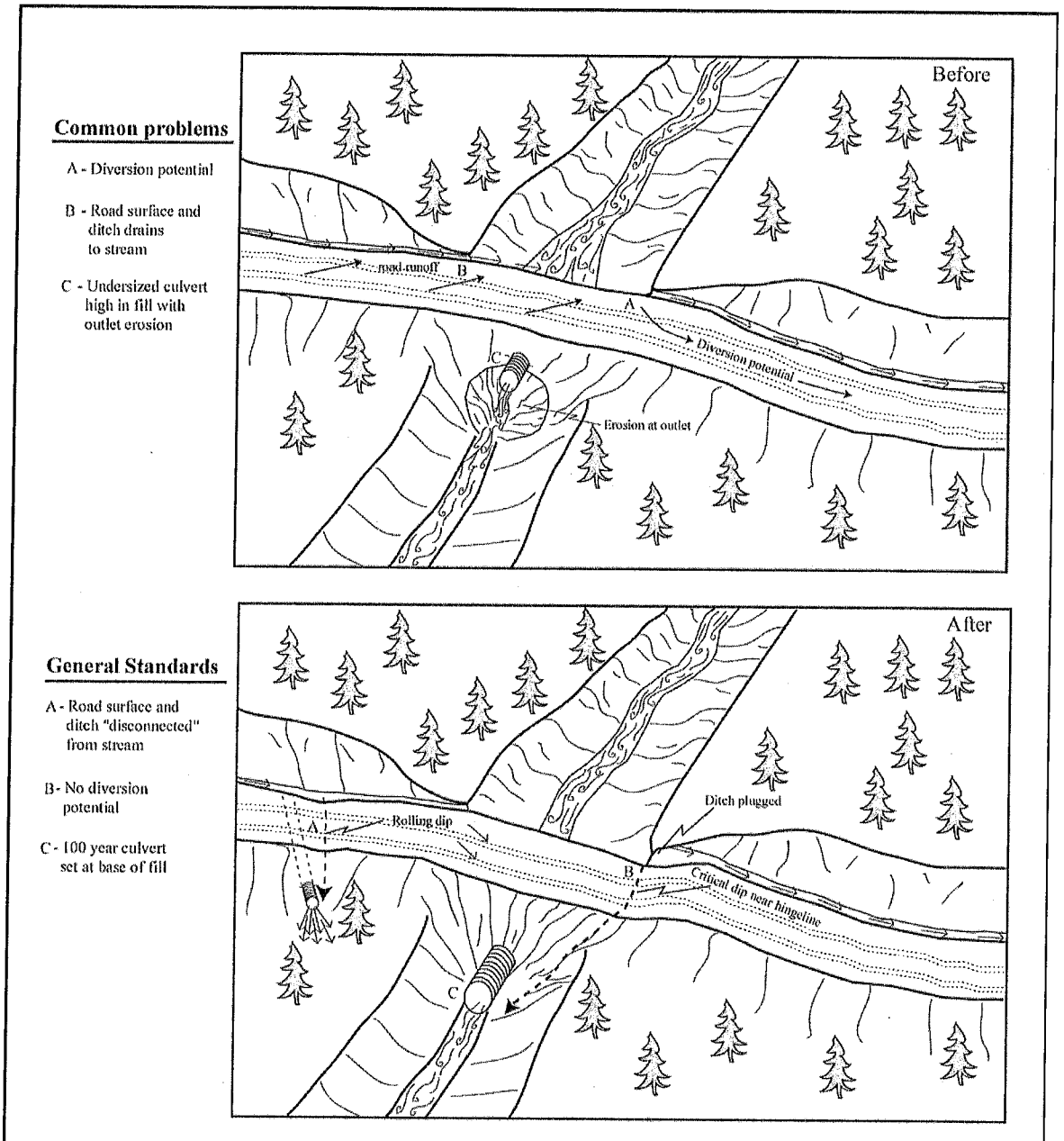


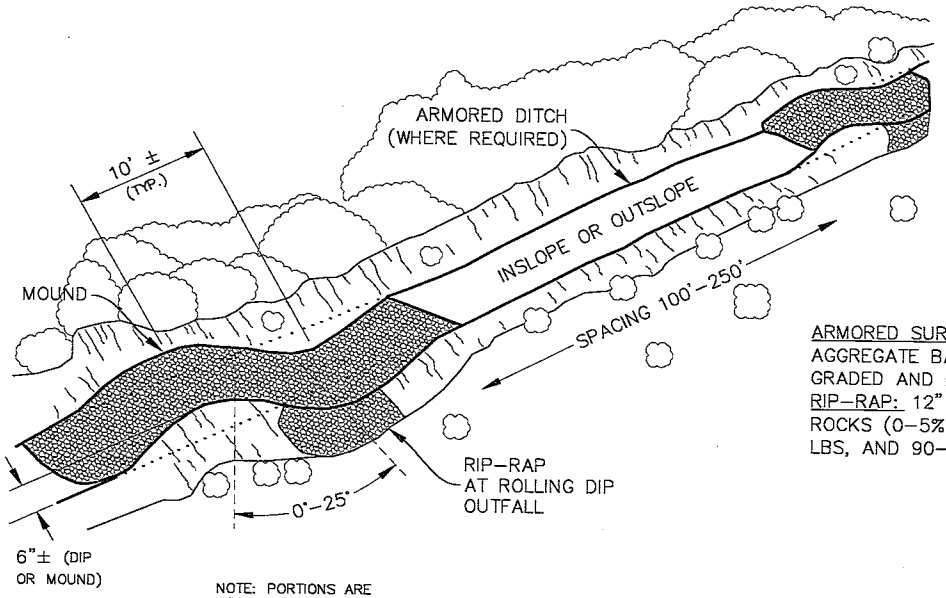
Figure 1. Install critical dips to prevent diversion prevention at stream crossings. Critical dips should be designed to handle the flow from a 100-year storm event. From CDFG (2006).

Source Material for Road BMP 2.9 Critical Dips

2006. California Department of Fish and Game. Part X - Upslope Erosion Inventory and Sediment Control Guidance, California Salmonid Stream Habitat Restoration Manual.

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

RD-1.8 ROLLING DIP



NOTE: PORTIONS ARE EXAGGERATED FOR CLARITY

ROLLING DIP DETAIL
NOT TO SCALE

ARMORED SURFACE: 12" OF CLASS 2 AGGREGATE BASE (3" MINUS, WELL GRADED AND LESS THAN 5% CLAYS)
RIP-RAP: 12" OF TYPE NO. 1 BACKING ROCKS (0-5% 200 LBS, 50-100% 75 LBS, AND 90-100% 25 LBS)

TABLE 1: ROLLING DIP AND DITCH RELIEF CULVERT RECOMMENDATIONS

ROAD GRADE (%)	SOIL ERODIBILITY EROSIVE SOILS (FT)
0-3	250
4-6	160
7-9	130
10-12	115
12+	100

RD-1.9 GRADING UNPAVED ROAD SURFACES

DESCRIPTION

Good maintenance practices on unpaved road surfaces prevent roadway erosion, deterioration or failure; helps with sediment and dust control, and provides a safe roadway surface for the traveling public.

BEST MANAGEMENT PRACTICES

- Fit grading to the surrounding terrain.
- Blade and compact a smooth surface and compact loose soils as needed.
- Crown or slope the road to avoid ponding or concentration of runoff. Outslope all roads where possible and safe.
- Preserve existing vegetation to the greatest extent feasible.
- Minimize the length and steepness of slopes.
- Maintain natural drainage patterns in watershed.
- Preserve or improve surface drainage in the vicinity of the road.
- Disconnect road drainage features from watershed hydrology.
- Make sure drainage is self-maintaining.
- Keep runoff velocities low, using energy dissipating control measures.
- Minimize amount of road-related sediment that gets into watercourses.
- Prevent dust abatement chemicals from getting into watercourses or riparian areas.

SEASONAL CONCERNS

- Perform routine road surface maintenance during the dry season. Avoid working in wet conditions and during the wet season (October 15- April 15), except for emergencies. Disturbed soil combined with rainfall, greatly increase the risk of exposed sediment runoff into streams.
- Inspect roads and associated drainage facilities for signs of erosion or deterioration at least twice annually with at least one inspection during or after first storm events of the season with additional follow-up for severe storm events. Inspect all road and drainage facilities after a large storm event. Note locations of road surfaces, drainage features, cutslopes and fillslopes that appear to be failing and contributing sediment to streams in order to prioritize maintenance or repair.

SPOILS AND SIDECASTING

- Avoid sidecasting of soil in all cases where it could be delivered into a watercourse, riparian area, roadside ditch or storm drain. In some instances, under the following guidelines (Table 1), sidecasting is allowable given remote distances from spoils storage sites. In these cases, the setback distance required depends on slope and vegetation. The presence of vegetation helps to slow the travel of sediment downslope, so good judgment is needed to assess the situation. *Do not sidecast at all* if the slope is sparsely vegetated and it appears that sediment will travel with rain runoff into a stream or estuary system, even if setback distances are applied. On slopes of 5:1 (20% gradient) or less, sidecasting is allowed beyond 150 feet of a watercourse, stream crossing, riparian area, roadside ditch or storm drain. On 2:1 slopes (50%) or less, sidecasting is allowed beyond 300 feet of a watercourse, stream crossing, riparian area, roadside ditch or storm drain. On slopes greater than 2:1, typically sidecasting is *not recommended*, however there may be rare instances on slopes greater than 2:1 where sidecasting is acceptable given very long distances from waterbodies and good vegetative cover. Seek advice from local fisheries agency staff when in doubt. Avoid concentrating sidecasting repeatedly in the same place. Never sidecast large amounts of soil from major landslides.

- Temporary spoils stockpiles should be located in areas that are relatively level; relatively free of vegetation and away from streams and wetlands areas (see Erosion Control BMP EC-1.5 Stockpile Management). The primary concern is to keep stockpiled materials from eroding into stream or wetland systems. Apply erosion control BMPs when needed. Do not place temporary spoils piles at the top of unstable slopes or at the edges of slopes where water will carry sediment into watercourses. Remove temporary stockpiles to permanent disposal locations before the rainy season. If emergency work is conducted during the rainy season, remove stockpile as soon as feasible and before the next rain storm.

SLOPE GRADIENT	DISTANCE FROM WATERCOURSE, STREAM CROSSING, RIPARIAN AREA, ROADSIDE DITCH, STORM DRAIN	SIDECASTING RULE
Any slope	Appears that sediment will travel with rainwater into watercourse.	Not allowed
5:1 (20%) or less	150 feet or more	Allowed using good judgment
2:1 (50%) or less	300 feet or more	Allowed using good judgment
Greater than 5:1 (50%)	Vegetated slope long distance from watercourse	Allowed
Greater than 5:1 (50%)	Sparsely vegetated slope and it appears that sediment will travel with rain into watercourse	Not allowed

Table 1. Sidecasting guidelines. From: FishNet 4C (2004)

BERMS

- Do not leave loose soil piled in berms alongside the road or ditch. Loose or exposed soil berms are erodible and readily flushed into waterways and storm drains.

- If any berm is left in place for public safety reasons it must be compacted and stabilized with seeding or asphalt. Frequent well placed breaks in the berms are necessary to allow water to drain from road, preserving the natural drainage pattern of the slope.

Source Material for Road BMP RD-3.2 Grading

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

2002. Five Counties Salmon Conservation Program. A Water Quality and Stream Habitat Protection Manual for County Road Maintenance.

RD-1.10 WATERBARS

DESCRIPTION

Waterbars are shallow, abrupt excavated dips or troughs with an adjacent, downslope hump or mounded berm, that are built at an oblique angle across the road (Figure 1 and 2). Waterbars are useful only on low standard seasonal or temporary, unsurfaced roads where winter use will not occur, because traffic easily cuts through the soft berm and fills the adjacent dip. Waterbars should be constructed at proper spacing according to the grade of the road (Table 3). Waterbars are usually regraded (smoothed out) at the beginning of each operating season, and then reconstructed at the beginning of each winter period.

Waterbars are high maintenance drainage structures that are prone to failure if not properly built and maintained. Unauthorized winter traffic is likely to break down waterbars and result in serious road surface erosion and water pollution.

BEST MANAGEMENT PRACTICES

- Waterbars and rolling dips should be spaced along the road close enough together that the road surface is not gullied (Table 3). Appropriate spacing of surface drainage structures depends on soil credibility and runoff rates. Look at local roads to determine the maximum spacing that will work in your specific area.

Table 3. Maximum distance between waterbreaks on roads and trails (feet)[1]

Erosion Hazard Rating (for surface erosion)	Road or Trail Gradient (%)			
	10%, or less	11-25%	26-50%	over 50%
Extremely high	100'	75'	50'	50'
High	150'	100'	75'	50'
Moderate	200'	150'	100'	75'
Low	300'	200'	150'	100'

Table 3. From Weaver and Hagans (1994). [1] Adapted from California Forest Practice Rules. This is the maximum distance between waterbars: when in doubt, reduce the spacing. Soils are nonrenewable and waterbars are inexpensive.

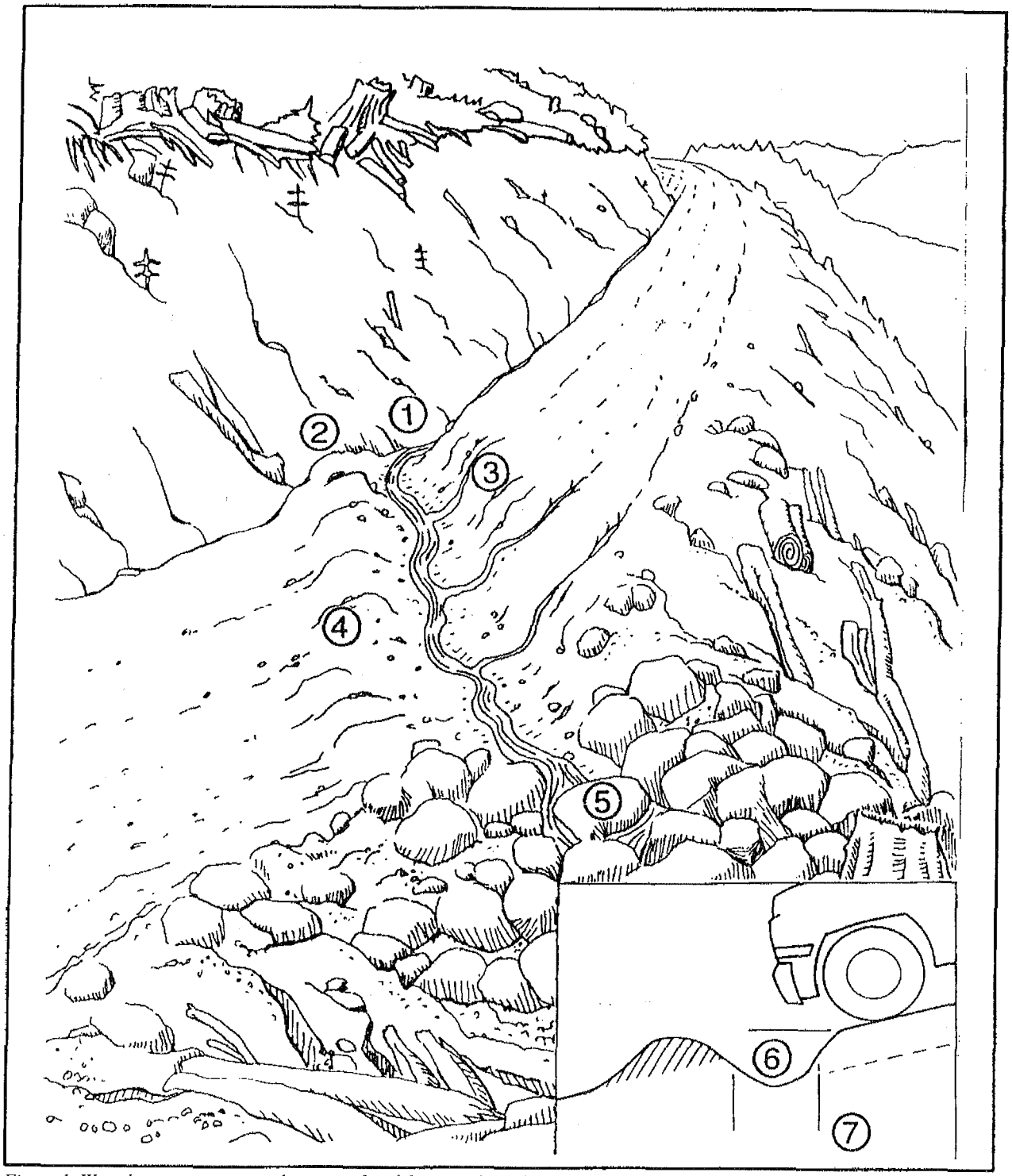


Figure 1. Waterbars are constructed on unsurfaced forest and ranch roads that will have little or no traffic during the wet winter period. The waterbar should be extended to the cutbank to intercept all ditch flow (1) and extend beyond the shoulder of the road. A berm (2) must block and prevent ditch flow from continuing down the road during flood flows. The excavated waterbar (3) should be skewed 30° to the ditch-line with the excavated material bermed on the downhill grade of the road (4). Water should always be discharged onto the downhill side on a stable slope protected by rip rap or vegetation (5). The cross ditch depth (6)

and width (7) must allow vehicle cross-over without destroying the function of the drain (B.CM.F., 1991). From Weaver and Hagans (1994).

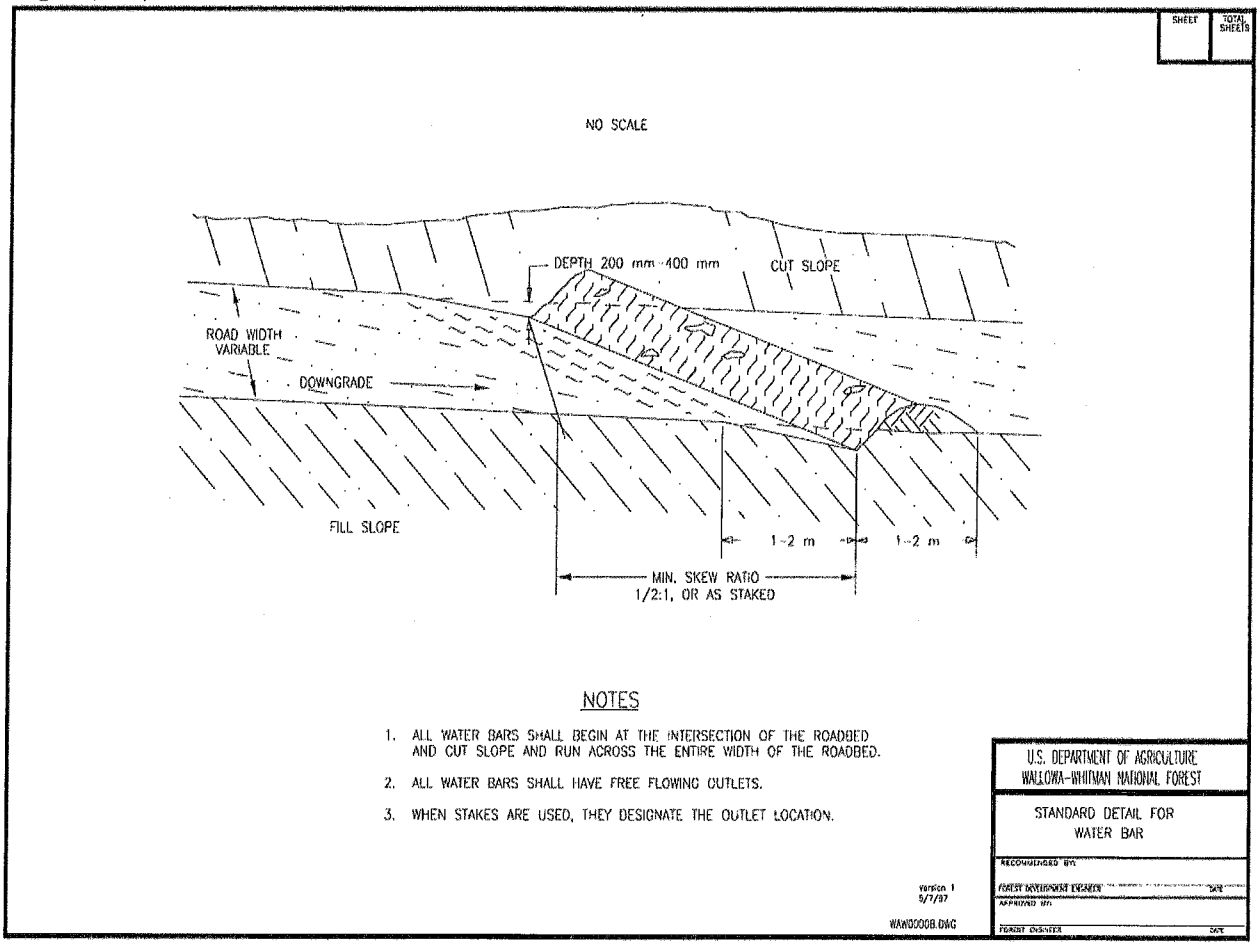


Figure 2. Typical design of a waterbar. From US Forest Service.

Source Material for Road BMP RD-7.8 Waterbars

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.11 DITCH RELIEF CULVERT INSTALLATION

DESCRIPTION

Ditch relief culverts (DRCs) divert water from an inside road ditch to an outside area beyond the outer edge of the road fill. DRCs take the flow through or beneath the road surface. Ditch relief culverts may also be used to filter water in a buffer zone prior to entering a waterway.

BEST MANAGEMENT PRACTICES

- Culverts should be designed and installed at intervals along the road that are close enough to prevent erosion of the ditch and at the culvert outfall, and at locations where collected water and sediment is not discharged directly into watercourses (Table 1).

- Install ditch relief culverts at an oblique (typically 30 degree) angle to the road so that ditch flow does not have to make a sharp angle turn to enter the pipe (Figure 1). On low gradient roads (<5%), where ditch flow is slow, ditch relief culverts can be installed at right angles to the road.

- Ditches should ***neither*** be discharged directly into the inlet of a watercourse crossing culvert, nor should ditch relief culverts discharge into a watercourse via surface flow without first directing flow through an adequate filter strip (Figure 2).

- In addition to installing ditch relief culverts on either approach to watercourse crossings, it is also advisable to consider installing ditch drains before curves, above and below through-cut road sections, and before and after steep sections of the road.

- If the ditch is on an insloped or crowned road that is very close to a stream, consider using outsloping to drain the road surface (see Road BMP RD-1.3, 1.4 Outslope Road). The ditch and the ditch relief culvert would then convey only spring flow from the cutbank, and not turbid runoff from the road surface.

- Do not discharge flow from ditch relief culverts onto unstable or highly erodible hillslopes

- Culverts should be installed at the gradient of the original ground slope, so it will emerge on the ground surface beyond the base of the fill. If not, either the fill below the culvert outlet should be armored with rock, or the culvert should be fitted with an anchored downspout to carry erosive flow past the base of the fill (Figure 1).

- Downspouts longer than 20 feet should be secured to the hillslope for stability. Full round downspouts are preferred over half-round downspouts.

Table 1. Maximum suggested spacing for ditch relief culverts[1] (ft)

Road grade (%)	Soil credibility				
	very high	high	moderate	slight	very low
2	600-800[2]				
4	530	600-800[2]			
6	355	585	600-800[2]		
8	265	425	525	600-800[2]	
10	160	340	420	555	
12	180	285	350	460	600-800[2]
14	155	245	300	365	560
16	135	215	270	345	490
18	118	190	240	310	435

[1]*Adapted from Transportation Handbook USDA Forest Service, R-6, 1966. Culvert spacing may be too great in locations where ditch runoff is accumulated and discharged onto steep hillslopes that are prone to gullying. Spacing is designed to control ditch erosion, not culvert outfall erosion, and are based on 25-year storm and precipitation rate of 1-2 in/hr for 15 minutes. If less, multiply by the intensity 0.50, 030, etc. If 2-3 in/hr, divide distance in table by 1.50; if3 -4 in/hr, divide by 1.75; and if 4-5 in/hr, divide by 2.00. The U.S. Forest Service also publishes abundant information on preventing and controlling gully erosion below culvert outfalls. From Hagans and Weaver (1994).*

[2]*Even with stable ditches, ditch relief culvert spacing greater than about 600 to 800 feet is generally not recommended due to the large volume of road surface and cutslope runoff that would be discharged through the culvert and onto lower slopes during peak runoff periods. Culvert outlet erosion may occur with less than 800 feet of contributing ditch line, so observe local conditions to determine the upper limit of acceptable spacing in your area.*

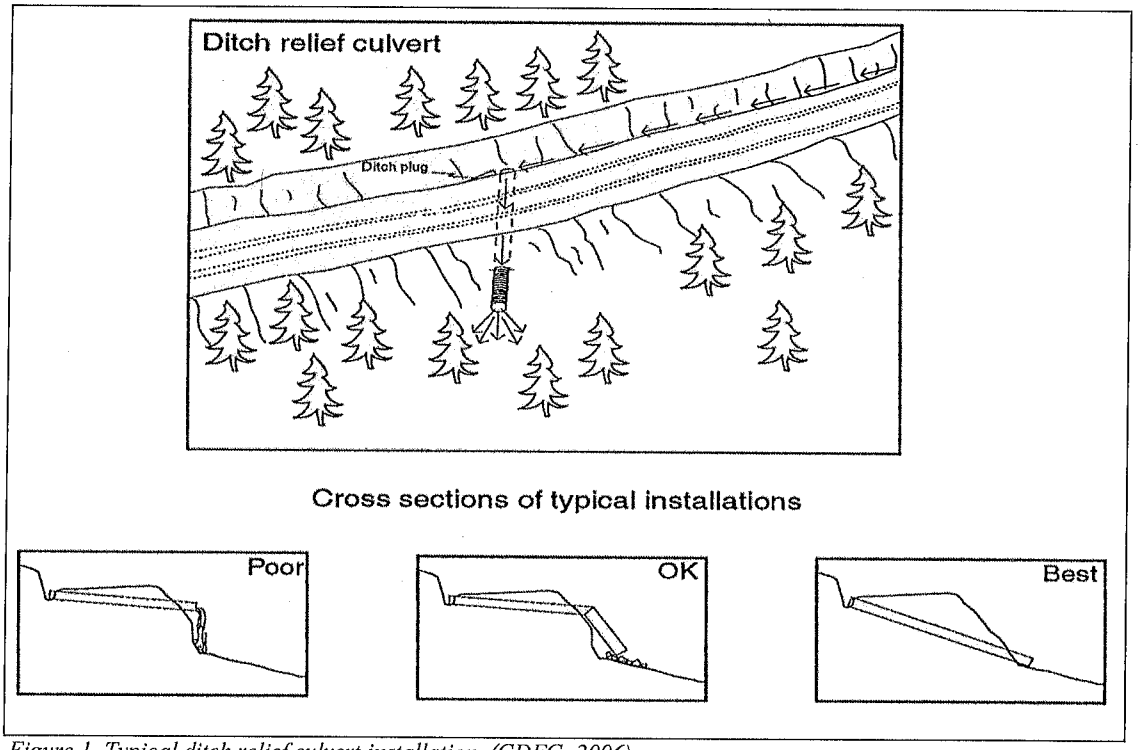


Figure 1. Typical ditch relief culvert installation. (CDFG, 2006)

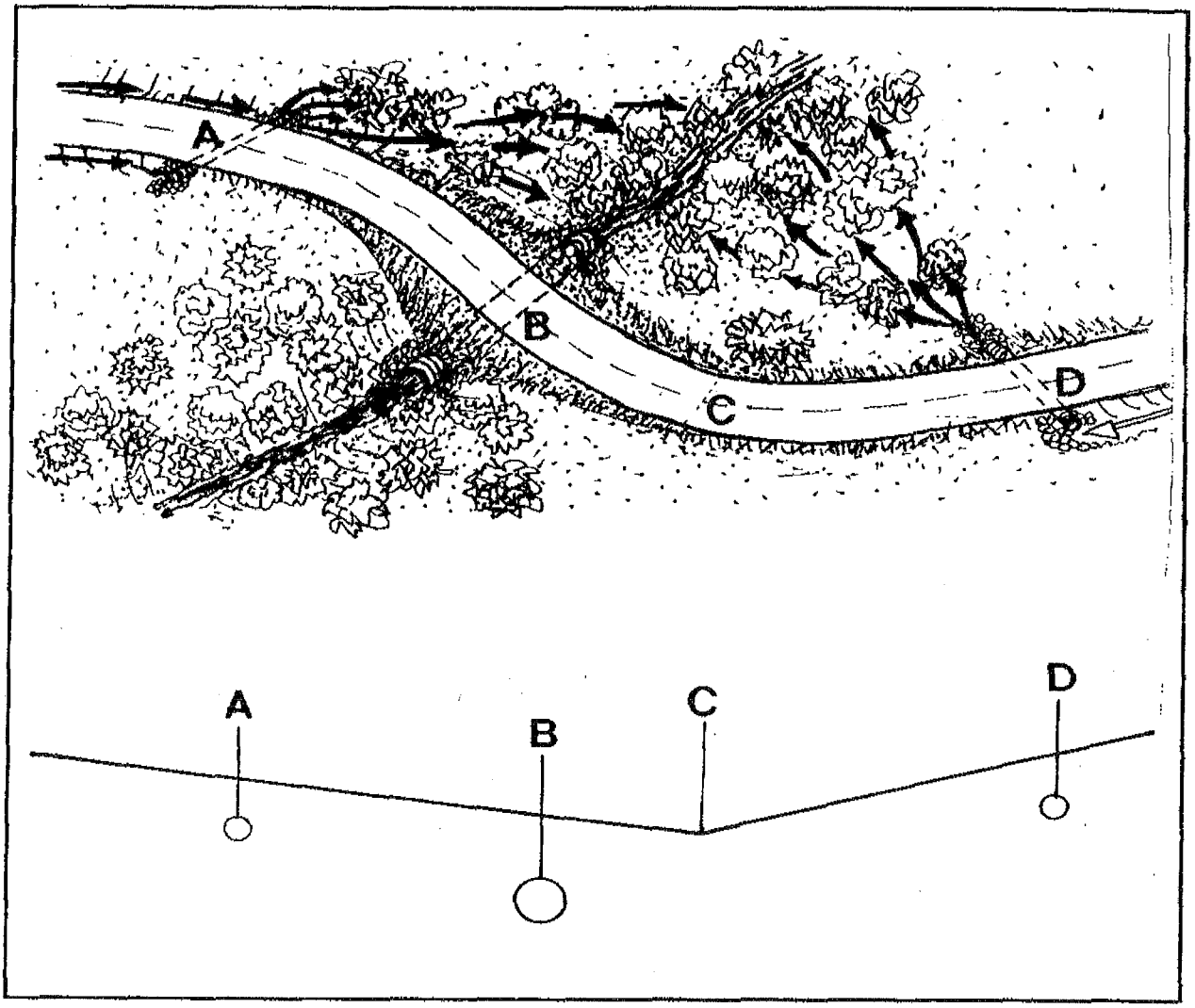


Figure 2. Where a road approaches a stream crossing (B), ditch flow should be culverted across the road (A,D) and discharged into a vegetated buffer that can filter the runoff before it reaches the watercourse. If the stream culvert plugs with debris or is topped by flood flows, flow will spillover the road at the change in grade at location "C" and back into the stream channel (modified from M.D.S.L. 1991). From Weaver and Hagans (1994).

Source Material for Road BMP 2.10 Ditch Relief Culvert Installation

2006. California Department of Fish and Game. Part X - Upslope Erosion Inventory and Sediment Control Guidance, California Salmonid Stream Habitat Restoration Manual.

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.12 STREAM CROSSING INSTALLATION

DESCRIPTION

During road building, the construction of culverted stream crossings has the greatest potential of all activities to cause immediate sediment pollution. Culverts should be properly aligned, bedded, backfilled and covered, or they will be subject to eventual failure. In all cases, disturbance to the stream banks and streambed should be minimized during stream crossing construction.

BEST MANAGEMENT PRACTICES

- Culverts should be aligned with the natural stream channel. Correct alignment is critical for the culvert to function properly. Misalignment can result in bank erosion and debris plugging problems (Figure 69a).

- Stream crossing culverts should be placed at the base of the fill, and at the grade of the original streambed (Figure 1) (Figure 69d).

- Culvert should be inset slightly into the natural streambed so that water drops several inches as it enters the pipe. Culvert inlets set too low can plug with debris and those set too high can allow water to undercut the culvert (Figure 69b). Culverts placed midway up the outside of the fill are more likely to plug with sediment or organic debris, because their ability to pass materials is reduced, or to cause erosion of the fill below the culvert outlet (Figure1).

- The culvert bed may be composed of either compacted rock-free soil, or gravel. If gravel is used for the bed, filter fabric will be needed to separate the gravel from the soil to minimize the potential for soil piping. Bedding beneath the culvert should provide for even distribution of the load over the length of the pipe.

- Inlet and outlet of the culvert should be armored. A metal, concrete, sandbag or rock head-wall can be constructed to prevent inlet erosion. A trash protector can be installed just upstream from the inlet where there is a hazard of floating limbs and wood chunks plugging the culvert inlet. This is especially important on logging roads where the upslope areas have recently been harvested or are slated for harvesting in the future.

- Stream crossings that are not at grade can be retrofitted with a downspout with rock placed at the outlet for armoring against hillslope erosion.

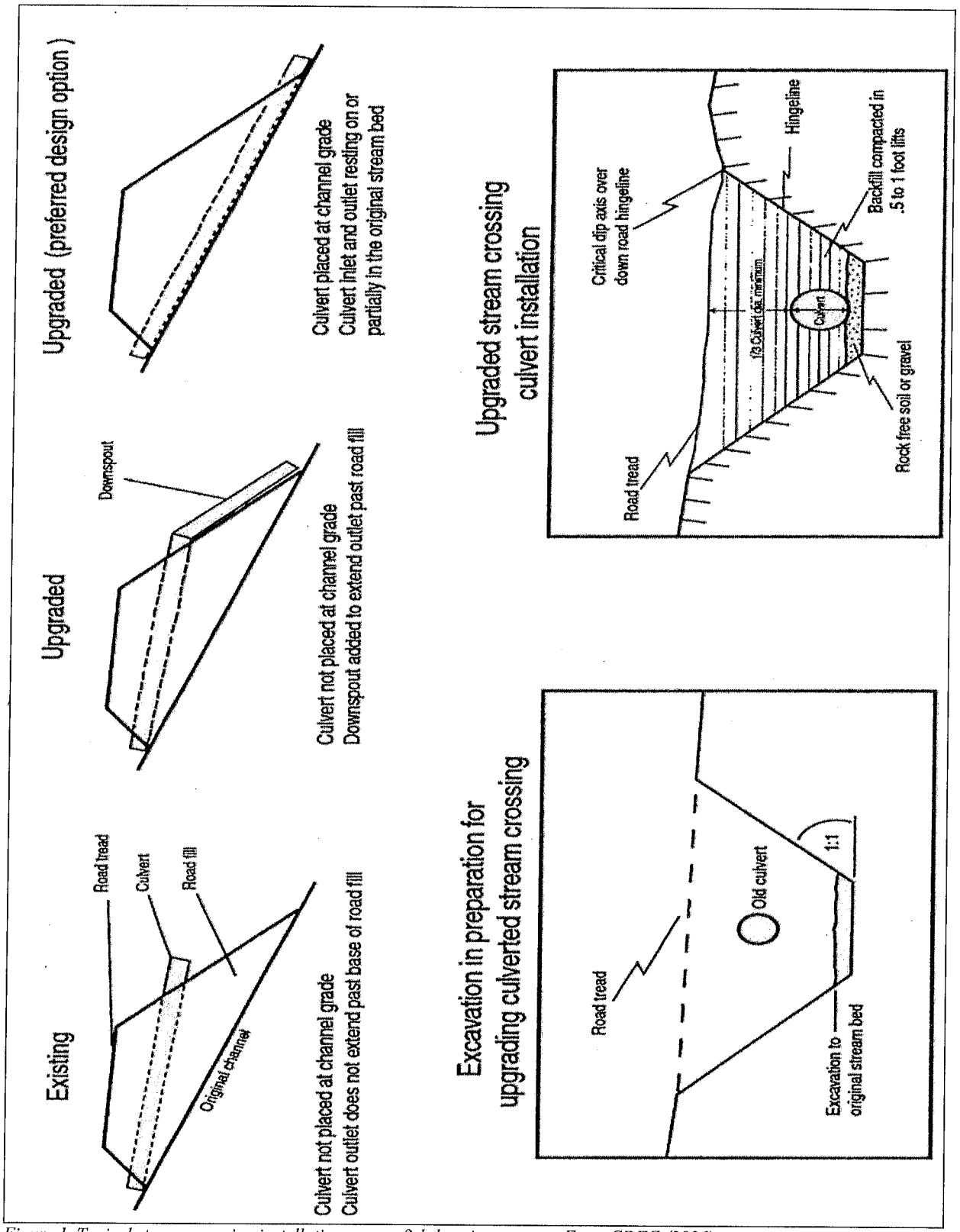


Figure 1. Typical stream crossing installation on non fish-bearing streams. From CDFG (2006).

Figure 69a, b. Proper culvert installation involves correct culvert orientation, setting the pipe slightly below the bed of the original stream, and backfilling and compacting the fill as it is placed over the culvert. Installing the inlet too low in the streambed (A) can lead to culvert plugging, yet if it set too high (B) flow can undercut the inlet (fromM.D.SL.,1991).

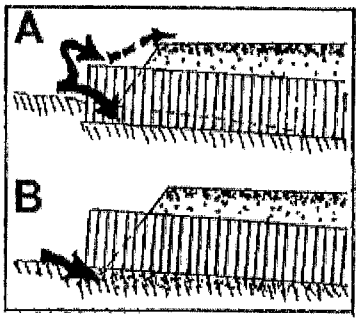
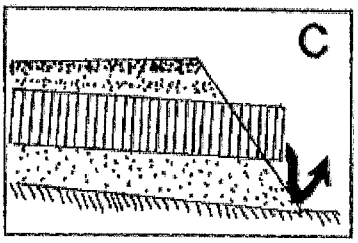


Figure 69c. If the culvert outlet is placed too high in the fill (C), flow at the outfall will erode the fill.



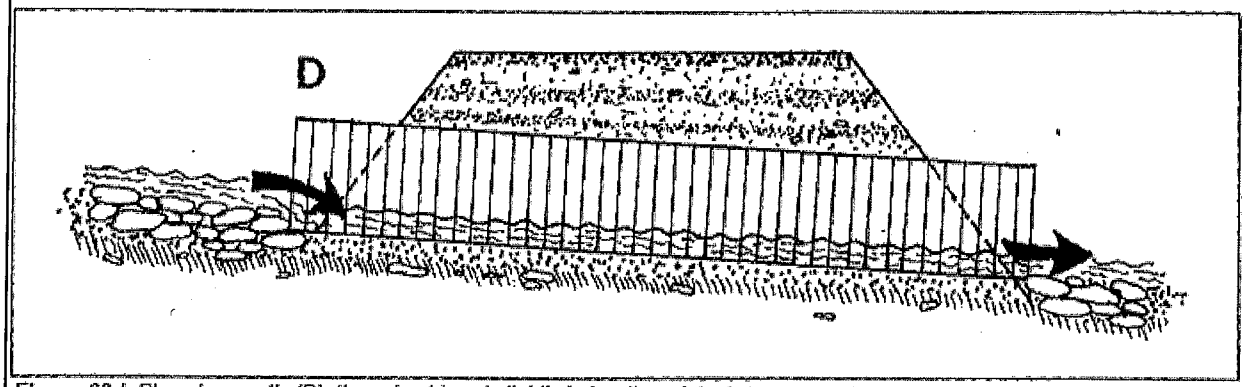


Figure 69d. Placed correctly (D), the culvert is set slightly below the original stream, grade and protected with armor at the inlet and outlet.

Figures 69a,b,c,d. Typical stream crossing installation. From Hagans and Weaver (1994).

Source Material for Road BMP RD-2.8 Stream Crossing Installation

2006. California Department of Fish and Game. Part X - Upslope Erosion Inventory and Sediment Control Guidance, California Salmonid Stream Habitat Restoration Manual.

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.13 DRAINAGE FOR UNPAVED ROAD SURFACES

DESCRIPTION

Roads should be designed and constructed to cause minimal disruption of natural drainage patterns. Provisions for two components of road drainage should be included in every road project: 1) road surface drainage (including drainage which *originates* from the cutbank, road surface, and fillslope); and 2) hillslope drainage (including drainage from large springs, gullies, and streams which *cross* the road alignment).

BEST MANAGEMENT PRACTICES

- Maintain natural drainage patterns in watershed through installing drainage features to keep water within sub-basins.
- Crown or slope the road to avoid ponding or concentration of runoff. Outslope all roads where possible and safe (see Road BMP RD-1.3,1.4 Outslope).
- Use rolling dips instead of ditch relief culverts (DRCs) when possible (Table 1) (Figure 1). Rolling dips require less maintenance and are less prone to failure than culverts (see Road BMP RD-1.8 Rolling Dips).
- Disconnect road drainage features from watershed hydrology. Shorten ditch lengths to stream crossings by installing a ditch relief culvert or rolling dip before the watercourse (see Road BMP RD-1.11 Ditch Relief Culvert Installation).
- In addition to installing DRCs on either approach to the stream crossings, it is also advisable to consider installing ditch drains before curves, above and below through-cut road sections, and before and after steep sections of the road.
- Ditches should neither be discharged directly into the inlet of a stream crossing culvert, nor should DRCs discharge into a watercourse without first directing flow through an adequate filter strip.
- Culverts should be designed and installed at intervals along the road that are close enough to prevent erosion of the ditch and at the culvert outfall. They should be installed at locations where collected water and sediment is not discharged directly into watercourses (Table 2).
- DRCs should not be used on erosive slopes without a downspout (see Construction BMP SS-11 Slope Drain).
- In areas of high erosion and/or storm runoff, *minimum* ditch relief culvert sizes should be 18 inches in diameter, and never less than 12 inches in other areas.
- A 10% grade to the culvert will usually be self cleaning. The culvert grade should also be at least 2% greater than the ditch which feeds it. The culvert should be placed at a 30 degree skew to the ditch to improve inlet efficiency and prevent plugging and erosion at the inlet.

- Stream crossings culverts and DRCs should be installed at the gradient of the original ground slope, so it will emerge on the ground surface beyond the base of the fill. If not, either the fill below the culvert outlet should be armored with rock, or the culvert should be fitted with an anchored downspout to carry erosive flow past the base of the fill (Figure 2) (see Road BMP RD1.12 Stream Crossing Installation).

- Culverts should be covered by a minimum of 1 foot of compacted soil, or a depth of 30% of its diameter, whichever is greater.

- Inlet protection, such as rock armoring or drop structures, can be used to help minimize erosion.

- DRCs must be spaced frequently enough to carry ditch and road surface waters without creating erosive concentrated flows. See attached table for spacing guidelines.

Road grade %	Upslope approach (distance from up-road start of rolling dip to trough) (ft)	Reverse grade (distance from trough to crest) (ft)	Depth below average road grade at discharge end of trough (ft)	Depth below average road grade at upslope end of trough (ft)
<6	55	15-20	0.9	0.3
8	65	15-20	1.0	0.2
10	75	15-20	1.1	.01
12	85	20-25	1.2	.01
>12	100	20-25	1.3	.01

Table 1. Table of rolling dips dimensions. From CDFG (2006).

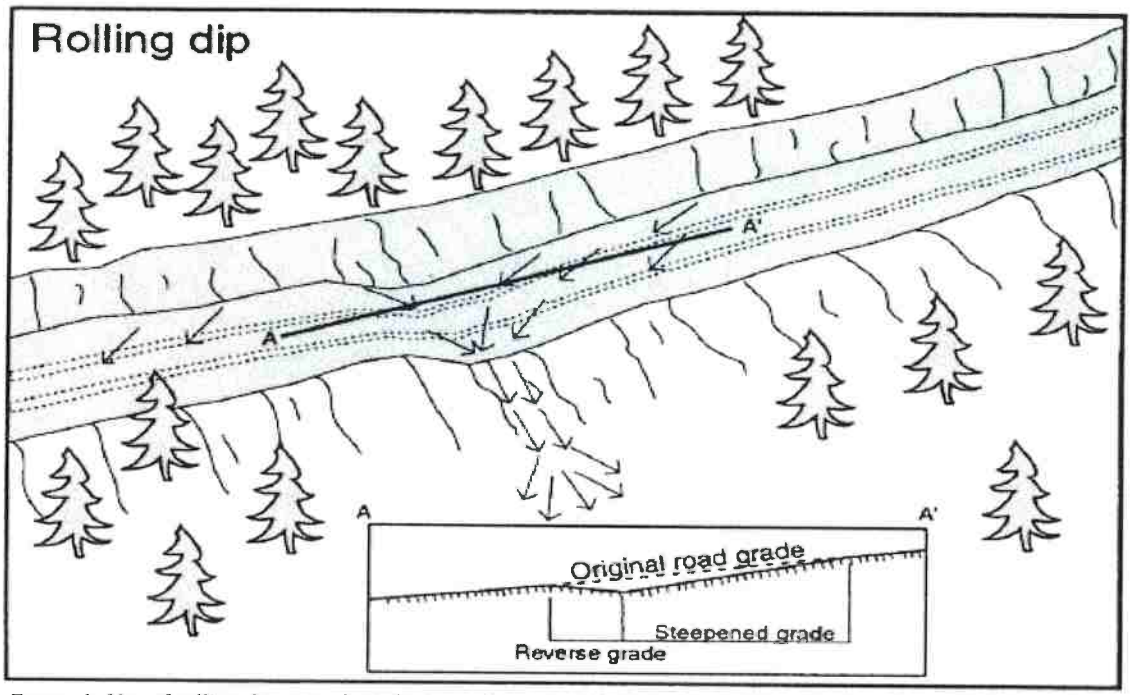


Figure 1. Use of rolling dips to reduce ditch erosion and surface runoff. Rolling dips must drain the road surface and be driveable for the expected traffic. From CDFG (2006).

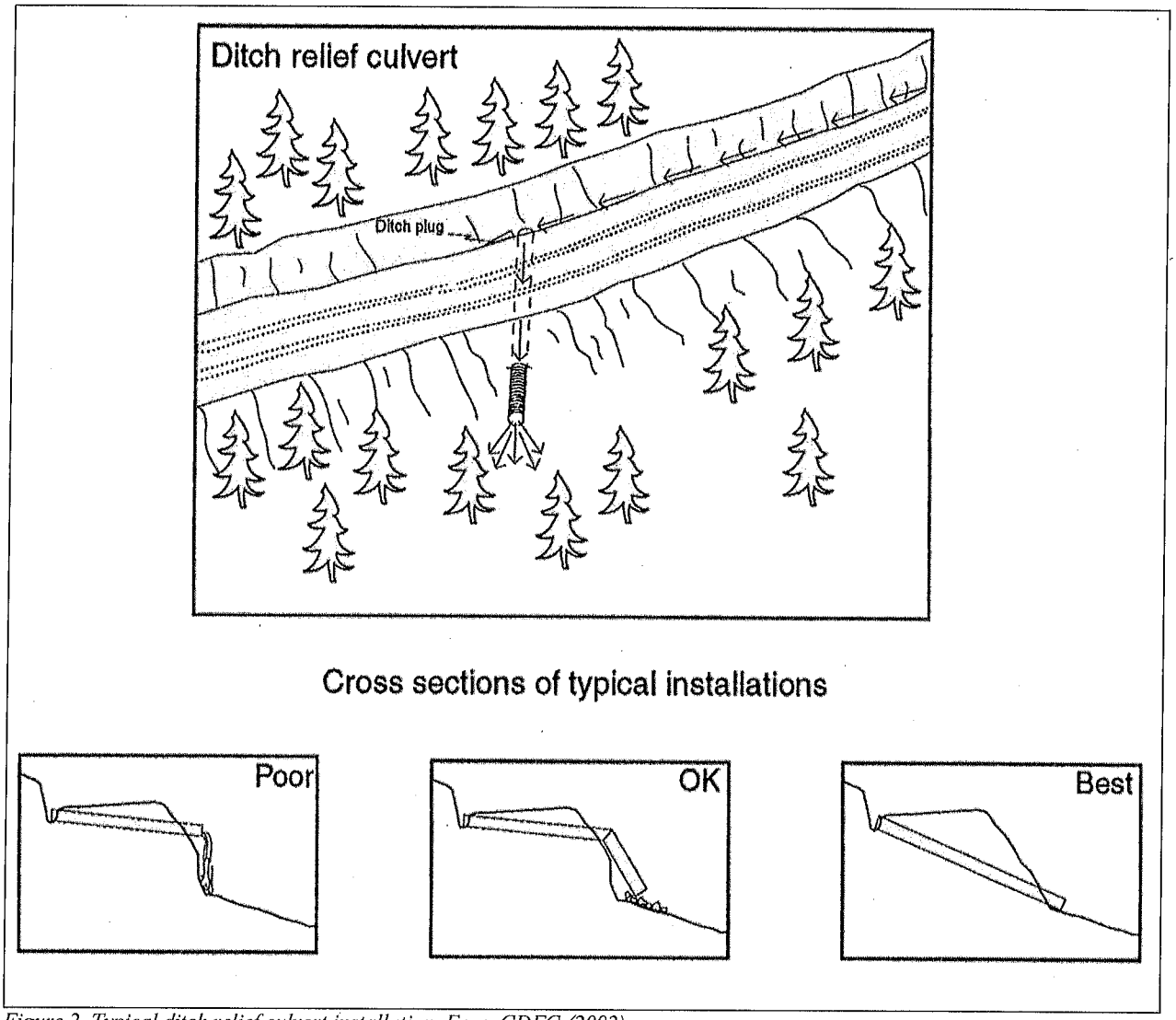


Figure 2. Typical ditch relief culvert installation. From CDFG (2002).

Table 2. Maximum suggested spacing for ditch relief culverts[1] (ft)

Road grade (%)	Soil credibility				
	very high	high	moderate	slight	very low
2	600-800[2]				
4	530	600-800[2]			
6	355	585	600-800[2]		
8	265	425	525	600-800[2]	
10	160	340	420	555	
12	180	285	350	460	600-800[2]
14	155	245	300	365	560
16	135	215	270	345	490
18	118	190	240	310	435

[1]Adapted from Transportation Handbook USDA Forest Service, R-6, 1966. Culvert spacing may be too great in locations where ditch runoff is accumulated and discharged onto steep hillslopes that are prone to gullying. Spacing is designed to control ditch erosion, not culvert outfall erosion, and are based on 25-year storm and precipitation rate of 1-2 in/hr for 15 minutes. If less, multiply by the intensity 0.50, 030, etc. If 2-3 in/hr, divide distance in table by 1.50; if3 -4 in/hr, divide by 1.75; and if 4-5 in/hr, divide by 2.00. The U.S. Forest Service also publishes abundant information on preventing and controlling gully erosion below culvert outfalls. From Hagans and Weaver (1994).

[2]Even with stable ditches, ditch relief culvert spacing greater than about 600 to 800 feet is generally not recommended due to the large volume of road surface and cutslope runoff that would be discharged through the culvert and onto lower slopes during peak runoff periods. Culvert outlet erosion may occur with less than 800 feet of contributing ditch line, so observe local conditions to determine the upper limit of acceptable spacing in your area.

Source Material for Road BMP RD-1.3 Road Drainage for Unpaved Road Surface

2006. California Department of Fish and Game. Part X - Upslope Erosion Inventory and Sediment Control Guidance, California Salmonid Stream Habitat Restoration Manual.

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.14 ROAD SURFACE UPGRADE

DESCRIPTION

The road surface can be a big source of stream sediment. In some watersheds, it may be the primary source of accelerated (human-caused) erosion and sediment yield from the road system. Proper road construction and surfacing can significantly reduce this source of fine sediment. Permanent roads that are to be used for winter and wet weather hauling, including ranch roads and roads used for commercial hauling of forest products, need to be surfaced to improve trafficability and reduce erosion. Roads which receive heavy use should be inspected regularly to discover early signs of damage. Serious damage to road surfaces usually begins with the build up of thick (1-4 inch) accumulations of dry dust during the summer, or excess water (and mud) during the winter. Standing water is a sign of poor road drainage and ruts indicate that road strength is deteriorating.

BEST MANAGEMENT PRACTICES

- Follow Road BMPS in RD-1.4 Road Surfacing.

- A stable and well drained subgrade is essential for a good road. The load bearing capacity of a road depends upon the subgrade's soil strength, drainage and compaction characteristics (Table 23). Native material is often suitable, and can be used for the road's subgrade. Weak or wet subgrades (soils unable to support a load by themselves) need to be strengthened by adding loose or crushed rock or gravel to provide ballast and distribute the stress placed on the soil.

- Wet, low strength soils may be stabilized by the use of synthetic fabrics (geotextiles) designed specifically for this application. The fabric is spread over the subgrade and then covered with a layer of rock. Water passes through the membrane, but the wet soil remains below and does not mix with the surface aggregate. As a result, the road dries faster and the fabric spreads the wheel loading pressures over a large surface area.

- The running surface of the road should be smooth and hard-wearing, and it should not be subject to blowing or washing away. The most commonly used surfacing materials are angular (crushed) rock. In the past, river-run gravel was frequently used where crushed rock was not readily available. However, rounded material is not as well suited as long lasting surfacing material and may be difficult to keep in-place.

- First, a "base course" of 2 to 3 inch diameter angular rock is usually dumped on the compacted native road surface using dump trucks, spread to a uniform depth using a grader or tractor and then compacted. The use of true compaction equipment (instead of tractors) will provide the best, longest lasting road surface. Geotextile engineering fabrics can be used beneath the base course material if soil conditions are wet. A finer "surface course" several inches in thickness is then spread over the compacted base coarse material to provide a dense, smooth running surface. The resulting layers of angular, interlocking rock will provide a low impact road surface that can be used during much of the winter (Table 24) (Figure 1).

- For all-weather use, angular rock should be placed to a total depth of 6-10 inches, or more, which will then compact to a finished depth of 4 to 6 inches under normal use. Table 24 lists the volume of aggregate needed to surface one mile of road, ranging from 10-20 feet wide, to a depth of 1-6 inches.

Table 23. Soil characteristics for road subgrade materials[1]				
Material type	**Strength, compaction and foundation suitability**	**Drainage**	**Reaction to frost**	**Common symbols of soil types[2]**
Clean gravels and clean sand[3]	Good to excellent	Excellent	None to slight	GW, GP, SW, SP
Gravels and sands with non-plastic[4] fines	Good to excellent	Fair to poor	Slight to high	GMd, SMd
Gravels and sands with plastic[4] fines	Fair to good	Poor to impervious	Slight to high	GMu, GC, SMu, SC
Non-plastic and slightly plastic[4] silts and clays	Poor to fair	Fair to impervious (mostly poor)	Medium to high	ML, CL, OL
Medium and highly plastic[4] silts and clays	Very poor to poor	Pair to impervious (mostly poor)	Medium to very high	MH,CH
Peat and other highly organic soils	Very unstable, poor compaction	Fair to poor	Slight	Pt

[1] *W.D.N.R. (1982)*

[2] *Unified Soil Classification System (USCS) symbol*

[3] *"Clean" means less than about 12% of the material is smaller than 1/64" (the smallest particle visible to the naked eye)*

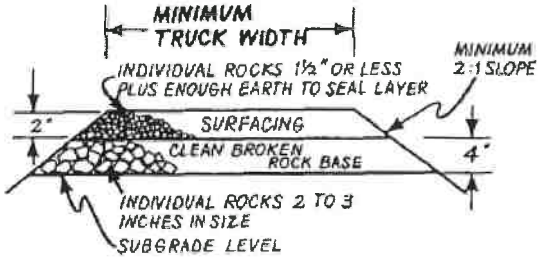
[4] *Plasticity can be tested by simple field methods, including lightly wetting a hand sample, rolling the fines into a ball and then into a thread before it crumbles:*

Non-plastic: a thread cannot be formed, regardless of the moisture content. Low plasticity: after 2-3 times, the molded ball will crumble.

Medium plasticity: After 3-5 times, the ball will easily crumble with moderate force (pressed between thumb and forefinger.

High plasticity: ball will not crumble, even with moderate force, after five times.

Table 23. From Weaver and Hagans (1994).



1. BASE COURSE PROVIDES DRAINAGE AND VEHICLE SUPPORT
2. SURFACE COURSE PROVIDES RUNNING SURFACE AND A WEATHER SEAL

NOTE: SURFACE WITHOUT BASE WILL NOT STAY IN PLACE.
ROCK MUST BE SHARP ANGLED TO PACK.

Figure 1. Cross section diagram showing typical base-course and surface-course application for forest and rand roads (USDA_SCS, 1983). From Weaver and Hagans (1994).

Table 24. Aggregate (yds^3) required to one mile of road[1]

Road width (ft)	Depth of uncompacted rock (inches)					
	2"	4"	6"	8"	10"	12"
10'	326	652	978	1,304	1,630	1,956
12'	391	782	1,174	1,564	1,956	2,348
14'	456	913	1,369	1,826	2,282	2,738
16'	522	1,043	1,565	2,086	2,608	3,130
18'	587	1,174	1,760	2,348	2,934	3,520
20'	652	1,304	1,956	2,608	3,260	3,912

[1] *USDA (1978). Uncompacted, 16.3 yds^3 equals 1 inch deep by 1 foot wide by 1 mile long. When aggregate is compacted, increase volumes required by 15-30%, depending on type and gradation of material.*

From Weaver and Hagans (1994).

Source Material for Road BMP RD-6.2 Road Surface Upgrade

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.15 ROUTING AND LOCATION

DESCRIPTION

Roads should be plotted and located by a person with some knowledge of the area to be served by the road and of the terrain where the road is to be built. An engineer or geologist should be consulted in routing forest system roads to identify unstable terrain and to protect aquatic resources.

LIMITATIONS

Road system layout is influenced by many factors, including topography, property lines, obstacles (rock outcrops, unstable areas, etc), and proposed land use activities. Controls on the location of a road include both natural features and man-made elements (Table 1).

Table 1. Some Man-Made Controls Which Affect Road Location[1]

Control	Comment
Legal	Boundary lines limit the location of a road. Talk with adjacent landowners and work out written right-of-way agreements to share roads and reduce road construction.
Specific Location	The beginning and ending points of a road are often fixed. These represent major controls.
Safety	Each class of road and level of use have specific safety requirements. Common sense should be applied in setting speed, grades, curve radius, sight distance, and turnouts.
Pollution Control	Roads should avoid problem areas. Allow ample room to trap sediment in a buffer before it reaches a stream. Do not allow any direct discharge points where road runoff flows directly into the stream. Avoid flood plains, landslides, credible soils, etc., as well as slopes over 40% wherever possible.
Design Elements	Physical limits for curve radius, road grade, pitch grade, stopping distance and separation from streams are set by you. Design to reduce maintenance costs and pollution potential.
Migrating Fish	Observe and maintain substantial buffers. Know what species use your streams, their habitat requirements, the susceptible periods of their life cycle, and their environmental tolerance limits. Permits may be needed from the Department of Fish and Game.
Approach Roads Permits	Issued by California Department of Transportation of the County for roads connecting to public highways. Location for intersections may be restricted.

From Hagans and Weaver (1994). [1] Adapted from USD A-SCS (1981).

BEST MANAGEMENT PRACTICES

- Identify and map the following conditions on the ground during the road layout process (Table 10):
    - favorable topography (especially benches and low gradient areas for landings turnouts and spoil disposal)
    - control points (the beginning and ending points, saddles and other sites)
    - obstacles (especially unstable or erodible soils, large rock outcrops and wet areas)
    - stream channels (including their degree of incision)
    - inner gorge locations
    - areas of steep slopes
    - any other obvious hazards or controls

Table 10. Some natural controls which affect road location[1]		
Control		**Comment**
Saddles		Major control for road location
Ridges		Major control and often a satisfactory road site.
Stream crossings		Major control. Seek locations with gentle side slopes and locations wide enough to accommodate the road. Good sites for bridges or culverts are needed. Evaluate for migratory fish where needed. Will need Fish and Game 1603 permit.
Benches		Often a good location for road junctions, switchbacks, landings, turnouts, etc.
Cliffs or rock outcrops		Cross above or below at a safe location. Rock which can be ripped is less costly to remove than hard rock needing blasting.
Slides		Major control. Avoid or cross at the safest point. Ask for professional geotechnical assistance.
Wetlands (bogs, swamps, wet meadows)		Major control. Avoid where possible or cross quickly at best point. May need Fish and Game clearance.
Valley floor	wide	Low gradient, desirable road location if above the flood line. If crossing, cross and get out of floodplain quickly. Little excavation required. Fish and Game permit may be required.
	narrow	Poor location because of flooding, erosion and pollution potential and high costs to cross the stream if it meanders. Keep road above floodplain. Fish and Game 1603 permit may be required.
Slopes	>40%, but <60%	Avoid sidecasting and sliver fills (thin blankets of fill placed on steep slopes) in which large bare areas are exposed to erosion. This loose sediment may be difficult to control because of long buffers needed.
	≥60%	Construction in unstable areas should be avoided. Full bench road construction and endhauling material may be needed where slopes remain steep alongside stream channels. **Proceed only with extreme caution.** Avoid road construction on these steep slopes if possible.
	ridge crest	Good alignment and little excavation. Good drainage. Few culverts required. Adverse grade encountered on uneven ridges. Spur roads will have an adverse grade.
Aspect		Maintenance requirements in moist climates can be minimized by placing roads on south-facing slopes to promote drying and snow melt. In dry climates, the north-facing slopes have more vegetation and may have less erosion. Extremely wet or dry climate negates this effect.
Rock slope (dip)		Place roads on the hillside where rocks dip (slant) into the hillside, not parallel to or out of the hillslope. Consult a geologist for other problems and advice.
Soils		Where possible, avoid road building on naturally erodible soils. Check soils maps for potential problems and ask extension agents or the SCS for advice. Frozen soils require special care; ask for assistance.

From Weaver and Hagans (1994). [1] Adapted from USDA-SCS (1981)

- Identify and evaluate nearby rock outcrops for potential rock aggregate for road surfacing materials.
- Identify broad ridge crests and benches as possible locations for landings, road turnouts and spoil disposal sites (Figure 1).
- Locate switchback with little or no grade so that trucks and equipment can pass safely and so they won't tear up the road surface while turning the comer and continuing up the road.

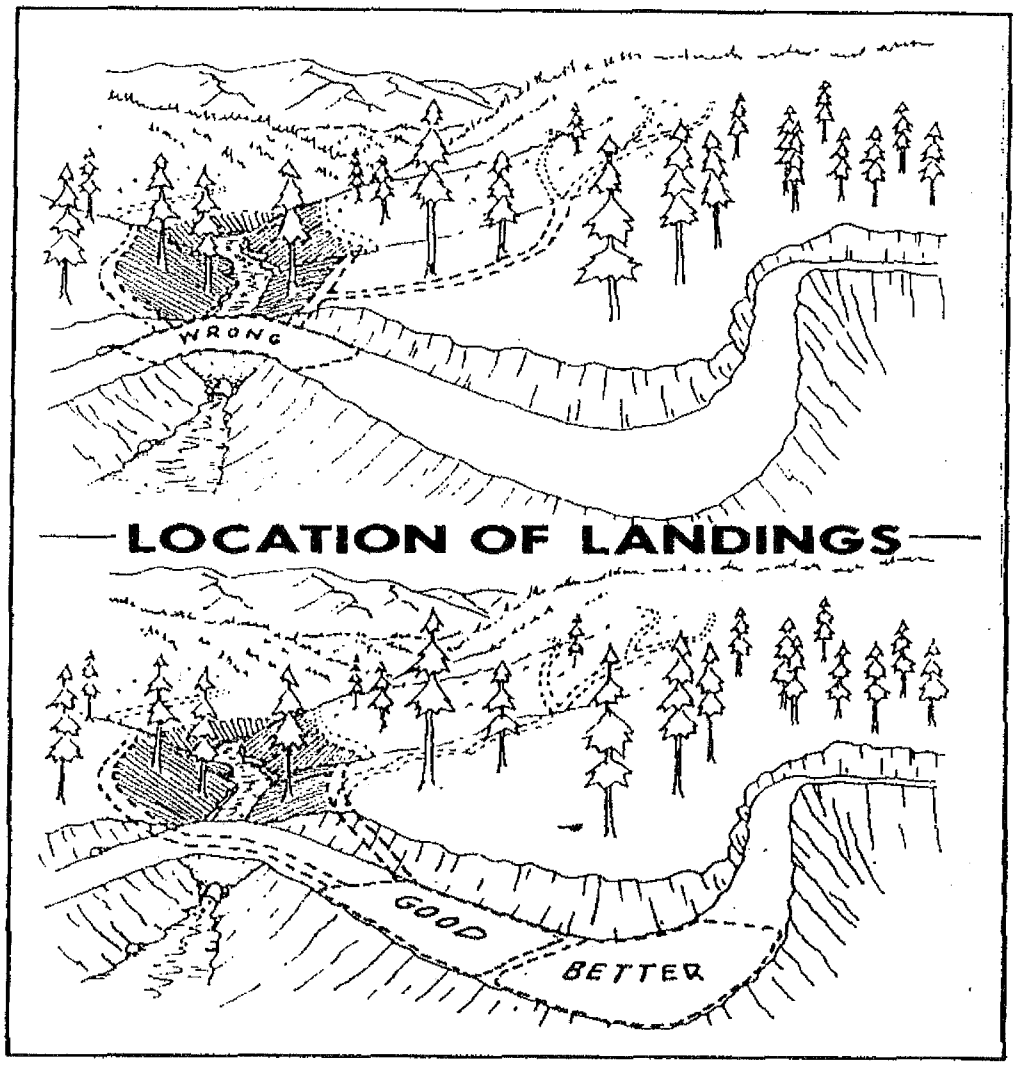


Figure 1.. Log landings on forest road systems should be kept to the absolute minimum size necessary to accommodate yarding, loading and hauling equipment and the minimum number needed to remove timber resources. Landings constructed on gentle ground and broad ridge crests far removed from stream channels are least likely to cause water quality problems, whereas landings built on steep slopes and near watercourses can result in severe impacts. From Weaver and Hagans (1994). Adapted from (USFS, 1963).

For more information, see Handbook for Forest and Ranch Roads. Weaver and Hagans (1994) and consult a trained engineer or geologist before construction. A trained wildlife biologist may be required to investigate for endangered species or species of special concern. An archaeologist may occasionally be needed to identify cultural sites that have to be avoided or mitigated before construction can begin.

Source Material for Road BMP RD-1.2 Routing and Location

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.16 UNDERSTANDING ROAD REMOVAL

DESCRIPTION

Approaches to removing roads may be divided into six categories: closure, abandonment, reclassification as trail, decommissioning, conversion to trail, and obliteration (Figure 1).

REMOVAL OPTIONS

Closure

Some agencies close roads with gates, berms, or deep ditches (tank traps) as an approach to road removal (see Road BMP RD-7.3 Road Closure). On-the-ground surveys indicate that conventional closure devices are ineffective at stopping road use by people intent on accessing restricted areas. With an effective device that prohibits motorized access, however, closure may reduce a road's terrestrial impacts by providing wildlife security. Even so, closure is an ineffective approach to removing a road, because the road continues to disrupt natural drainage patterns, cause soil erosion, and potentially initiate mass failures; in short, a closed road continues to impact aquatic ecosystems.

Abandonment

When a road is "abandoned," it is no longer maintained and may or may not be driveable based on physical conditions or the presence of vegetation. The Forest Service considers road abandonment a "no-action treatment" (Moll 1996). Like a closed road with an effective closure device, abandoned roads that no longer receive motorized use may reduce a road's terrestrial impacts by providing wildlife security. Simply discontinuing maintenance and abandoning a road, however, rarely prevents continuing and potential hydrologic problems. The presence of vegetation may provide the false idea that the road is recovering and is no longer problematic. Culverts can become plugged, and roads may continue to function as surface flow paths for water. Road fills may remain unstable and susceptible to failure. Because an abandoned road continues to impact aquatic ecosystems, abandonment is an ineffective approach to removing a road.

Reclassification as Trail

Reclassifying a road as a trail without restoring drainage patterns and stabilizing fill materials is not an effective approach to removing a road, especially if motorized use continues. Even if wildlife security is improved by stopping motorized use, simply reclassifying a road as a trail does not address a road's aquatic impacts; this type of approach is basically the same as abandonment. If a road is changed to a trail, it must be actively converted (see "Conversion to trail" below) by first stabilizing fill materials and dispersing concentrated water.

Decommissioning

Decommissioning is carried out to minimize shortterm sediment production, while "storing" a road for future use. Major treatments include removing stream crossings and stabilizing sidecast fill material. Site-specific drainage treatments such as constructing cross road drains, removing inboard ditches, and/or outsloping also help disperse concentrated water. Road surfaces may be mechanically scarified to facilitate revegetation. The goal of decommissioning is to leave much of the road prism intact so the road can be reconstructed in the future with only minimal effort. Decommissioning preserves most of the original construction investment, while reducing road-caused erosion and avoiding maintenance and/or repair costs. Other common terms used to indicate road removal with plans for future reconstruction

include storm-proofing, flood-proofing, erosion-proofing, putting-to-bed, deactivation, reclamation, hydrologic closure, hydrologic obliteration, and storage for future use. Planning for reconstruction and leaving much of the road prism intact may result in treating a road too lightly during removal. Future plans may change; post-decommissioning is too late to further treat the road for the long-term. Even if decommissioning stops road-related erosion in the shortterm, it is not the same as obliterating a road because the road is expected to be reconstructed. Even if roads may be reconstructed in the future, they should be removed as if reconstruction will not occur.

Conversion to Trail

Converting a road to a modest walking trail can be an effective approach to removing a road if all fill materials are stabilized before the trail is constructed. Some road-to-trail conversions are implemented by only partially recontouring a road, which may not stabilize all fill materials. Conversion is ineffective when ORVs are allowed because impacts associated with motorized use continue. Though trails are less intrusive and damaging than roads, they can cause similar impacts, such as stream sedimentation and facilitation of non-native species invasions.

Obliteration

Obliteration involves removing a road with no plans for future reconstruction. To be most effective, obliteration restores the original landform to the greatest extent possible. Stream crossings are removed and slopes are recontoured. Road surfaces and fill sites are ripped to improve subsurface water flow. Coarse woody debris placed on the recontoured road surface provides erosion protection, long-term nutrient sources, and wildlife habitat. Revegetation is also actively carried out with native species collected near the site. Fully obliterating roads speeds the restoration and recovery of hydrologic function, as well as ecological and evolutionary processes. If implemented appropriately, obliteration is the most effective approach to road removal since it addresses both terrestrial and aquatic impacts caused by roads.

Road impact considerations	How different approaches to removing roads address road impact considerations					
	Close	Abandon	Reclassify as trail	Decommission	Convert to trail	Obliterate
Is wildlife security improved?	Yes* (short - term)	Yes (long - term)	Depends on extent of trail use	Yes* (short - term)	Depends on extent of trail use	Yes* (long - term)
Are fill stability problems fixed?	No	No	No	Yes* (short - term)	Yes*	Yes*
Is surface erosion controlled?	No	No	No	Yes* (short - term)	No* (much reduced)	Yes*
Will the road be reopened or reconstructed?	Yes	No	No	Yes	No	No
Is motorized use accommodated?**	Yes	Yes (unless overgrown)	Yes	No*	Yes	No*
Will continued maintenance and repair funding be necessary?	Yes	No	Yes	No* (until reconstructed)	Yes	No*
* if implemented effectively ** decommissioned and obliterated roads may continue to accommodate winter use by snowmobiles						

Figure 1. From Bagley (1998).

REMOVAL TREATMENT OPTIONS

Specific road removal treatments include removing stream crossings, constructing cross road drains, ripping, recontouring, and outsloping. Each treatment is summarized below.

Stream Crossing

Stream crossing removal is a fundamental treatment for removing roads. When done correctly, stream crossings are removed by excavating All fill materials and restoring the original channel and valley shape. Simply removing culverts is not enough, because any remaining road fill will erode into the channel. Materials excavated from stream crossings can be used to recontour road segments to their natural slope, essentially returning fill to the location from which it was cut. Endhauling is necessary when the amount of fill removed is greater than that needed for recontouring. Any road removal project that does not remove stream crossings (or does not remove all fill materials) is not effective and may cause more ecological damage by causing additional sedimentation.

Cross Road Drains

Cross road drains are deep ditches excavated across road surfaces (similar to waterbars, but more substantial) to facilitate drainage on closed roads. They are too deep and steep to be cleared by motor vehicles. Unless spaced frequently enough to disperse concentrated water, cross road drains may cause erosion downslope. They must be constructed more frequently on roads with steep grades, but are not necessary if roads are fully recontoured or outsloped steeply.

Ripping

Ripping involves decompacting road surfaces and fill sites to a depth of two to three feet. The goal is to enhance subsurface water flow by reducing soil density and increasing porosity, infiltration, and percolation. Ripping relatively impermeable fill sites reduces the chance of fill saturation and failure. Some soil settling occurs since organic matter is limited in sterile road soils. Therefore, adding organic matter to the ripped soil can greatly accelerate the recovery of hydrologic function, including both infiltration and percolation (Luce 1997). Ripping also increases revegetation success.

Recontouring

Recontouring involves placing all fill materials back into locations where fill was removed during road construction. Recontouring restores the original slope as much as possible, dispersing concentrated water and greatly enhancing slope stability. Full recontouring is sometimes impossible, especially on very steep slopes, since the sidecast material may have slid downhill out of reach. In some cases, cutslopes will be so high and road cuts so narrow, that replaced fill material will not blend with the original undisturbed slope. Even so, slope recontouring to the extent possible generally results in the most stable landform shape, restores natural surface runoff patterns, and deters motorized access.

Outsloping

Outsloping involves filling inboard ditches with sidecast fill material and sloping the road surface to disperse water to the downhill side of the road. Some sidecast fill materials remain, but saturation and potential failure is reduced because water cannot concentrate in inboard ditches or on the road surface. The remaining fill slope materials may still cause stability problems, especially on steep slopes.

Source Material for Road BMP RD-7.2 Understanding Road Removal

1983. Bagley, Scott. The Road-Ripper's Guide to Wildland Road Removal. Wildlands Center for Preventing Roads

1994. Weaver W.E. and D.K. Hagans. Handbook for Forest and Ranch Roads. Mendocino County Resource Conservation District

RD-1.17 ROAD CLOSURE

DESCRIPTION

Road closure is an effective tool in managing road systems to protect private property, road systems, water quality, and sensitive landscapes. Choosing the access control treatment depends on the type of vehicle assess to be discouraged and the length of the closure (Table 1). For example, closure treatments can to designed to discourage motorized traffic, but allow mountain biking or walking access. Closure treatments can also be designed to permanently close a road or allow seasonal treatments. The closure treatment chosen should reflect both the short term and long term use of the road system.

BEST MANAGEMENT PRACTICES

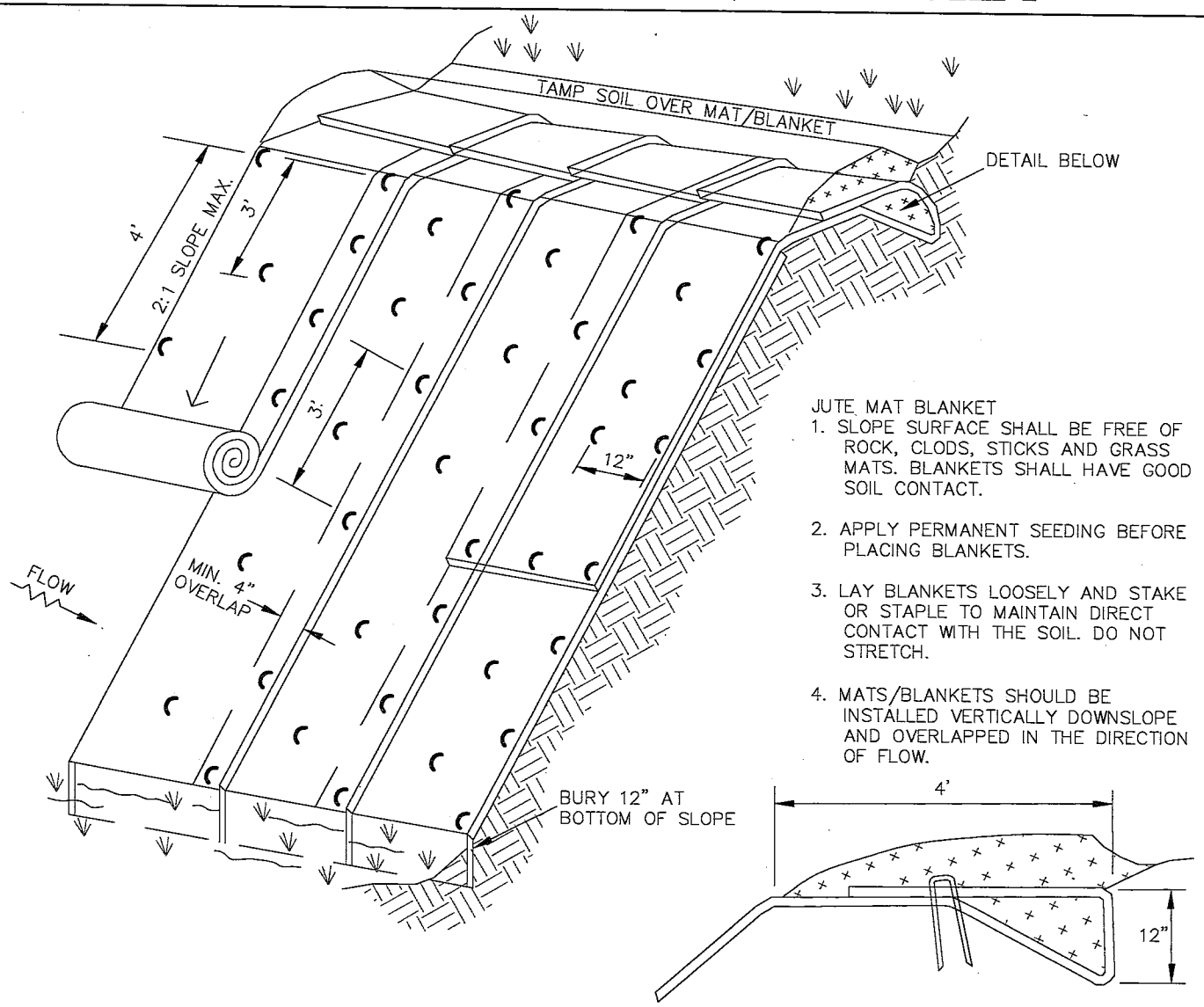
Closure Type	Description	Purpose Application
Blockage with On-Site Materials	Rock, logs, stumps, slash piles, posts, water bars, tank traps, decomposition	Discourage use, economical, dependent on-site and available material
Vegetative Planting, Seeding	Trees, shrubs, cactus, and grass seeding, recycled paper mulch, chip and spread slash	Discourage use, camouflage road, speed revegetation and healing of site, provide browse and forage
Imported Material	Fences, gates, posts, guardrails, concrete barriers	Discourage use, lack of on-site material or inappropriate site for use of on-site materials
Pole Fences Wood Barriers	Onsite or imported poles, reinforce with metal strips to deter chain-sawing	Discourage use, can be dismantled for emergency access, aesthetically pleasing
Closure Devices	Materials used include metal telescoping tubing, pipe, and well casing. Available in single lane to double lane widths	Discourage use, allow quick easy access, single or multiple locks, signing
Obliteration	Re-contour road junction or entire road. Combine with other closure treatments. Removal of drainage structures, bridges, and associated embankments	Eliminate travelway, return corridor to resource production, reduce modifications to hydrology and aesthetics, camouflage road

Table 1. Access Control Treatments. Adapted from US Forest Service 1996.

Source Material for Road BMP RD-7.3 Road Closure

1996. US Forest Service. A Guide for Road Closure and Obliteration in the Forest Service. Technology and Development Program. Publication: 9677 1205.

EC-1.1 JUTE MAT BLANKET



JUTE MAT BLANKET

1. SLOPE SURFACE SHALL BE FREE OF ROCK, CLODS, STICKS AND GRASS MATS. BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.
4. MATS/BLANKETS SHOULD BE INSTALLED VERTICALLY DOWNSLOPE AND OVERLAPPED IN THE DIRECTION OF FLOW.

EC-1.2 CULVERT OUTLET ENERGY DISSIPATER

DESCRIPTION

An energy dissipater is a structure designed to control erosion at the outlet of a culvert or conduit by reducing the velocity of flow and dissipating the energy (see BMP SS-10 Outlet Protection/ Velocity Dissipation Devices).

LIMITATIONS

- Do not use this BMP below the mean high water line of any water body before obtaining appropriate permits. Due to issues relative to Corps 404 jurisdiction sometimes energy dissipaters are not placed below the ordinary high water mark which results in increased erosion.
- Consider other energy dissipaters such as concrete impact basins, paved outlet structures, or a half culvert where site conditions warrant.
- Rock/riprap dissipaters may require containment in mattresses to maintain their effectiveness.

BEST MANAGEMENT PRACTICES

- Size rock to handle high velocity storm events.
- Key rock into sides of fillslope to prevent undercutting (Figure 1).
- Best results are obtained when sound, durable, angular rock is used (Figure 2).
- Inspect after each significant rain for erosion and/or disruption of the rock, and repair immediately.

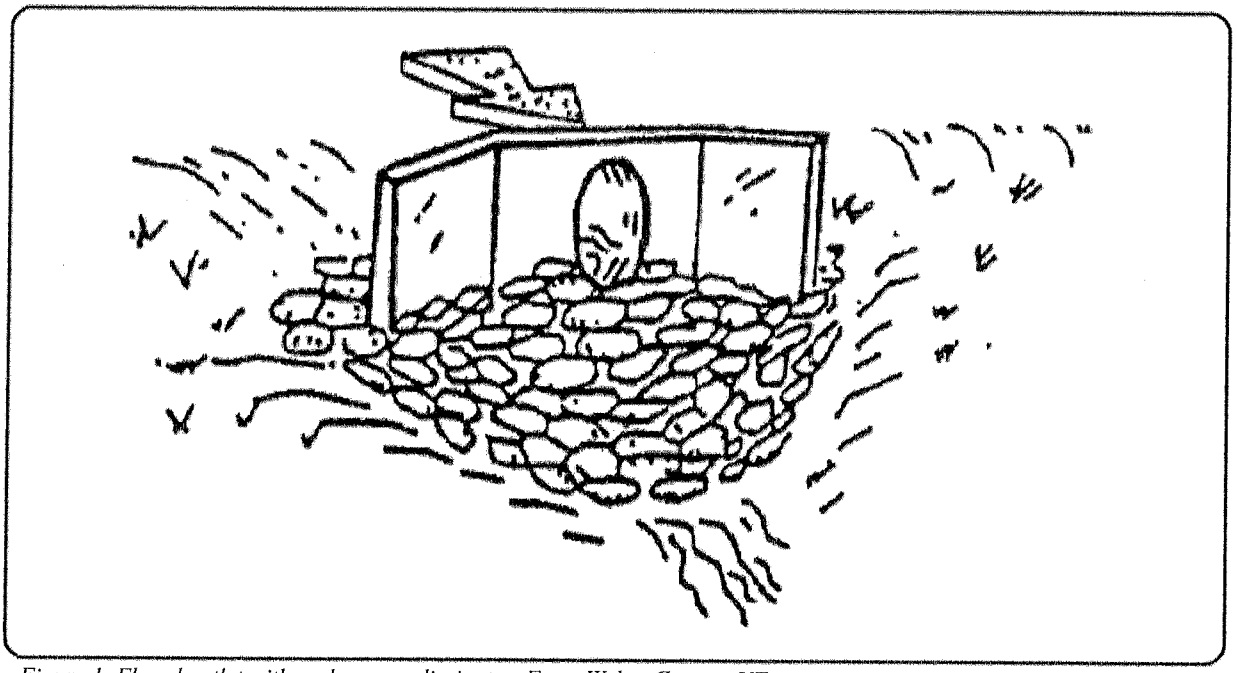


Figure 1. Flared outlet with rock energy dissipater. From Weber County, UT.

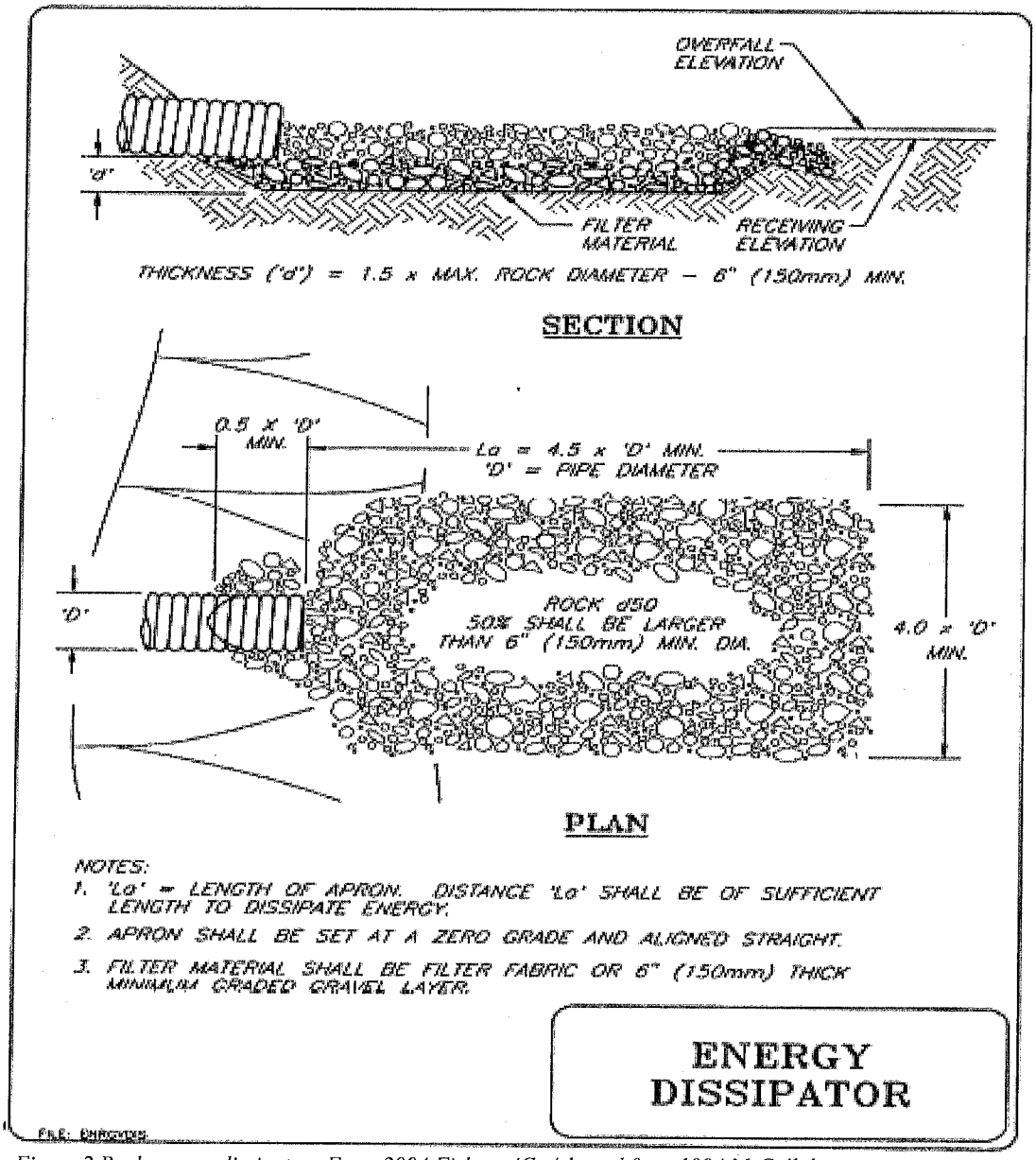


Figure 2.Rock energy dissipater. From 2004 Fishnet 4C. Adapted from 1994 McCullah.

Source Material for Road BMP RD-2.12 Culvert Outlet Energy Dissipater

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

N/A. Weber County, Engineering Department. Ogden, Utah.

EC-1.3 OUTLET PROTECTION

DESCRIPTION

A rock outlet protection is a physical device composed of rock, riprap, grouted riprap, or concrete rubble which is placed at the outlet of a pipe to prevent scour of the soil caused by high pipe flow velocities, and to absorb flow energy to produce nonerosive velocities (see Construction BMP SS-10 Outlet Protection/ Velocity Dissipation Devices).

APPLICATIONS:

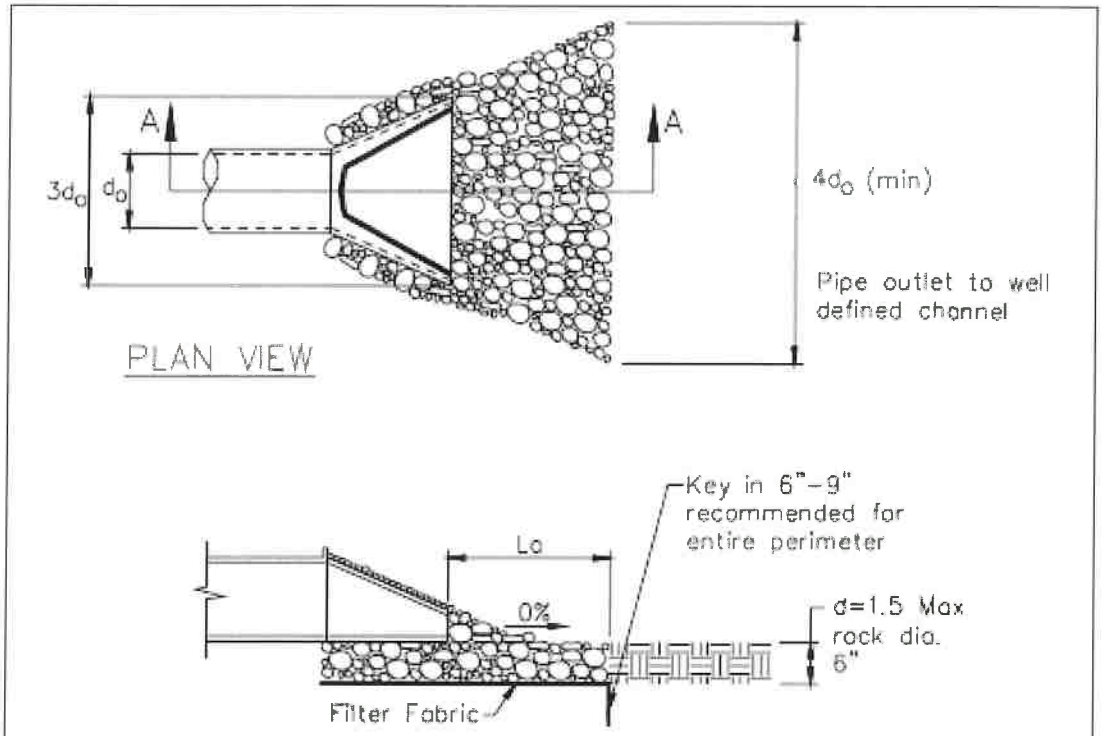
- Wherever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach.
- Rock outlet protection is best suited for temporary use during construction because it is usually less expensive and easier to install than concrete aprons or an energy dissipater (Figure 1) (see Erosion Control BMP EC-1.3 Energy Dissipater).
- A sediment trap below the pipe outlet is recommended if runoff is sediment laden (Figure 2).
- Permanent rock riprap protection should be designed and sized by the engineer as part of the culvert, conduit or channel design (Figure 2).
- Grouted riprap should be avoided in areas of freeze and thaw because the grout will break up.

LIMITATIONS

- Large storms often wash away the rock outlet protection and leave the area susceptible to erosion.
- Sediment captured by the rock outlet protection may be difficult to remove without removing the rock.
- Outlet protection may negatively impact the channel habitat in streams.

BEST MANAGEMENT PRACTICES

- Size rock to handle high velocity storm events (Figure 3).
- Key rock into sides of fillslope to prevent undercutting.
- Best results are obtained when sound, durable, angular rock is used.
- Inspect after each significant rain for erosion and/or disruption of the rock, and repair immediately.



Pipe Diameter inches	Discharge ft^3/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

Figure 1. Flared outlet with energy dissipater. From Caltrans (2003). (Adapted from USDA-SCS).

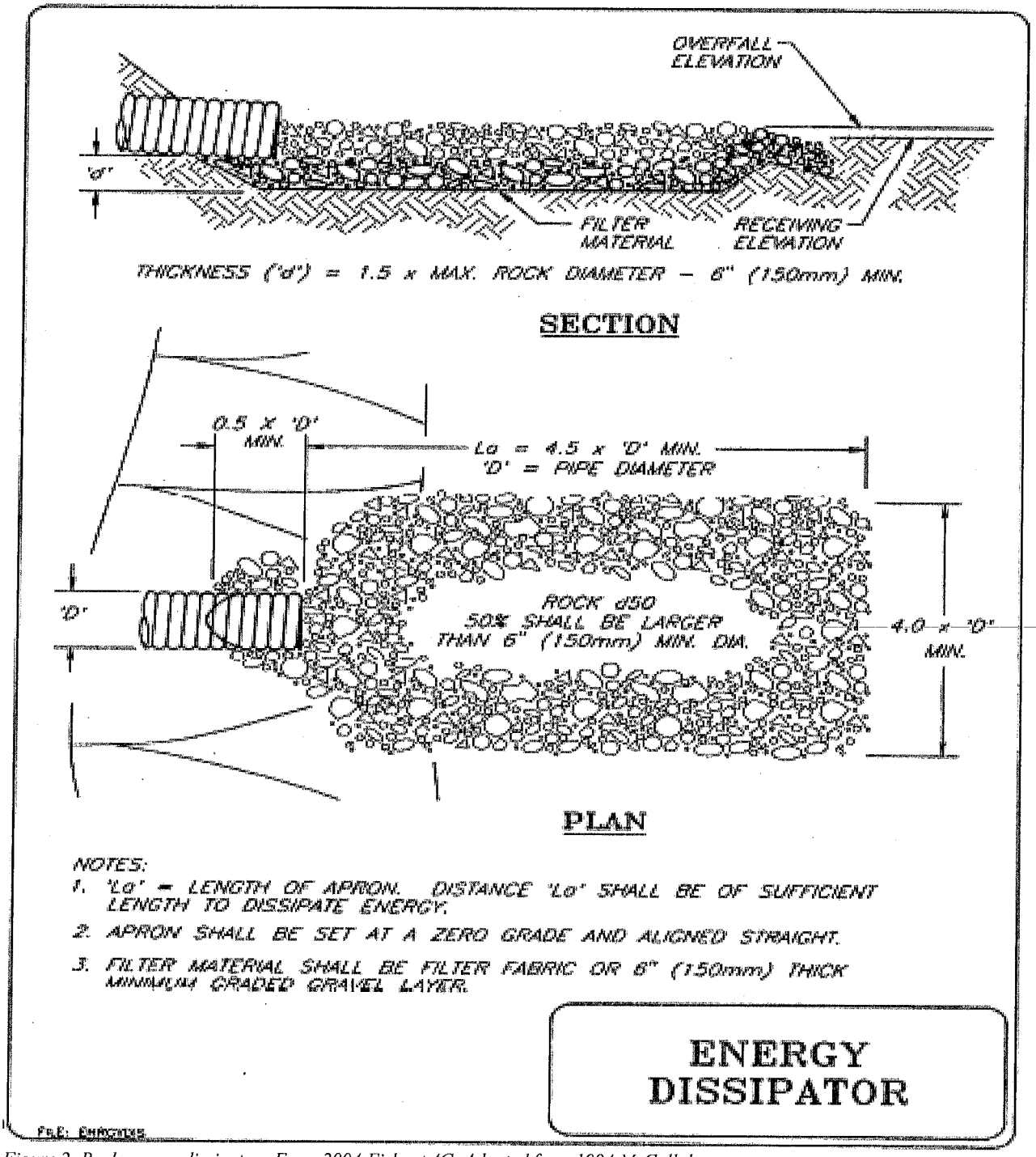


Figure 2. Rock energy dissipater. From 2004 Fishnet 4C. Adapted from 1994 McCullah.

Figure 3. Rock armoring on shotgun culvert outlet. Photo Courtesy of California Department of Transportation (Caltrans).

Source Material for Road BMP RD-2.11 Outlet Protection

2003. California Department of Transportation (CALTRANS). Storm Water Quality Handbooks – Construction Site Best Management Practices (BMPs) Manual.

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

EC-1.4 STOCKPILE MANAGEMENT

DESCRIPTION

This activity involves the selection of sites in advance of the need for long-term and short-term stockpiling of materials for road maintenance activities and disposing of excess materials from excavations, grading and culvert basin cleaning. The general watershed criteria for selecting any disposal site is a site where the material will not erode into any part of the channel network, and where it will not initiate a formerly dormant landslide.

ENVIRONMENTAL CONCERNS

- Filling wetlands with spoil material.
- Discharge of sediment, debris, or organic material into the stream or storm water discharge system.
- Destruction or harm to aquatic, riparian or wetland habitat, or to endangered or threatened plant and animal species due to placement of fill material.
- Surface or groundwater impacts from leachate formed in organic material disposal sites.
- Damage to endangered or threatened plant species on site.
- Slope stability of both the disposal site and the spoil pile.

BEST MANAGEMENT PRACTICES

Site Selection

- Determine the location of existing disposal sites, potential disposal sites, and locations of significant spoil generation along roads.
  - Conduct site investigations of existing and potentially suitable disposal sites. Site investigations should include the disposal area size, distance to watercourses, potential slope instabilities, listed species habitat, archaeological sites, nearby residential areas, access, and other limiting factors.
  - Prepare a map and data set indicating sites (existing and potential) with acceptable site characteristics (see below). Prioritize acceptable sites.
  - Develop site plans for sites adjacent to or near riparian areas or streams to identify erosion and sediment control needs, and to ensure stability of the material.
- Follow these acceptable site characteristics in the site election & design process:
  - Seek a stable site where sediment cannot reach the stream during any high water event.
  - Avoid adjacent riparian corridors or any area within the 100-year floodplain.
  - Avoid all wetland sites as these sites are protected from disposal activities and permits will be required and may not be granted.
  - Avoid placing spoil on unstable slopes, where the added weight could trigger a land movement. Excessive loading of clay or silt soils could also trigger a failure.
  - Use wide, stable locations such as rock pits, ridges, and benches as places to dispose of fill. Avoid locations where ground water emerges or a thick organic layer is present. Do not leave loose soil piled in berms alongside the road or ditch.

- Avoid sites with endangered or threatened plant species. Search the California Natural Diversity Database (www.dfg.ca.gov/whdab/html/cnddb.html) for any known listed plant sites in the area. Seek site evaluations by qualified botanists during the appropriate season before selecting a new site.

Implementation

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect all stockpiles from stormwater run-on using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, gravel bags, or straw bale barriers.
- During the rainy season, soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- During the non-rainy season, soil stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation (Figure 1).
- Apply erosion and sediment control BMPs as needed.
- Place bagged materials on pallets and under cover.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information.
- The performance of erosion control BMPs should be monitored routinely during construction, especially during and after storm events. BMPs should be maintained or upgraded as needed.
- Manage stockpiles of contaminated soil in accordance with State and Federal Regulations.
- Avoid sidecasting of soil in all cases where it could be delivered into a watercourse, riparian area, roadside ditch or storm drain. Do not sidecast outside of the landowner right-of-way without landowner's permission. In some instances, under the following guidelines (See Table 1), sidecasting is allowable given remote distances from spoils storage sites. In these cases, the setback distance required depends on slope and vegetation. The presence of vegetation helps to slow the travel of sediment downslope, so good judgment is needed to assess the situation. *Do not sidecast at all* if the slope is sparsely vegetated and it appears that sediment will travel with rain runoff into a stream or estuary system, even if setback distances are applied. On slopes of 5:1 (20% gradient) or less, sidecasting is allowed beyond 150 feet of a watercourse, stream crossing, riparian area, roadside ditch or storm drain. On 2:1 slopes (50%) or less, sidecasting is allowed beyond 300 feet of a watercourse, stream crossing, riparian area, roadside ditch or storm drain. On slopes greater than 2:1, typically sidecasting is *not recommended*, however there may be rare instances on slopes greater than 2:1 where sidecasting is acceptable given very long distances from waterbodies and good vegetative cover. Seek advice from local fisheries agency staff when in doubt. Avoid concentrating sidecasting repeatedly in the same place. Never sidecast large amounts of soil from major landslides.

SLOPE GRADIENT	DISTANCE FROM WATERCOURSE, STREAM CROSSING, RIPARIAN AREA, ROADSIDE DITCH, STORM DRAIN	SIDECASTING RULE
Any slope	Appears that sediment will travel with rainwater into watercourse.	Not allowed
5:1 (20%) or less	150 feet or more	Allowed using good judgment
2:1 (50%) or less	300 feet or more	Allowed using good judgment
Greater than 2:1 (50%)	Vegetated slope long distance from watercourse	Allowed
Greater than 2:1 (50%)	Sparsely vegetated slope and it appears that sediment will travel with rain into watercourse	Not allowed

Table 1. Sidecasting BMP. From FishNet 4C (2004).

Figure 1. Stock piles should be covered with erosion and sediment control BMPs employed to keep sediment on site. From Caltrans (2003).

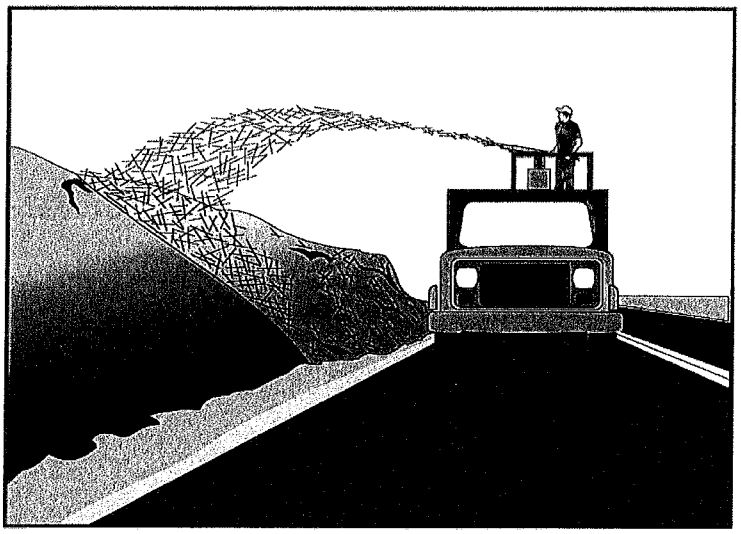
Source Material for Road BMP RD-2.16 Stockpile Management

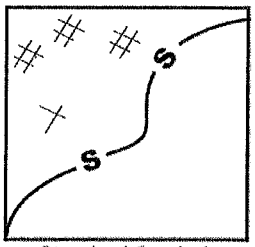
2003. California Department of Transportation (CALTRANS). Storm Water Quality Handbooks – Construction Site Best Management Practices (BMPs) Manual.

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

Straw Mulch

SS-6





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a stabilizing emulsion. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

- Straw mulch is typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established.
- Also typically used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of erosion control contractors and straw may be limited prior to the rainy season due to high demand.
- There is a potential for introduction of weed-seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 45 m (150 ft) of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.
- May have to be removed prior to permanent seeding or soil stabilization.
- "Punching" of straw does not work in sandy soils.

Straw Mulch

SS-6

Standards and Specifications

- Straw shall be derived from wheat, rice, or barley.
- All materials shall conform to Standard Specifications Sections 20-2.06, 20-2.07 and 20-2.11.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.

Application Procedures

- Apply loose straw at a minimum rate of 3,570 kg/ha (4,000 lb/ac), or as indicated in the project's special provisions, either by machine or by hand distribution.
- If stabilizing emulsion will be used to anchor the straw mulch in lieu of incorporation, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by "punching" it into the soil mechanically (incorporating).
- A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place.
- A tackifier is typically applied at a rate of 140 kg/ha (125 lb/ac). In windy conditions, the rates are typically 200 kg/ha (178 lb/ac).
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
  - Applying and incorporating straw shall follow the requirements in Standard Specifications Section 20-3.03.
  - On small areas, a spade or shovel can be used.

Straw Mulch

SS-6

- On slopes with soils, which are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a "crimper."
- On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes. Refer to BMP SS-7, "Geotextiles, Plastic Covers and Erosion Control Blankets/Mats."

Maintenance and Inspections

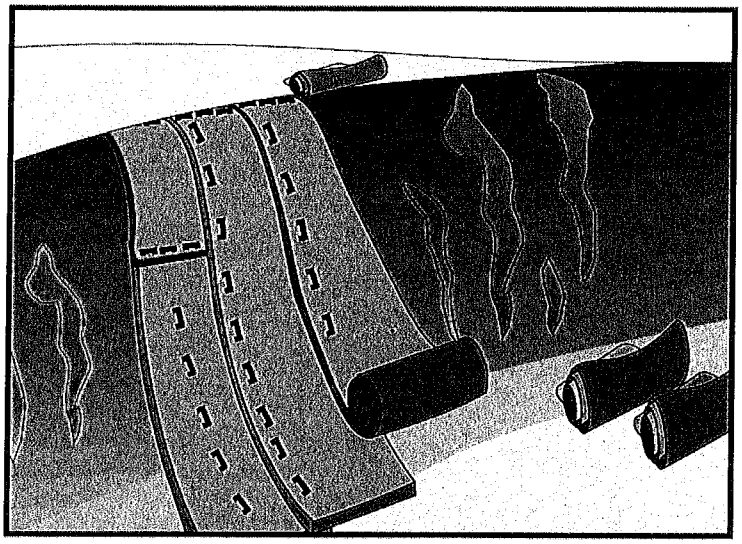
- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required by the Resident Engineer (RE) to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, the Contractor is responsible for maintaining all slopes to prevent erosion.

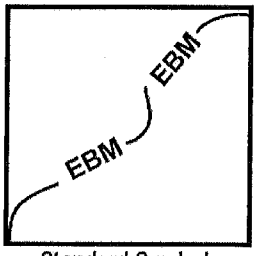
Source Material for Construction BMP SS-6

2003. State of California Department of Transportation. Caltrans Storm Water Quality Handbook Construction Site BMP Manual.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

This Best Management Practice (BMP) involves the placement of geotextiles, mats, plastic covers, or erosion control blankets to stabilize disturbed soil areas and protect soils from erosion by wind or water. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

These measures are used when disturbed soils may be particularly difficult to stabilize, including the following situations:

- Steep slopes, generally steeper than 1:3 (V:H).
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.
- Disturbed areas where plants are slow to develop.
- Channels with flows exceeding 1.0 m/s (3.3 ft/s).
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs).

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7

Limitations

- Blankets and mats are more expensive than other erosion control measures, due to labor and material costs. This usually limits their application to areas inaccessible to hydraulic equipment, or where other measures are not applicable, such as channels.
- Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (since staples and netting can catch in mowers).
- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.
- Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
- Plastic results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- The use of plastic shall be limited to covering stockpiles, or very small graded areas for short periods of time (such as through one imminent storm event), until alternative measures, such as seeding and mulching, may be installed.
- Geotextiles, mats, plastic covers, and erosion control covers have maximum flow rate limitations; consult the manufacturer for proper selection.

Standards and Specifications

Material Selection

There are many types of erosion control blankets and mats, and selection of the appropriate type shall be based on the specific type of application and site conditions. Selection(s) made by the Contractor must be approved by the Resident Engineer (RE); certification of compliance shall be in accordance with Standard Specifications Section 6-1.07.

Site Preparation

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 50 mm (2 in) to 75 mm (3 in) of topsoil.

Seeding

Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

SS-7

Maintenance and Inspection

Areas treated with temporary soil stabilization shall be inspected as specified in the special provisions. Areas treated with temporary soil stabilization shall be maintained to provide adequate erosion control. Temporary soil stabilization shall be reapplied or replaced on exposed soils when area becomes exposed or exhibits visible erosion.

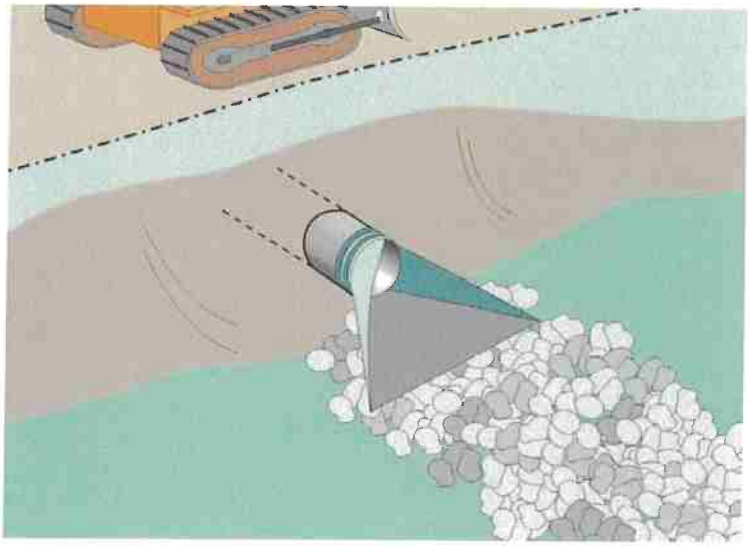
- All blankets and mats shall be inspected periodically after installation.
- Installation shall be inspected after significant rain storms to check for erosion and undermining. Any failures shall be repaired immediately.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.

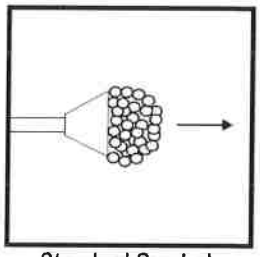
Source Material for Construction BMP SS-7 Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

2003. State of California Department of Transportation. Caltrans Storm Water Quality Handbook Construction Site BMP Manual.

Outlet Protection/Velocity Dissipation Devices

SS-10





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of storm water flows.

Appropriate Applications

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Discharge outlets that carry continuous flows of water.
  - Outlets subject to short, intense flows of water, such as flash floods.
  - Points where lined conveyances discharge to unlined conveyances.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Loose rock may have stones washed away during high flows.
- Grouted riprap may break up in areas of freeze and thaw.
- If there is not adequate drainage, and water builds up behind grouted riprap, it may cause the grouted riprap to break up due to the resulting hydrostatic pressure.

Outlet Protection/Velocity Dissipation Devices

SS-10

Standards and Specifications

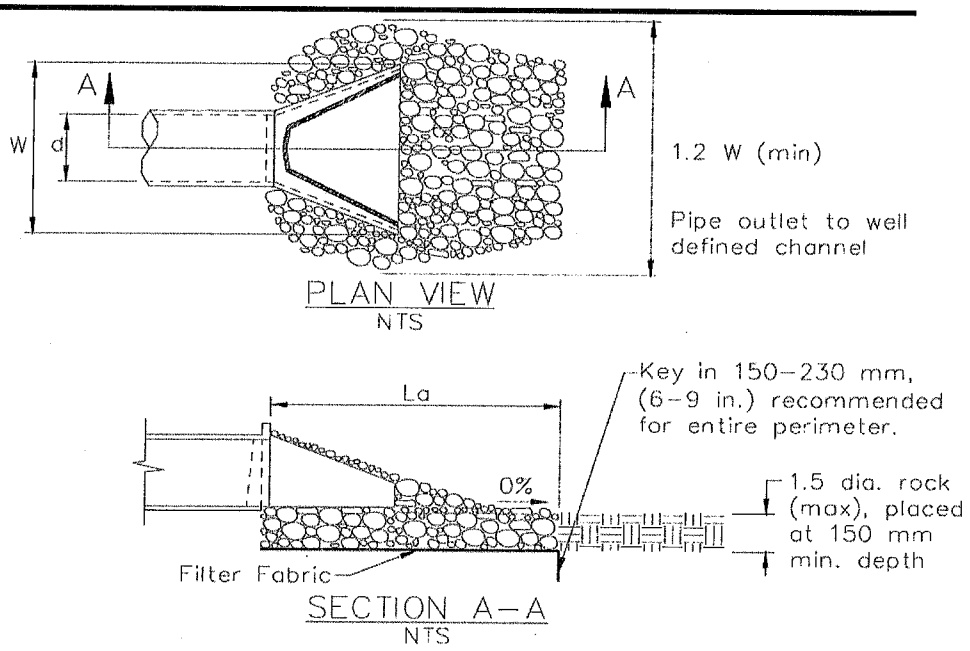
- There are many types of energy dissipaters, with rock being the one that is represented in the figure on Page 3. Please note that this is only one example and the RE may approve other types of devices proposed by the contractor.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction.
- Carefully place riprap to avoid damaging the filter fabric.
- For proper operation of apron:
  - Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
  - If size of apron riprap is large, protect underlying filter fabric with a gravel blanket.
- Outlets on slopes steeper than 10% shall have additional protection.

Maintenance and Inspection

- Inspect temporary measures prior to the rainy season, after rainfall events, and regularly (approximately once per week) during the rainy season.
- Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap that has washed away.
- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- Temporary devices shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Outlet Protection/Velocity Dissipation Devices

SS-10



Pipe Diameter mm	Discharge m^3/s	Apron Length, La m	Rip Rap D_{50} Diameter Min mm
300	0.14	3	100
	0.28	4	150
450	0.28	3	150
	0.57	5	200
	0.85	7	300
	1.13	8	400
600	0.85	5	200
	1.13	8	200
	1.42	8	300
	1.70	9	400
For larger or higher flows, consult a Registered Civil Engineer			

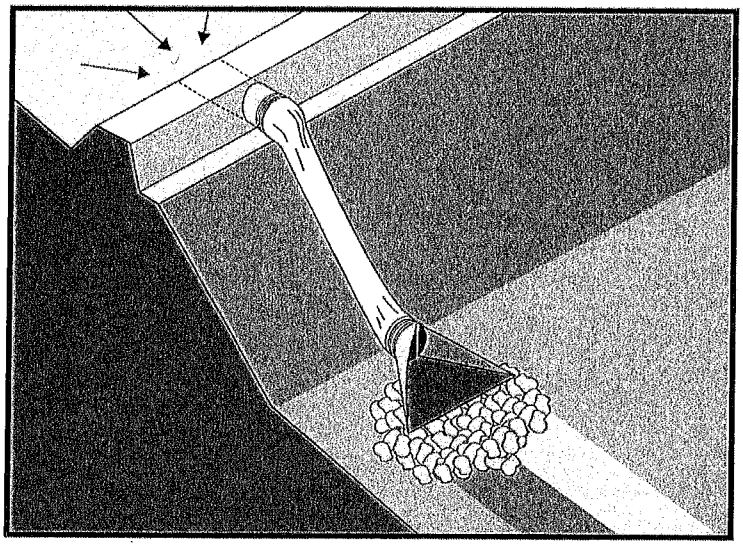
Source: USDA – SCS

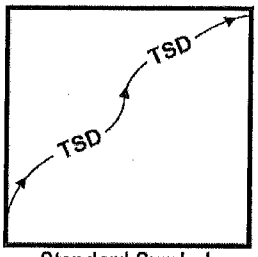
Source Material for Construction BMP SS-10 Outlet Protection

2003. State of California Department of Transportation. Caltrans Storm Water Quality Handbook Construction Site BMP Manual.

Slope Drains

SS-11





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device or stabilized area. Slope drains are used with lined ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes.

Appropriate Applications

- Slope drains may be used on construction sites where slopes may be eroded by surface runoff.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Resident Engineer (RE).

Limitations

- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.

Standards and Specifications

- When using slope drains, limit drainage area to 4 ha (10 ac) per pipe. For larger areas, use a rock-lined channel or a series of pipes.
- Maximum slope generally limited to 1:2 (V:H), as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. See BMP SS-8, "Earth Dikes/Drainage Swales, and Lined Ditches."
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials are PVC, ABS, or comparable pipe.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.

Slope Drains

SS-11

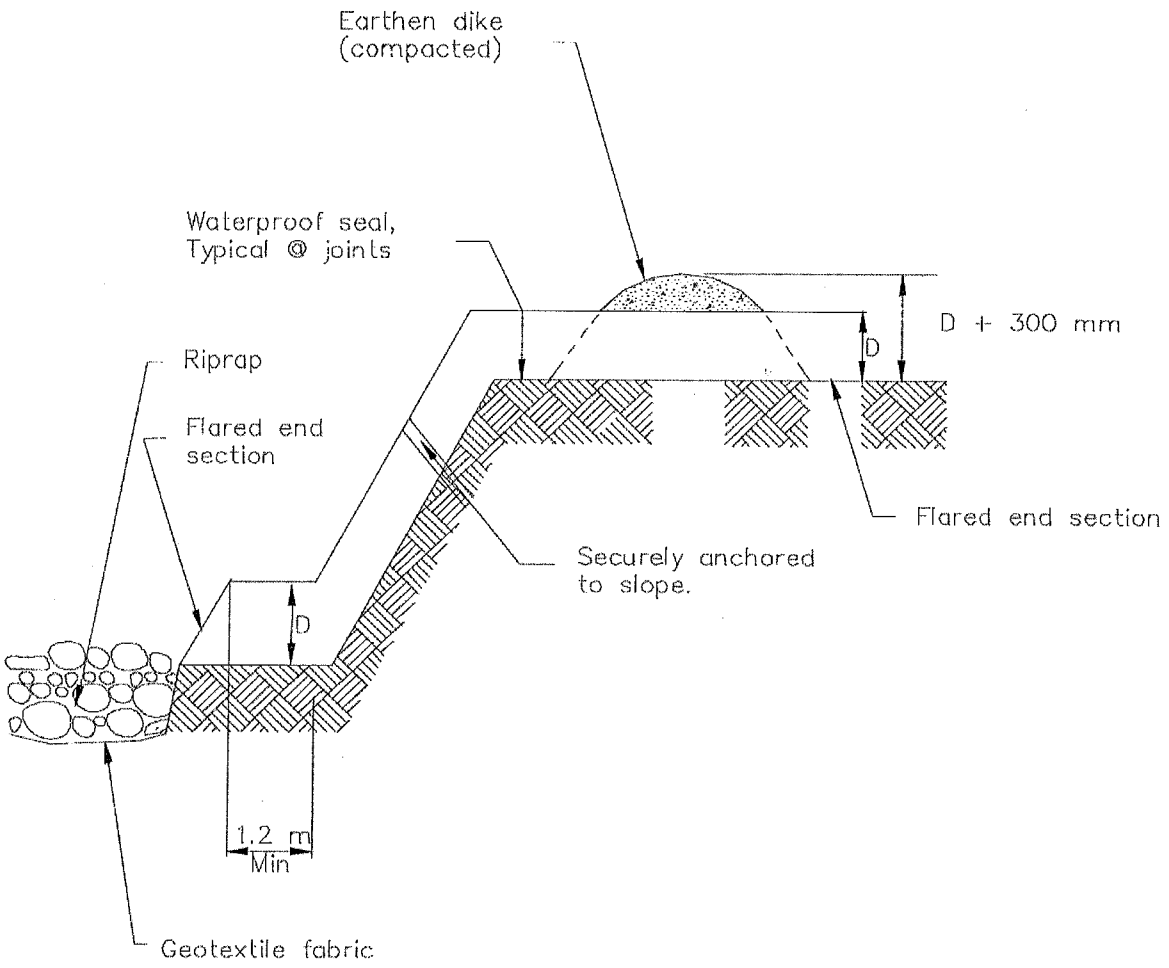
- Compact soil around and under entrance, outlet, and along length of pipe.
- Securely anchor and stabilize pipe and appurtenances into soil.
- Check to ensure that pipe connections are water tight.
- Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
- Protect inlet and outlet of slope drains; use standard flared end section at entrance and exit for pipe slope drains 300 mm (12in) and larger.

Maintenance and Inspection

- Inspect before and after each rain storm, and twice monthly until the tributary drainage area has been stabilized. Follow routine inspection procedures for inlets thereafter.
- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built-up sediment from entrances, outlets, and within drains as required.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).

Slope Drains

SS-11

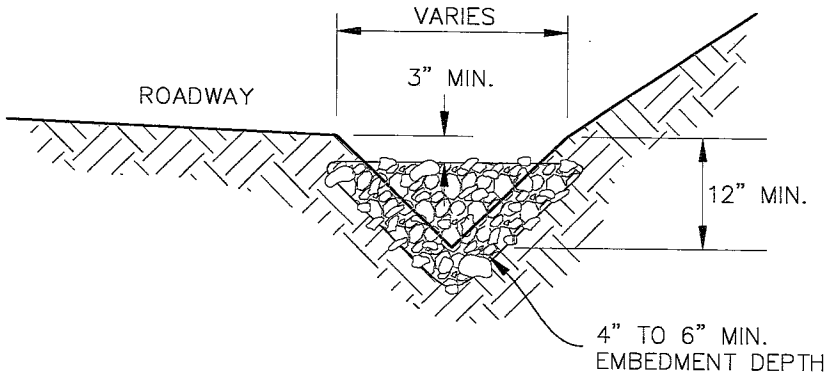


TYPICAL SLOPE DRAIN
NOT TO SCALE

Source Material for Construction BMP SS-11 Slope Drains

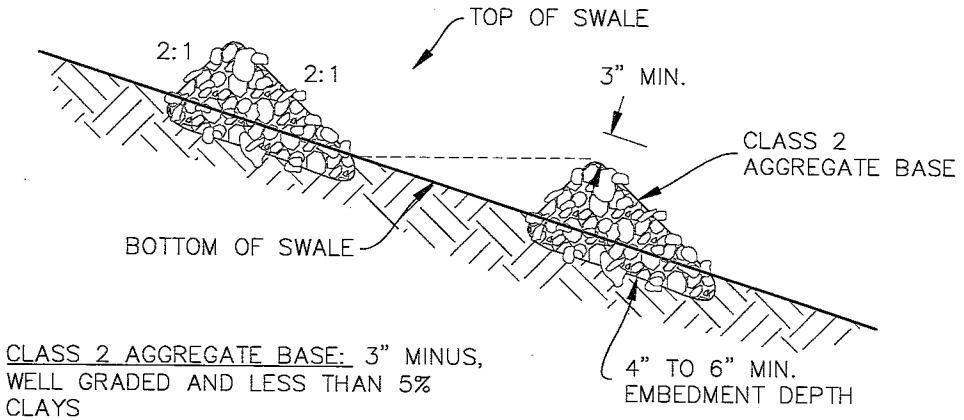
2003. State of California Department of Transportation. Caltrans Storm Water Quality Handbook Construction Site BMP Manual.

SC-1.1 CHECK DAMS



SECTION VIEW

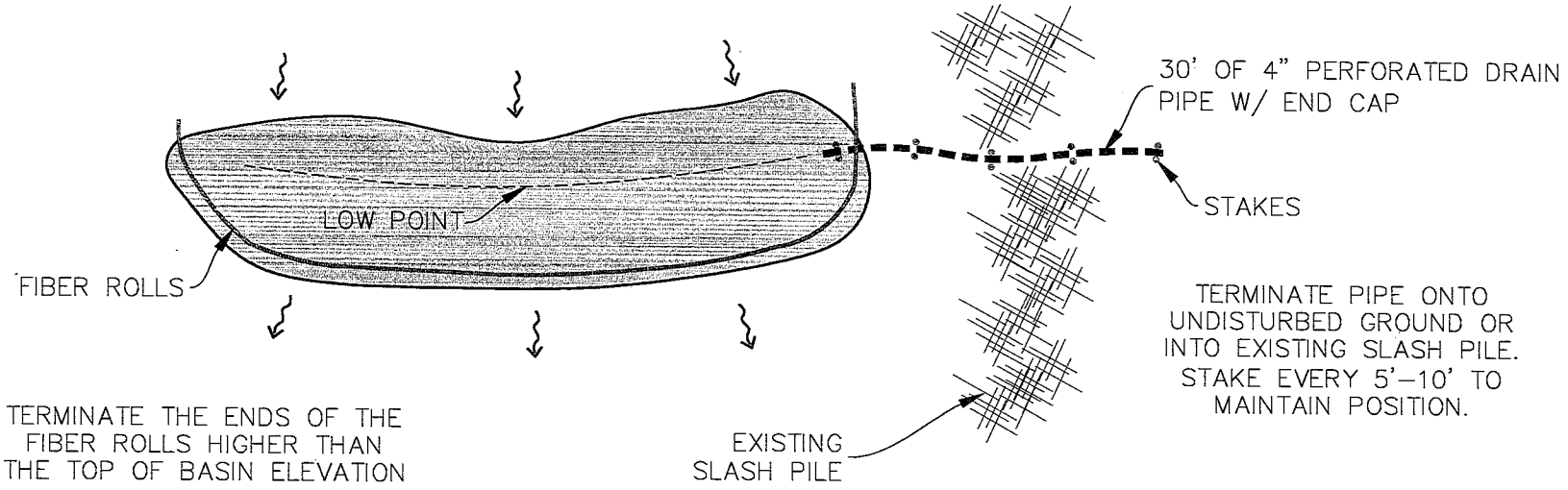
CHECK DAMS:
1. CHECK DAMS SHALL BE INSTALLED AT ALL LOCATIONS INDICATED ON THE WRPP, AND AT ANY OTHER LOCATION DEEMED NECESSARY BY THE SITE CONTRACTOR.
2. CHECK DAMS SHOULD BE SPACED SO THAT THE TOE OF CHECK DAM IS THE SAME ELEVATION AS THE TOP OF THE CHECK DAM BELOW.
3. CHECK DAMS SHOULD BE IMBEDDED IN CHANNEL A MINIMUM OF 4"-6"
4. CHECK DAMS THAT EXCEED A HEIGHT OF 3' SHOULD BE DESIGNED BY A QUALIFIED ENGINEER, GEOLOGIST, OR EROSION CONTROL SPECIALIST.
5. CHECK DAMS SHALL BE INSPECTED PERIODICALLY THROUGHOUT THE COURSE OF CONSTRUCTION, ONCE AFTER EACH RAINFALL EVENT, AND ONCE EVERY 24 HOURS DURING EXTENDED RAINFALL EVENTS. ANY SPLIT, TORN, UNRAVELED OR SLUMPING FIBER ROLLS SHALL BE REPAIRED OR REPLACED IMMEDIATELY.



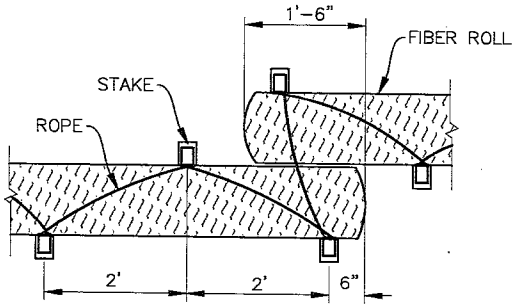
CLASS 2 AGGREGATE BASE: 3" MINUS, WELL GRADED AND LESS THAN 5% CLAYS

CHCECK DAM SPACING

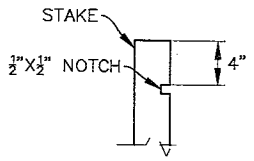
SC1.2 TEMPORARY SEDIMENT BASIN

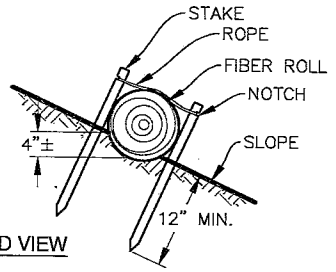


SC-1.3 FIBER ROLLS



PLAN VIEW

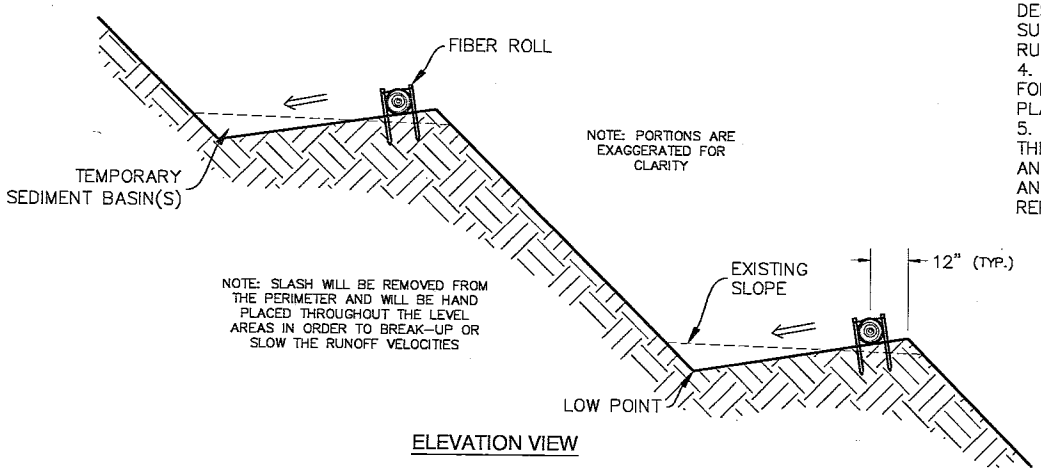




ENLARGED VIEW

FIBER ROLLS:

1. FIBER ROLLS SHALL BE INSTALLED AT ALL LOCATIONS INDICATED ON THE WRPP, AND AT ANY OTHER LOCATION DEEMED NECESSARY BY THE SITE CONTRACTOR.
2. FIBER ROLLS SHOULD BE USED ALONG THE FACE OF EXPOSED SLOPES TO SHORTEN SLOPE LENGTH AND DECREASE FLOW VELOCITY; AT GRADE BREAKS WHERE SLOPES TRANSITION TO STEEPER SLOPES; AND ALONG STREAM BANKS TO ASSIST STABILIZATION, AND IN DRAINAGE SWALES TO SLOW FLOWS. ON 1:1 SLOPES PLACE FIBER ROLLS SPACED AT 10' INTERVALS PARALLEL TO SLOPE, ON 1.5:1 SLOPES PLACE FIBER ROLLS SPACED AT 15' INTERVALS PARALLEL TO SLOPE, AND ON 2:1 SLOPES PLACE FIBER ROLLS SPACED AT 20' INTERVALS PARALLEL TO SLOPE.
3. FIBER ROLLS SHALL CONSIST OF BIODEGRADABLE FIBERS STUFFED INTO A PHOTO-DEGRADABLE OPEN WEAVE NETTING. THEY SHALL BE DESIGNED TO ALLOW WATER TO PASS THROUGH THE FIBERS; TO TRAP SUSPENDED SEDIMENT; INCREASE FILTRATION RATES; AND TO SLOW RUNOFF.
4. FIBER ROLLS SHALL BE PLACED SUCH THAT THEY OVERLAP AND FOLLOW THE CONTOUR LINES OF THE SLOPE ON WHICH THEY ARE PLACED.
5. FIBER ROLLS SHALL BE INSPECTED PERIODICALLY THROUGHOUT THE COURSE OF CONSTRUCTION, ONCE AFTER EACH RAINFALL EVENT, AND ONCE EVERY 24 HOURS DURING EXTENDED RAINFALL EVENTS. ANY SPLIT, TORN, UNRAVELED OR SLUMPING FIBER ROLLS SHALL BE REPAIRED OR REPLACED IMMEDIATELY.



ELEVATION VIEW

ROAD BMP RESOURCES

DESCRIPTION

Listed below are some of the resource materials for Road BMPs that are available for landowners.

2006. California Department of Fish and Game. Part X - Upslope Erosion Inventory and Sediment Control Guidance, California Salmonid Stream Habitat Restoration Manual.

Available at:
California Department of Fish and Game
Inland Fisheries Division
ATTN: Salmonid Habitat Restoration Coordinator
1416 Ninth Street, Sacramento, CA 95814 (916) 654-5997
or
www.dfg.ca.gov/fish/resources/habitatmanual.asp

2003. California Department of Transportation (CALTRANS). Storm Water Quality Handbooks – Construction Site Best Management Practices (BMPs) Manual.

Available at:
www.dot.ca.gov/hq/construc/stormwater/CSBMPM_303_Final.pdf

2009. California Stormwater Quality Association (CASQA). California Stormwater BMP Handbook.

Available at:
California Stormwater Quality Association
PO Box 2105
Menlo Park, CA 94026
or
www.cabmphandbooks.com

2004. FishNet 4C. Guidelines for Protecting Aquatic Habitat and Salmon Fisheries for County Road Maintenance.

Available at:
3820 Cypress Dr., Suite 11
Petaluma, CA 94954 Phone: 707.762.1336
or
http://fishnet.marin.org/projects_roads_manual.html

2002. Five Counties Salmon Conservation Program. A Water Quality and Stream Habitat Protection Manual for County Road Maintenance.

Available at:
www.5counties.org/Projects/FinalGeneralProjectPages/RoadsManual800.htm

1996. US Forest Service. A Guide for Road Closure and Obliteration In the Forest Service. Technology and Development Program. Publication: 9677 1205.

Available at:
www.fs.fed.us/eng/pubs/pdfimage/96771205.pdf

2014. Weaver W.E., Wepner E. and Hagans D.K. Handbook for Forest, Ranch, and Rural Roads. Mendocino County Resource Conservation District

Available at:
Mendocino County Resource Conservation District
404 Orchard Avenue, Ukiah, CA 95482 (707) 468-9223
Or
http://mcrcd.org/wp-content/uploads/Handbook_for_Forest_Ranch&Rural_Roads.pdf

ATTACHMENT C. WATER RIGHTS

Attachment C – Water Rights

An Initial Statement of Water Diversion and Use (ISDU) and Small Irrigation Use Registration (SIUR) will be registered with the California State Water Resources Control Board (SWRCB) in 2016. A Streambed Alteration Agreement will be applied for in 2016 for the construction of the pond.

Document to be included when available

- e-WRIMS – California Integrated Water Quality System (CIWQS) database print out
- Statement of Water Diversion and Use – SWRCB
- Small Irrigation Use Registration (Right to Divert and Use Water) – SWRCB
- Review of SIUR – California Department of Fish and Wildlife (CDFW)
- Streambed Alteration Agreement - CDFW

CIWQS

e-WRIMS Water Right Search Results

Criteria: Displaying Water Rights where Holder Name like '*strauss*'.

Search Results: previous 1-1 of 1 ▼ **next**

Appl ID	Permit ID	License ID	Water Right Type	Status	Holder Name	Date	Face Amt	County	Source	View Reports	Water Right	Open in GIS	Export to Excel
S025417			Statement of Div and Use	Claimed	TRISTAN STRAUSS	04/06/2016	0 acre-ft/yr	Humboldt	UNNAMED STREAM	View Reports	View Statement	Open in GIS	Download to Excel

Return to Water Right Public Search Form · Download to Excel

e-WRIMS Public Summary Page

[Return to Water Right Search] [Return to Water Right Search Results]

Application ID: S025417 View Statement
Permit ID: None
License ID: None
Water Right Type: Statement of Div and Use
Water Rights Status: Claimed (04/06/2016)
Primary Owner: TRISTAN STRAUSS

Current Parties	Relationship	Effective Date
TRISTAN STRAUSS	Primary Owner	04/06/2016
MANHARD CONSULTING LTD	Agent	04/06/2016
Need to report a change of ownership or agent? Click Here		

Historical Parties

Record Summary	
Application Acceptance Date	04/07/2016
Permit Issuance Date	
License Issuance Date	
Face Value Amount	0.0
Subtypes (Statements Only)	Riparian

Name(s) of Sources of Water	County Location	Parcel Number	Diversion Site Name	Lat/Long Coordinates
UNNAMED STREAM	Humboldt	108-012-010	STRAUSS CISTERN	40.1655 ; -124.019
				Map It

Beneficial Uses	Acres	Direct Diversion Season	Collection to Storage Season
Domestic	0.0		
Irrigation	0.23		

Electronic Reports				
Year	Revision	Report Type	Date Received	View Report PDF
no reports submitted				

*For reports submitted prior to 2009, please contact our records room.

Water Rights Associated with Primary Owner		
Application ID	Water Right Type	Water Right Status
S025417	Statement of Div and Use	Claimed

Associated Decisions/Orders			
Decision/Order Number	Date	Description	View Document

Manhard CONSULTING

Civil Engineering
Surveying
Water Resources Management
Water & Wastewater Engineering
Supply Chain Logistics
Construction Management
Environmental Sciences
Landscape Architecture
Land Planning

April 12, 2016

Jane Arnold
California Department of Fish & Wildlife
619 Second Street
Eureka, CA 95501

Subject: **Water Availability Analysis – Small Irrigation Use Registration:**
Tristan Strauss, Humboldt County APN 108-012-010; Ettersburg, CA

Introduction

This report is to summarize the results of a Cumulative Flow Impairment Index (CFII) calculation and water availability analysis for the site located within the Cape Mendocino watershed in Humboldt County. This analysis has been prepared as a component of a pending Small Irrigation Use Registration. Concurrent with filing the Small Irrigation Use Registration (SIUR), a Lake and Streambed Alteration Notification has been prepared in accordance with the State Water Resources Control Board, Division of Water Rights' SIUR policy.

The objective of the analysis is to provide information required under California Water Code Section 1275 (a), 1375 (d), 1234.5 and California Code of Regulations, Title 23, Section 782, to determine if water may be appropriated for small use irrigation. This analysis is also to determine the potential impacts of the intended water use on streamflow within the watershed for environmental compliance.

The CFII portion of the analysis was prepared by applying the methodology established in the *Policy for Maintaining Instream Flows in Northern California Coastal Streams, February 4, 2014* (Policy).

Project Description

The site location is located near Ettersburg, approximately 11 miles due west of Redway, CA. The application for this SIUR seeks a water right to seasonally divert 0.7 acre-feet for storage from an unnamed seasonal stream. The 0.7 acre-feet of water is intended to be diverted to a proposed pond and a series of storage tanks during the season between December 15 and March 31. The point of interest (POI) 1 is assumed to be upstream of the confluence of the unnamed steam and the Mattole River, and downstream of the existing point of diversion (POD) for the attached SIUR. The POD is a cistern in the unnamed stream on the parcel that contributes directly to the Mattole River. A review of Calfish.org data indicates that no anadromous species exist upstream of POI 1. Point of Interest 2 is just downstream from the confluence of the unnamed stream and the Mattole River. Point of Interest 3 is located at the A.W. Way Campground to account for the increase in senior water rights from the previous POI. Due to the amount of data on record, POI 4 was established to be at USGS Gauge 1469000 near Petrolia, CA. This significantly increases the amount of senior water rights upstream which are accounted for in the subsequent CFII calculations. The final POI is at the mouth of the Mattole River to account for the final

senior water rights between the gauge and the Pacific Ocean. Figures showing each POI and the senior water rights within each sub basin can be found in the Appendix.

Methods

Streamflow at each POI is estimated based on a proration of USGS streamflow data using Gauge 1469000 near Petrolia, CA for the Mattole River. The CFII is determined based on the seasonal unimpaired flow. During this seasonal period, diversion for storage may occur. The season during which unimpaired seasonal flow occurs is December 15 to March 31. Unimpaired flow is the average total volume of water in acre-feet that would pass a POI in a season if no additional diversions occur upstream of that POI. The formula used to determine the prorated seasonal unimpaired flow at each POI, as outlined in the Policy is:

$$Q_{POI}=(Q_{gauge})(A_2/A_1)(I_2/I_1) \qquad \text{(Equation 1)}$$

Where:

Q_{POI} =	Daily unimpaired seasonal flow at POI	(cfs)
Q_{gauge} =	Daily unimpaired seasonal flow at nearby gauge	(cfs)
A_2 =	Sub basin area above POI	(mi^2)
A_1 =	Watershed area above gauge	(mi^2)
I_2 =	Precipitation at sub basin above POI	(in)
I_1 =	Precipitation at watershed above gauge	(in)

Watershed sub basins for each POI and location of the USGS streamflow gauge in the watershed are shown in Appendix A. The boundaries of each sub basin were defined using the USGS California Stream Stats interactive map tools. For each POI, a basin characteristics report was generated listing the area of basins upstream of each POI, in square miles, as well as the mean annual precipitation, in inches, which are used for calculating the prorated daily seasonal flow at each POI as summarized in Table 1.

Seasonal Unimpaired Flow

Taking data from USGS Gauge 1469000 (POI 4), daily streamflow records were averaged for each season of December 15 to March 31 between the years of 1970 to 2015. This average daily value is also used to prorate the streamflow at each POI. The total basin area and mean annual precipitation upstream of POI 4 is 156.8 square miles and 74.1 inches respectively. The seasonal unimpaired flow for this POI was determined to be 2817 cfs. Table 1 provides a summary of unimpaired flows for each POI. Using Equation 1, the unimpaired seasonal daily flow for POI 1 can be calculated using Equation 1:

$$3.5 \text{ cfs} = (2817 \text{ cfs})(0.21 \text{ mi}^2/156.76 \text{ mi}^2)(69.3 \text{ in}/74.1 \text{ in})$$

Table 1: Summary of sub basin characteristics for each POI

POI	Area (mi^2)	Mean Annual Precipitation (in)	Unimpaired Flow Dec 15 - Mar 31 (cfs)
1	0.2	69.3	3.5
2	93.8	72.4	1647.2
3	218.9	71.9	3817.5
4	156.8	74.1	2817.0
5	218.9	76.1	4040.5

Water Rights on Record

All senior water rights within the sub basin of each POI were tabulated based on the State Water Board's electronic Water Rights Information Management System (eWRIMS) database. The data was sorted for each sub basin using ArcGIS and summed to represent the total face value of senior water rights upstream of each POI. Water rights with a revoked status were included in the total face value of each sub basin to offset unaccounted diversions. A majority of senior water right holders upstream of POI 5 and downstream of POI 1 are at an elevation above the main stem of the Mattole. For cumulative impacts of all diversion within the watershed, the face value for these senior water rights were still considered in the analysis even though bypass flows from POI 1 would not be seen at the POD's of the senior diverters. Table 2 presents the tabulation of water rights within the Cape Mendocino that indicate a positive face value.

Table 2: Face values of existing senior water rights and senior rights with the proposed POD

POI	Area (mi^2)	Face Value of Senior Water Rights (ac-ft)	Face Value of Senior Water Rights and POD (ac-ft)
1	0.2	0	0.7
2	93.8	333.04	333.7
3	218.9	566.3	567.0
4	156.8	822.2	822.9
5	218.9	984.4	985.1

CFII

The CFII is used to evaluate the cumulative flow impairment of all existing and pending projects in the Cape Mendocino watershed upstream of USGS Gauge Station 1469000. The CFII is a percentage obtained by dividing the face value demand by the face value supply at a POI. The face value demand is a volume of all existing and pending water rights above a POI in acre-feet. These demand values were taken from the eWRIMS database and plotted in ArcGIS to determine where senior water rights may occur upstream of a POI. The supply is assumed to be the seasonal unimpaired flow, converted to a volume in acre-feet, and was determined using 45 years of USGS data from Gauge 1469000.

The prorated flow volume is calculated at each POI using the form of Equation 1, replacing the unimpaired flow rate with the equivalent flow volume. The summed face values of each senior water right upstream of each POI is divided by the prorated flow volume at the same POI. This percentage represents the CFII prior to the proposed water right. A second CFII percentage is calculated by adding the proposed 0.7 acre-feet of storage to the summed face values for each POI, and again divided by the corresponding prorated flow volume. This percentage represents the CFII should the proposed water right be approved.

Should this second CFII percentage be less than 5 percent, it is expected that the cumulative impacts due to the diversion will not create any further impacts and the project does not require additional studies for assessment, as stated in the Policy. The Policy also states that if the CFII is between 5 and 10 percent, additional site specific studies and hydrologic analyses to estimate effects of cumulative diversions on the stream must be provided. It is noted that the CFII methodology is conservative since the face values of water rights are used. These face values are not a representative demand for an average year due to the assumption that all storage supplies start empty each fall. Typically, it is common for reservoir owners to carry over water from one year to the next, which assumes that the volume of water diverted during each season will be less than the face value.

CFII Results

The results for the CFII are summarized in Table 1. Two conditions are represented in the table. One of which represents the CFII for senior water rights only, the other of which represents the CFII for senior water rights combined with the proposed water right. Based on the Policy, no further cumulative impact studies should be required for the POI's listed.

Table 3: Summary of CFII Results for POI's within Cape Mendocino Watershed

POI	A Unimpaired Flow Volume Dec 15 - Mar 31 (ac-ft)	B Face Value of Senior Water Rights (ac-ft)	CFII **(B/A)**	C Face Value of Senior Water Rights and POD (ac-ft)	CFII **(C/A)**
1	476	0	0.00%	0.70	0.15%
2	225431	333.04	0.15%	333.74	0.15%
3	522459	566.3	0.11%	567.04	0.11%
4	603834	822.2	0.14%	822.94	0.14%
5	748855	984.4	0.13%	985.14	0.13%

Bypass Flows

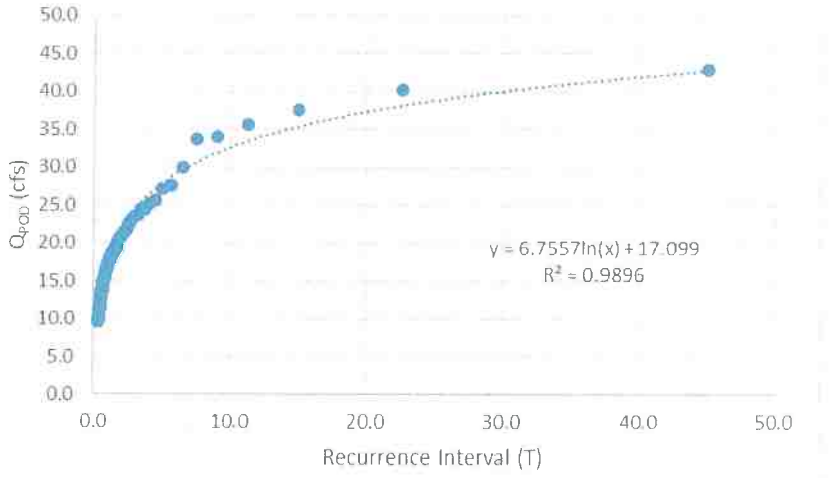
The median February flow has been identified as the bypass flow in order to protect fish habitat. The median flow for each point of diversion was prorated based on the USGS Gauge 1468900 data and the ratio of watershed sub basins and mean annual precipitation. The 1276 days on record for the month of

February between the years 1970 and 2015 have a median daily flow of 1580 cfs. The gauging station used is at POI 4.

The median daily flow for the Mattole River was multiplied by the ratio of drainage areas and the ratio of mean annual precipitation for each sub basin upstream of POI 4 to determine the average daily unimpaired flow. Using the methodology outline in the Policy, the bypass flow at the point of diversion is calculated below. Because the sub basin area of the POD is less than one square mile, the minimum bypass flow can be determined by multiplying the daily average unimpaired flow by 9. Point of interest 1 has a sub basin area of 0.2 square miles, and POI 4 has a sub basin area of 245.5 square miles. The expected bypass flow at POI 1 is expected to be 11 cfs:

$$Q_{MBF} = (9)(1580\ cfs)(0.21\ mi^2/156.76\ mi^2)(69.3\ in/74.1\ in)=17.5\ cfs$$

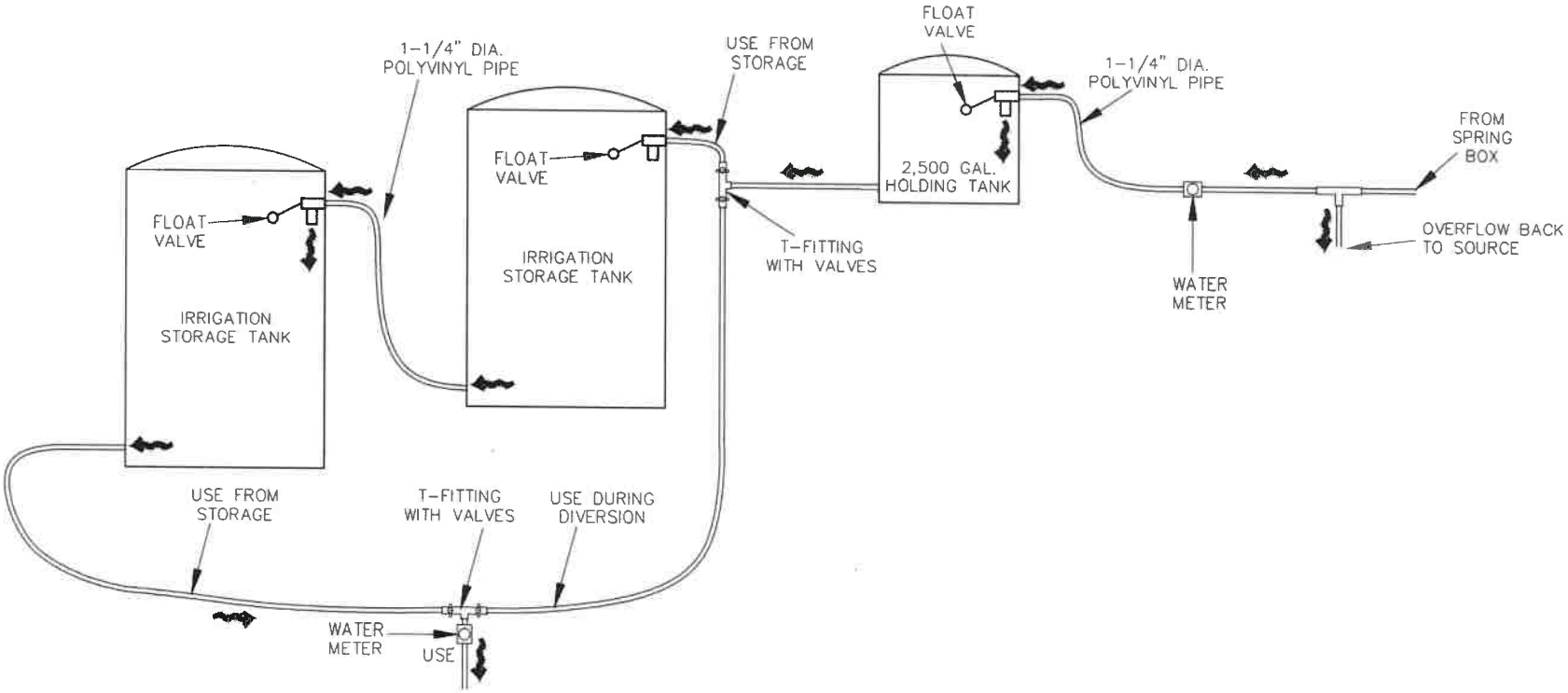
In addition to the minimum bypass flow, a maximum cumulative diversion has been determined using the Peaks over Threshold method as outline in Appendix B of the Policy. The maximum rate of diversion applies to the contributing basin at POI 1 and does not represent a maximum diversion rate for the SIUR applicant. Using proration methods as previously, the 1.5-year instantaneous peak flow was determined for POI 1 using USGS Gauge 1468900 data. Because a log-log plot generated negative values, a trend line could therefore not be displayed. Prior to generating a log-log plot of recurrence interval and peak flows, the two were plotted below to fit a trend line.



The shown equation was used to determine the 1.5-year peak flow. The log of that number was then used to determine the maximum cumulative diversion as outlined in Appendix B of the Policy since the equation for the log-log plot could not be displayed. The maximum cumulative diversion at POI 1 is determined to be 41,930 gallons per day.

$$\text{Max. Cum. Diversion} = (5\%)(\text{Log}_{10}(6.7557\ \ln(1.5)+17.099))=41{,}930\ gpd$$

Water System Diagram for Monitoring - Diversion, Storage, and Use



Water Meters Recommendation – Pulsafeeder Brand Water Meters
http://www.pulsatron.com/products/parts/pulsafeeder-genuine-parts/water-meter

http://www.grainger.com/product/PULSAFEEDER-Flowmeter-WP142047/_/N-ccc/Ntt-Water+Meters?s_kwcid=AL%212966%213%2188444975990%21b%21%21g%21%21water+meters&sst=subset&ts_optout=true&s_pp=false&picUrl=//static.grainger.com/rp/s/is/image/Grainger/3FKP1_AS01?$smthumb$

ATTACHMENT D. FERTILIZER AND PESTICIDES

ATTACHMENT D. CULTIVATION FERTILIZER, SOIL AMENDMENTS, HERBICIDE, AND PESTICIDE LIST

TABLE D1. Fertilizers, soil amendments, herbicides, and pesticides used at Strauss Number: 108-012-010

Brand	Type	Container Size	N/P/K/Active Ingredients	
ABC Organics	Fertilizer	5 gallons	0.0-4.7-1.5	10 to 20 ml per gallon of water
Dr. Earth Premium Gold	Fertilizer/Soil amendment	1.5 cubic ft.	4-4-4	Bed Preparation: During bed preparation, mix in 1 1/3 cups for every 10 sq. ft. of growing area, or 6 cups for every 50 feet of planting row. Apply every 2 months year-round. Direct Use: For fertilizer tea mix 2 lbs or 5 cups for every 5 gallons of water.
Dyna Grow Neem Oil	Pesticide	1 gallon	Neem Oil	1 oz per gallon of water
Native Nutrients: Kelp help	Fertilizer	2.5 gallon	-	0.5 gallons per acre 3-4 times per growing season
Organicide Plant Doctor	Fungicide	1 quart	Mono and D potassium	2 tsp to 5 tsp per gallon of water every 14 to 21 days.
Planet Natural Pacific Pearl Oyster Lime	Fertilizer	50 lb bag	Oyster Shell	NA
Planet Natural Sulfur Prills	Pesticide Fungicide	2 lb bag	Sulfur	1-3 table spoons per greenhouse. Burn/ vaporize for 3-7 hours
Primodial Solutions True Bloom	Fertilizer	1 gallon	0.1-0.3-0.5	2 ml per gallon of water
Primodial Solutions Sea Green	Fertilizer	1 gallon	1.5-0.5-4.0	0.5 ml per gallon of water
Primodial Solutions Rootementary	Fertilizer	1 gallon	6.5-2.0-1.5	2 oz per 240 gallons of water
Primodial Solutions Paleo Bloom	Fertilizer	1 gallon	0.3-4.0-4.0	10-20 ml per gallon of water
Sparetime Supply: Molasses	Fertilizer	5 gallons	1-0.1-3	1-2 Tbsp per gallon of water once a week

Brand	Type	Container Size	N/P/K/Active Ingredients	
Xtream Gardening: Mykos	Biological inoculant	15 lbs bag	-	Direct Use: Add to hole, directly around the plant roots. Containers: 1 - 2 Tbsp per 1 - 3 gallons 4- 6 Tbsp per 5 - 7 gallons 1/2 cup per 10 - 20 gallons 1 cup per 25 - 50 gallons 2 cups per 100 gallons Rock Wool Cubes: Add 1 - 2tsp to hole, directly under plant roots. In Ground & Raised Bed: 1 - 2 Tbsp per plant around each plant hole or directly to roots. Sowing Seed :1 Tbsp per foot, 1/2 tsp per cell / plug. For Xtreme Results: Water with Azos & Xtreme tea. Double applications rates

ATTACHMENT E. SEPTIC SYSTEM

Attachment E – Septic System

A County permit for a new septic system for the shop should be issued by January 2017 and the system installed by October 2017.

ATTACHMENT F. MONITORING REPORT AND DISCHARGE INVENTORY

NCRWRCB Cannabis Cultivation Waste Discharge Regulatory Program

Yearly Monitoring Reporting

Water Diversion, Storage, and Use

Name_____

APN#_____

Year_____

Total surface water diversion by source and month (gallons or acre-feet)

Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Water input to storage by source and month (gallons or acre-feet)

Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Water use by source and month (gallon or acre-feet)

Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Monitoring Data Sheet for NCRWRCB Cannabis Cultivation Waste Discharge Regulatory Program
(Controllable Sediment Discharge Source Inventory)

Inspector(s): _____ Date: _____

Owner: _____ APN: _____

Inspection Period (Circle) < Oct 15, < Dec 15, 3" Precip/24 hours) Other: _____

Map Point	Map Point Description	BMP	*Condition: G/M/R	Comment

* **G** – Good Condition (working as designed), **M** – Maintenance (needs maintenance to work properly), **R** – Replacement (needs to be reconstructed)

Map Point	Map Point Description	BMP	*Condition: G/M/R	Comment

* **G** – Good Condition (working as designed), **M** – Maintenance (needs maintenance to work properly), **R** – Replacement (needs to be reconstructed)

ATTACHMENT G. RWQCB DOCUMENTS

California Regional Water Quality Control Board
North Coast Region

Order No. 2015-0023

Waiver of Waste Discharge Requirements
and
General Water Quality Certification
for
Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities
or Operations with Similar Environmental Effects
In the
North Coast Region

The California Regional Water Quality Control Board, North Coast Region, (hereinafter Regional Water Board) finds that:

Overview

1. The North Coast Region is inundated with cannabis cultivation in headwaters and main river systems, with active, developed sites in steep and rugged terrain. With the increase in use and cultivation of cannabis since the voters' passage of the Compassionate Use Act (Prop 215) and the legislature's passage of AB 420, the unregulated activity of cannabis cultivation has grown increasingly year by year, with land area under cultivation increasing exponentially over the past decade. The increased cultivation throughout the North Coast Region has resulted in significant waste discharges and a loss of instream flows associated with improper development of rural landscapes on privately-owned parcels, and the diversion of springs and streams, to the cumulative detriment of beneficial uses of water.

2. The purpose of this Order is to provide a water quality regulatory structure to prevent and/or address poor water quality conditions and adverse impacts to water resources associated with cannabis cultivation on private land. Under this Order, any landowner or operator cultivating cannabis that results in a discharge of waste to an area that could affect waters of the State (including groundwater) will fall within one of three tiers depending on the nature of their operation and risk to water quality.[1] Properties with site characteristics or development that have impacts that cannot be ultimately mitigated to less than significant levels require regulation under a separate and individual order.

3. This Order applies to any person engaged in cultivating cannabis and associated activities, on private land, that discharge waste to any area that could affect waters of

[1] This Order does not apply to any parcel with a cumulative area of cannabis cultivation or operations with similar environmental effects of less than 2,000 square feet where there is no potential for discharge of waste.

the state including landowners, operators, lessees, tenants and occupiers[2] (hereinafter referred to as "Dischargers"). Subject to approval from the Executive Officer, Dischargers with similar operations to cannabis cultivation[3] may also elect to enroll and comply with this Order to ensure their discharges are authorized. Landowners are responsible for the conditions, activities, and operations occurring on properties that they own. These activities have the potential to result in impacts to water resources, including discharges of waste to receiving waters. Landowners are responsible for discharges of waste and water resource impacts both from recent site development and activities underway, as well as discharges of waste from past or legacy development/features[4] on the properties that they own. Cannabis cultivators, whether landowners or tenants, are also responsible for water resource and water quality impacts associated with their occupancy of and activities on a property. Compliance with this Order may require information from or cooperation between both landowners and their tenants.

4. Discharges and related controllable water quality factors from the following activities covered under this Order include:

   a. Maintenance of developed areas and drainage features.

   b. Stream crossing maintenance and improvement, including culvert sizing and installation, non-culverted stream crossing installation, culvert cleaning, culvert improvement and repair, and culvert and non-culverted stream crossing replacement.

   c. Activities within and adjacent to wetlands and riparian zones.

   d. Spoil storage and disposal.

   e. Water diversion, storage, and use.

   f. Irrigation runoff from cannabis cultivation and other similar growing operations.

   g. Fertilizer, soil amendments, petroleum products, biodiesel, and pesticide/herbicide/rodenticide storage, use, and waste disposal.

   h. Waste handling and disposal, including empty soil/soil amendment/ fertilizer/pesticide bags and containers, empty plant pots or containers, dead or harvested plant waste, spent growth medium, and other cultivation-associated wastes.

---

[2] A lessee/occupier has primary responsibility for compliance; however, if the lessee/occupier fails to clean up or comply and/or cannot be reached, the landowner must assume responsibility (see Vallco Park, State Water Board WQO 86-18).

[3] Operations with similar environmental effects do not include agricultural operations otherwise subject to existing agricultural permits or those in development.

[4] Legacy features are considered controllable sediment delivery sites as defined in footnote 25.

i. Household refuse, human waste and domestic wastewater.

j. Site remediation/cleanup/restoration activities including, but not limited to removal of fill from watercourses, stream restoration, riparian vegetation planting and maintenance, soil stabilization, erosion control, upgrading stream crossings, road outsloping and rolling dip installation where safe and suitable, installing or maintaining water bars, ditch relief culverts and overside drains, removing berms, stabilizing unstable areas, reshaping cutbanks, and rocking native-surfaced roads.

5. This Order authorizes discharges of waste from cannabis cultivation sites and associated activities listed above. Most of the potential water quality impacts from the listed activities are associated with erosion and sediment delivery[5] and/or changes to riparian systems that may reduce shade and affect water temperatures, over allocation of water sources, and chemical/pollutant discharges from areas under cultivation or material/waste storage areas. This Order contains requirements that eliminate, minimize, or mitigate these impacts to protect and/or restore water quality. Listed activities that also require water quality certification are subject to additional requirements described in findings 28-31 and General Water Quality Certification. This Order does not authorize dredge and fill activities that result in a permanent loss of wetlands and other waters.

6. This Order does not preclude the need for permits that may be required by other governmental agencies for the activities listed in finding 4, nor does it supersede any requirements, ordinances, or regulations of any other regulatory agency, including necessary certification and permitting for the application of pesticides and herbicides and proper handling and disposal of solid and domestic wastes.

7. This Order does not apply to land use activities subject to other permitting programs (e.g., industrial activities, animal waste, mining, forestry), and hazardous waste cleanup.

8. This Order does not authorize discharges of waste associated with any new development of sites for cannabis cultivation or related activities. Dischargers must obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 2009-0009-DWQ) for construction projects (individual or part of a common development) that disturb one or more acres of land surface, specifically for new site preparation and development.[6] Timberland conversion requires permitting through CalFIRE and subsequent enrollment under Order No. R1-2004-0030, General Waste Discharge Requirements for Discharges Related to Timber Activities on Non-Federal Lands in the North Coast Region. In addition, any new site development involving dredge or fill in waters of the

[5] Fine sediment waste discharges into surface waters impact many beneficial uses including those associated with fish habitat and health, domestic, municipal, and agricultural water supplies, and recreation.
[6] Construction activities subject to the Construction General Permit include clearing, grading and disturbances to the land surface such as stockpiling, or excavation, but do not include regular maintenance activities performed to repair roads and related facilities.

United States must apply for and receive coverage under Clean Water Act section 401 water quality certification. Many sites in the North Coast include steep slopes, highly erodible soils, or unstable areas. Land development on sites with these characteristics often requires design and oversight by a licensed engineer, geologist, or other appropriate California-licensed individual during construction to ensure that constructed features on the site are stable and do not represent a threat to the beneficial uses of water or public health and safety.

9. This Order does not in any way authorize, endorse, sanction, permit or approve the cultivation, possession, use, sale or other activities associated with cannabis. Individuals engaging in cannabis cultivation and other activities risk prosecution under federal, state, or local law.

Water Quality Regulation

10. Water Code section 13260(a) requires that any person discharging waste or proposing to discharge waste within any region that could affect the quality of the waters of the state, other than into a community sewer system, shall file with the appropriate regional water board a Report of Waste Discharge (ROWD) containing such information and data as may be required by the Regional Water Board. The Regional Water Board may waive the requirements of Water Code section 13260 for specific types of discharges if the waiver is consistent with the Basin Plan and in the public interest. Any waiver is conditional and may be terminated at any time. A waiver should include monitoring requirements to verify the adequacy and effectiveness of the waiver's conditions. This Order conditionally waives the requirement to file a ROWD for discharges and associated activities described in finding 4.

11. The *Water Quality Control Plan for the North Coast Region* (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives to protect waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. Economic considerations were evaluated as required by law during the development of these objectives. Compliance with the conditions, prohibitions, and provisions contained in this Order will implement these previously-developed water quality objectives and protect beneficial uses.

12. Activities described in finding 4 that involve construction and other work in waters of the United States may require a federal permit pursuant to section 404 of the Clean Water Act. Section 401 of the Clean Water Act (33 U.S.C. §1341) requires every applicant for a federal license or permit to apply for and receive water quality certification from the state. State water quality certification conditions shall become conditions of any federal license or permit for the project. This Order includes a Section 401 General Water Quality Certification for activities and associated discharges described in finding 4.

13. The federal Clean Water Act section 303(d) requires the states to determine waterbody compliance with water quality objectives and to develop a list of impaired waterbodies.

Federal regulations require that a Total Maximum Daily Load (TMDL) be developed for 303(d)-listed waterbodies for each pollutant of concern. The US Environmental Protection Agency (EPA) has established TMDLs for 25 impaired stream segments in the North Coast Region. The Regional Water Board has adopted five additional TMDLs for impaired stream segments in the North Coast Region with accompanying implementation plans.

14. The majority of the North Coast TMDLs developed to date address sediment and temperature impairments, most with common approaches. The TMDLs typically list COLD[7] as an important beneficial use. While specific load allocations and targets may vary slightly, all address the need to reduce and prevent excess sediment inputs and decrease water temperature by protecting and restoring natural shade or conditions equivalent to natural shade.

15. Implementation of this Order will address sediment and temperature impairments by requiring: 1) the application of Best Management Practices (BMPs) to avoid excess sediment and other waste discharges; 2) the protection and maintenance of riparian conditions and shade; 3) inventories, prioritization and remediation of sediment delivery sites; 4) implementation and effectiveness monitoring of BMPs and documentation of the monitoring results; 5) water conservation and measures to ensure that water diversions do not unreasonably impact beneficial uses; and 6) on-going education and outreach. For activities identified in finding 4, it is anticipated that compliance with the conditions contained in this Order will serve to prevent or minimize a site's contribution to watershed impairments and, thus, represent compliance or progress toward compliance with applicable sediment and temperature TMDLs, subject to periodic review, monitoring and reassessment.

16. It is evident that the over-diversion of surface water for cannabis cultivation continues to impact instream beneficial uses. The impacts are compounded by the cumulative effect of many dischargers drawing on the same water source, which is often the biggest problem in regulating nonpoint sources. The State Water Board, Division of Water Rights is the agency with authority to oversee and regulate water rights. The Regional Water Board does not have jurisdiction to determine the scope and extent of any water right, or grant or make changes to water rights permits and licenses; however, it may request that the State Water Board consider various water right actions and refer cases to the Office of Enforcement. Additionally, the Regional Water Board may require information pursuant to Water Code section 13267.

    Under Water Code 174, "[i]t is also the intention of the Legislature to combine the water rights, water quality, and drinking water functions of the state government to provide for coordinated consideration of water rights, water quality, and safe and reliable drinking water." Accordingly, this Order contains information requirements pursuant to

[7] Cold Freshwater Habitat (COLD): Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Water Code section 13267, and general guidance provisions for water quality as it relates to the diversion and use of surface water.

Program Framework

17. In order to prevent and/or address poor water quality conditions and adverse impacts to beneficial uses associated with cannabis cultivation on private land, any landowner or operator cultivating cannabis that results in a discharge of waste to an area that could affect waters of the state (including groundwater) will fall within one of three tiers depending on the nature of their operation and risk to water quality.

    Tier 1:
    The first tier is for dischargers with low risk to water quality based on certain physical characteristics of the operation such as slope, proximity to surface water, and scale of the operation. Specifically, slopes[8] are no more than 35%; cultivation areas[9] are no more than 5000 square feet; no cultivation areas or associated facilities[10] are located within 200 feet of a surface water (i.e., wetland, Class I, II, or III[11] streams); and Tier 1 Dischargers do not directly divert surface water from May 15 through October 31.[12]

---

[8] The Tier 1 slope criteria apply to areas within and adjacent to the cultivation area; if the cultivation area has been terraced, the slope shall be calculated as the average of the up and down gradient slopes.

[9] Cultivation area: The sum of the area(s) of cannabis cultivation and/or operations with similar environmental effects as measured around the perimeter of each discrete cultivation area on a single parcel of land.

[10] Associated facilities include those constructed or placed features that facilitate plant cultivation (including, but not limited to storage buildings, material and water storage areas, and irrigation systems).

[11] A wetland is: An area that is covered by shallow water or where the surface soil is saturated, either year round or during periods of the year; where that water coverage has caused a lack of oxygen in the surface soil; and has either no vegetation or plants of a type that have adapted to shallow water or saturated soil. Some examples are fresh water marshes, bogs, riparian areas, vernal pools, coastal mud flats and salt marshes.
California Forest Practice Rules define a Class I watercourse as 1) a watercourse providing habitat for fish always or seasonally, and/or 2) providing a domestic water source; a Class II watercourse is 1) a watercourse capable of supporting non-fish aquatic species, or 2) a watercourse within 1000 feet of a watercourse that seasonally or always has fish present; and a Class III watercourse is a watercourse with no aquatic life present, and that shows evidence of being capable of transporting sediment to Class I and Class II waters during high water flow conditions after completion of timber operations.

[12] Persons who are diverting water pursuant to a riparian water right, and move to storage for the purpose of meeting Tier 1 characteristics or for any other reason, must apply for and obtain an appropriative water right. The Department of Fish and Wildlife, in collaboration with the State Water Resources Control Board, has developed an expedited process for applying conditions to Small Domestic Use registrations for diversions that meet certain criteria. Registrations that meet these criteria are known as Emergency Tank Storage Registrations. A "small irrigation" registration process is also available in certain locations for water diversions not associated with the primary dwelling (i.e. commercial crop). Additional information on these programs is provided here (as of the date of the Order):
http://www.swrcb.ca.gov/waterrights/water_issues/programs/registrations/index.shtml Others may need to file an application for a water right under the regular permitting process. (See generally http://www.swrcb.ca.gov/waterrights/board_info/faqs.shtml.)

Dischargers in this tier must adhere to certain standard conditions contained in this Order at section I.A. Dischargers must certify that their site meets Tier 1 characteristics and standard conditions. (See Appendix C.)

A copy of the self-certification and this Order must be retained on site and shown to Regional Water Board staff on request. Enrollment, annual fee, and annual reporting are required for Tier 1, and dischargers are subject to civil liabilities and other formal enforcement actions if standard conditions are not met. If a site meets Tier 1 characteristics but does not meet standard conditions, the discharger must enroll under Tier 2 and follow Tier 2 requirements. Once standard conditions are met, (by development and full implementation of a water resource protection plan), a discharger may re-enroll under Tier 1.

Tier 2:
Tier 2 is for dischargers with operations that present a higher threat to water quality and water resources. The site does not meet the characteristics of Tier 1, or the site meets the Tier 1 characteristics but does not meet standard conditions. Tier 2 Dischargers must develop and implement a water resource protection plan that includes management measures to be implemented to meet standard conditions. Required components of the water resource protection plan are detailed in this Order at section I.B. A copy of the water resource protection plan and this Order must be retained on site and shown to Regional Water Board staff on request. Enrollment, an annual fee, and annual reporting are required for Tier 2, and dischargers are subject to civil liabilities and other formal enforcement actions if standard conditions are not met and/or a water resource protection plan is not prepared or implemented according to schedules established in the water resource protection plan.

Dischargers with cultivation areas less than 10,000 square feet that have fully implemented a water resource protection plan and are determined by Staff or an approved third party to pose a low threat to water quality based on full compliance with standard conditions qualify for star status (Tier 2*). This includes sites that may be over 5,000 square feet, but otherwise meet Tier 1 site characteristics. Tier 2* Dischargers may be subject to a lower fee requirement.

Tier 3:
The third tier is for dischargers with sites requiring cleanup, restoration, and/or remediation based on current or past land development/management activities that have resulted in a discharge or threatened discharge in violation of water quality standards. Such conditions may include, but are not limited to, filled watercourses or wetlands, perched fill, steep cut slopes, roads, or fill prisms that cannot be stabilized sufficiently to prevent erosion and sediment delivery to surface waters (either on or off site). Tier 3 Dischargers must develop and implement a cleanup and restoration plan as detailed in this Order at section I.C., and comply with applicable standard conditions. Enrollment and annual fee through the life of cleanup activities is required for Tier 3, and dischargers are subject to civil liabilities and other formal enforcement actions if applicable standard conditions are not met and a cleanup plan is not developed or implemented. Tier 3 Dischargers who are cultivating cannabis concurrent with or

following site cleanup activities must adhere to all standard conditions and develop and implement a water resource protection plan for cannabis cultivation activities. Tier 3 Dischargers who are cultivating cannabis concurrent with site cleanup are also subject to Tier 2 annual fees and annual reporting, and are subject to civil liabilities and other formal enforcement actions if standard conditions are not met or a water resource protection plan is not prepared and implemented according to schedules established in the water resource protection plan.

18. Dischargers fall within one of the above three tiers. Dischargers shall be in the tier that covers the most impactful part of the operations (i.e., different sections of property are not divided among the tiers). All sites, regardless of size or tier, are subject to the standard conditions in section I.A. Tier 2 Dischargers are also subject to section I.B.; Tier 3 Dischargers are subject to sections I.A. and I.C. and, if cultivating cannabis before, during, or following cleanup activities, are also subject to section I.B.

    Some site-specific characteristics or cultivation operation characteristics may represent a higher threat to water quality than suggested by tier characteristic description, warranting regulation under higher tier requirements. Such sites will typically be identified by staff based on field inspection observations, or by recommendations made by approved third parties. Subject to approval from the Executive Officer, dischargers with operations that are similar to or whose potential impacts to water resources are similar to those posed by cannabis cultivation may also elect to enroll and comply with this Order to ensure their discharges are authorized.

19. This Order requires control of erosion and drainage features, proper soil disposal, proper stream crossing maintenance and improvements, water conservation, proper storage and handling of fertilizers and soil amendments, refuse and human waste, and petroleum products and other chemicals, and riparian management and protection. Standard conditions I.A. further describe the required site conditions. All Tier 1 Dischargers are responsible for ensuring that standard conditions are met. For more complex properties, the water resource protection plans required under Tier 2 are meant to describe the specific measures a discharger implements to achieve compliance with standard conditions. Plans can range from a simple description of the management practices to be implemented, to comprehensive descriptions of existing sources of waste discharge and elevated water temperatures, management practices employed to control the sources, and a monitoring and reporting program to document actions taken to control the sources and the effectiveness of such actions. The level of detail required in a plan will be dependent on the site-specific characteristics of an activity/operation. Plans must be kept available on the site and subject to inspection.

20. Appendix B provides best management practices (BMPs) that may be applicable to prevent, minimize, control and mitigate the discharge of waste and other controllable water quality factors. All BMPs in Appendix B are considered enforceable conditions under the Order as applicable to a given site. Some or all may be added to the Order as mandatory BMPs for all sites.

21. Third party programs – Tiers 1 and 2 Dischargers have the option to enroll, participate and comply with this Order through an approved, third party program. Third party programs can increase the program effectiveness and administrative efficiency of the Order, provided that the program meets certain elements (including sufficient feedback mechanisms to Regional Water Board). Third party programs can help meet some or all of the following:

- Tracking names of enrolled (and non-enrolled) dischargers.[13] This includes data entry in the California Integrated Water Quality System (CIWQS), using a unique and secure identifier and providing a framework for annual compliance reporting to CIWQS or other program as approved by the Executive Officer.
- Collecting and submitting required fees.[14]
- Managing communication and notifications between enrolled dischargers and the Regional Water Board, including informing growers of the program and status of implementation.
- Assisting dischargers with identifying the proper tier for a specific site.
- Assisting self-certification requirements for dischargers meeting Tier 1 characteristics.
- For Tier 2 Dischargers, developing sample water resource protection plans, helping individual dischargers to develop individual plans, and/or developing a more comprehensive community plan which individual dischargers agree to abide by. Plans must include a timeline for implementation as appropriate.
- Assisting dischargers in implementing water resource protection plans. This must include site inspections and documentation of timely implementation or installation of management measures per schedule in the water resource protection plan, and evaluation of their effectiveness in meeting intended objectives.
- Monitoring and reporting to Regional Water Board, including compliance with the Order, and effectiveness of management measures.

Compliance Assistance and Enforcement

22. Tier 1 Dischargers are required to meet standard conditions. Regional Water Board staff will be available to assist dischargers with complying with standard conditions, upon request. If standard conditions cannot be met, discharger must enroll under Tier 2 and develop and implement a water resource protection plan until standard conditions can be met. Once standard conditions are met, discharger may move to Tier 1. Tier 1 Dischargers must complete a self-certification (see Appendix C), indicating that the site meets Tier 1 characteristics and standard conditions, and retain the self-certification

[13] Tracking individual enrollments is a basic function that third parties must perform to facilitate implementation of the conditions of this Order and to provide the basic spatial information for watershed-scale program effectiveness reporting.

[14] A third party must collect fees from enrollees, in accordance with the State Water Board fee schedule contained in title 23 of the California Code of Regulations, and submit them to the State Water Board. The fees invoiced by the State Water Board will be based on each enrollee's tier status.

and this Order on site. The self-certification must be made available to Regional Water Board staff upon request. Tier 2 Dischargers and Tier 3 Dischargers (who are cultivating cannabis) are required to keep on the site a water resource protection plan, and implement the plan. Tier 3 Dischargers are also required to develop, submit and implement a cleanup and restoration plan. Staff may either confirm the adequacy of a water resource protection plan, or require that improvements be made. Similarly, staff may confirm that a site is Tier 3 and require cleanup and abatement actions and/or issue a separate cleanup and abatement order under Water Code section 13304.

23. Staff may conduct onsite inspections to assess compliance with conditions, and provide technical assistance or guidance, where necessary. Staff will conduct a certain number of routine inspections on a yearly rotation. Individual sites to inspect are prioritized based on threat to water quality (i.e. amount of land disturbance, proximity to watercourses and wetlands, etc.), and level of individual or third party program participation under the Order. Watershed or subwatershed areas may also be selected based on observable density or number of developed cultivation sites, or significant observed or reported instream impacts. Inspections allow Regional Water Board staff to confirm that dischargers have correctly identified their appropriate tier for coverage under this Order and are complying with applicable conditions and requirements. Inspections also serve to validate third-party program efficacy.

24. The Regional Water Board participates in environmental crimes and other multi-agency task forces in several counties, as well as a statewide and a federal task force. Some task force activities include identifying cultivation sites through various methods including, but not limited to, aerial surveillance, satellite imagery, and complaints received from the public or from other law enforcement agencies. It is the Regional Water Board's intent to coordinate environmental task force activities with this Order to the extent possible.

25. Dischargers who failed to enroll in this Order but can demonstrate compliance with the substantive requirements of this Order (including plans, schedule, and reasonable progress in bringing conditions on the site into compliance with the Order) may be subject to any additional enforcement response for failure to enroll and at a minimum must subsequently enroll and pay applicable fees for the time they should have been enrolled. Dischargers may be referred to organizations or groups that can provide technical assistance or support. The Regional Water Board prefers that water quality impacts be regulated under this Order to the extent possible. However, the Executive Officer reserves the right to require the discharger to submit a Report of Waste Discharge (ROWD) and/or to take other actions, including enforcement, as appropriate.

26. If water quality violations or impacts are confirmed, enforcement response may include requirements to clean up and abate violation conditions, restore impacted watercourses, remove and properly dispose of waste earthen material and other wastes, repair or remove stream crossings, upgrade roads, improve site drainage, and/or stabilize bare, erodible soils. If already enrolled under this Order, dischargers with cleanup obligations will need to comply with Tier 3 requirements of this Order. If not enrolled, dischargers must enroll and comply with this Order, and pay all applicable

fees for the time that they should have been enrolled, or otherwise be subject to an individual order. Enforcement response may also include assessment of penalties for violations, discharges of waste, or failure to comply with cleanup orders.

27. Nothing in this Order precludes actions to enforce any directly applicable requirements, prohibitions, or provisions, or to require cleanup and abatement of existing sources of pollution, where appropriate.

General Water Quality Certification

28. Remediation/cleanup/restoration activities described in finding 4 that involve construction and other work in waters of the United States may require a permit from the Army Corps of Engineers pursuant to section 404 of the Clean Water Act. Section 401 of the Clean Water Act (33 U.S.C. §1341) requires every applicant for a federal license or permit to provide the licensing or permitting federal agency with section 401 certification that the project will be in compliance with state water quality standards and implementation plans promulgated pursuant to section 303 of the Clean Water Act, and other appropriate requirements of state law (33 U.S.C. § 1313). The Regional Water Board Executive Officer may issue a decision on a water quality certification application. (Cal. Code Regs., tit. 23, § 3838, subd. (b).) State water quality certification conditions shall become conditions of any federal license or permit for the project.

29. The Regional Water Board may issue a general water quality certification for a class or classes of activities that are the same or similar, or involve the same or similar types of discharges and possible adverse impacts to water quality if it determines that these activities are more appropriately regulated under a general certification rather than individual certifications. (Cal. Code Regs., tit. 23, §3861.) General certifications apply for a fixed term not to exceed five years, must be conditioned to require notice to the Regional Water Board prior to commencement of the activity, and include appropriate monitoring and reporting requirements. A fee is also required pursuant to California Code of Regulations, title 23, section 3833, sub.(b)(3).

30. The General Water Quality Certification contained in this Order shall not apply to activities that will: 1) result in significant unavoidable environmental impacts including permanent impacts to wetlands and other waters from dredge and fill activities, and/or violation of water quality standards; 2) result in the direct or indirect take of any listed species; or 3) expose people and/or structures to potential adverse effects from flooding, landslides or soil erosion. (Cal. Code Regs., tit. 23, §3861, subd. (d).)

31. This Order includes a General Water Quality Certification for activities covered under this Order that may require a federal permit. General certification conditions in addition to waiver conditions are provided for in section V. General 401 Water Quality Certification of this Order. A discharger seeking Clean Water Act section 401 certification for a project shall notify the Regional Water Board 60 days prior to the proposed commencement of the activity and submit information regarding the construction schedule and other relevant information including an appropriate fee. Unless the Regional Water Board determines that the project or activity does not meet

the specified criteria for coverage under the General Water Quality Certification, this Order will provide Clean Water Act section 401 certification for the federal permit required for that project. The discharger may not commence the activity until the Regional Water Board notifies the discharger that the work is authorized. A list of projects authorized by this General Water Quality Certification will be posted on the Regional Water Board's website and shall serve as notice to the Army Corps of Engineers of project coverage. Projects that do not meet the criteria for coverage under the general certification must apply for individual certification.

Procedure

32. Tier 1 Dischargers shall complete and submit the applicable Tier 1 section of the Notice of Intent (NOI) form (Appendix A) and monitoring report self-certification (Appendix C) and retain a copy of the completed forms on-site with a copy of this Order. Tier 1 Dischargers may demonstrate enrollment and certification of compliance via alternative communication by participating in an approved third party program. The self-certification is meant to confirm that the site falls within Tier 1 scope and is meeting standard conditions. The self-certification must be provided for review upon request of Regional Water Board staff. Dischargers are encouraged to request a site inspection by an approved third party or Regional Water Board staff to confirm Tier 1 status. Tier 2 Dischargers shall complete and submit an NOI Form, and monitoring report (Appendix C). Tier 2 Dischargers must retain on site a copy of their NOI, monitoring reports, water resource protection plan and a copy of this Order. These documents must be provided for review upon request of Regional Water Board staff. Tier 3 Dischargers must complete and submit NOI Form, monitoring report, and submit a cleanup and restoration plan to the Regional Water Board for review and approval. Once a cleanup and restoration plan has been fully implemented, Tier 3 Dischargers submit a Notice of Completion and upon approval by the Executive Officer, may move out of Tier 3. If any Discharger ceases operations and wants to terminate permit coverage, the Discharger shall notify the Regional Water Board or an approved third party. The Discharger must demonstrate compliance with standard conditions and water resource protection plans and cleanup and restoration plans, as applicable.

    The timeframe for compliance with this Order, including filing NOI forms, water resource protection plans, and cleanup and restoration plans, is described in section II.

33. A third party program seeking approval from the Executive Officer to fulfill some or all of the elements listed in finding 21 must submit a proposal to the Regional Water Board (see Order at II.B). The proposal must demonstrate the substantive and procedural mechanisms to serve the function it is applying for. Third Parties are encouraged to work with Regional Water Board staff as early as possible (even prior to order adoption) to calibrate their program to the requirements of this Order

Fees

34. Under Water Code section 13269 subdivision (a)(4), a regional water board may include as a condition of a waiver the payment of an annual fee. Annual fees are

established by the State Water Board in accordance with Water Code section 13260 subdivisions (d) and (f). A discharger seeking coverage under this Order in Tiers 1, 2 or 3 will be required to pay an annual fee as set forth in California Code of Regulations title 23, section 2200.

Monitoring and Reporting

35. Water Code section 13267, subdivision (a), authorizes the Regional Water Board to investigate the quality of any waters of the state within its region in connection with any action relating to the Basin Plan. Water Code section 13267, subdivision (b) provides that the Regional Water Board, in conducting an investigation, may require Dischargers to furnish, under penalty of perjury, technical or monitoring program reports. A technical report, and restoration and monitoring work plan required by this Order, pursuant to Water Code section 13267, is necessary to ensure that the prior harm and future threat to water quality created by the discharges described above are properly assessed, abated, and controlled.

    The Monitoring and Reporting Program (MRP) is detailed in this Order at section I.D and Appendix C. Tier 1 Dischargers must inspect their site periodically and re-certify that it meets Tier 1 characteristics and standard conditions annually. Annual updates to the certification shall be maintained on site with the initial self-certification and copy of the Order.

    Tier 2 Dischargers must include a monitoring element in the water resource protection plan that at a minimum provides for periodic inspection of the site, checklist to confirm placement and efficacy of management measures, and document progress on any plan elements subject to a time schedule. Tier 2 Dischargers must submit annual reports that document implementation and effectiveness of management measures. Tier 2 annual reporting is a function that may be provided through an approved third party program. Tier 3 Dischargers must incorporate monitoring and reporting elements into their cleanup and restoration plans for approval by the Executive Officer. At a minimum, the monitoring and reporting must document completion and effectiveness of the specified cleanup and restoration actions in the plan.

    Anticipating that this program will result in an increased rate of site restoration and stream crossing replacement on sites across the region following Order adoption, Regional Water Board staff will implement comprehensive activity tracking by mapping Tier 3 cleanup and restoration sites and individual instream work proposed under Tier 2 water resource protection plans, including those covered under the provisions of this Order or through other individual or general orders issued by the Regional or State Water Board. Staff may draw information from Geotracker and SMARTS, the Regional Water Board's timber tracking database, and other available sources to help correlate cleanups and activities or restoration or remediation work in streams or wetlands that are proposed and underway in individual watersheds and subwatersheds. Comprehensive activity tracking will enable the Regional Water Board to direct activity timing under this Order as necessary to limit the number of individual potential construction-related impacts occurring at any given time in any given

watershed. Specifically, where cleanup activities or restoration or remediation work in streams or wetlands are proposed to be implemented on several properties within a subwatershed, staff will consult with project consultants and other sources to stagger the timing of implementation.

Additional Findings

36. State Water Board Resolution No. 68-16 Statement of Policy with Respect to Maintaining High Quality of Waters in California (Resolution No. 68-16) requires that regional water boards, in regulating the discharge of waste, to maintain high quality waters of the state, require that any discharge not unreasonably affect beneficial uses, and not result in water quality less than that described in regional water board's policies. This order is addressing an existing, previously unregulated discharge, and water quality impacts have already occurred. With the exception of certain cleanup activities, the order is not anticipated to result in new discharges. Compliance with the terms of this order should result in an improvement in water quality at and downstream of these sites. Any increase in further degradation to water quality as a result of this Order is not anticipated. This Order is consistent with Resolution No. 68-16 because it will result in a net benefit to water quality by improving existing environmental conditions currently impacted by this activity. The Order is designed to protect or recover instream beneficial uses and does not promote or authorize the permanent lowering of high quality waters. Mitigation measures are available and will be required to reduce to less-than-significant levels any potentially significant water quality impacts from cleanup/remediation and restoration activities. Implementation of this Order is a good first step toward bringing this largely un-regulated activity into compliance with the Basin Plan.

37. As lead agency under the California Environmental Quality Act (CEQA), the Regional Water Board provided notice of intent to adopt a mitigated negative declaration (SCH No. 2015042074) for this Order on April 24, 2015(Cal. Code Regs., tit. 14, § 15072). The mitigated negative declaration reflects the Regional Water Board's independent judgment and analysis. After considering the document and comments received during the public review process, the Regional Water Board hereby determines that the proposed project, with mitigation measures, will not have a significant effect on the environment. The documents or other materials, which constitute the record, are located at 5550 Skylane Blvd, Suite A, Santa Rosa, CA 95403. The Regional Water Board will file a Notice of Determination within five days from the issuance of this order. Mitigation measures necessary to reduce or eliminate significant impacts on the environment and monitoring and reporting are incorporated as conditions of approval below.

38. The Regional Water Board has reviewed the contents of this Order, its accompanying Initial Study and Mitigated Negative Declaration, written public comments and testimony provided after notice and hearing and finds that the adoption of this Order is consistent with the Basin Plan, and is in the public interest.

THEREFORE, IT IS HEREBY ORDERED that pursuant to Water Code sections 13263, subdivision (a), 13267, and 13269, the Regional Water Board waives the requirement to submit a report of waste discharge and the requirement to establish waste discharge requirements [WDRs] for activities described in finding 4. Dischargers shall comply with the following:

I. As described in the findings above, dischargers will fall within one of three tiers. Discharger shall be in the tier that covers the most impactful part of the operations (i.e., different sections of a property cannot be divided among the tiers). All dischargers, regardless of Tier are subject to the standard conditions in section I.A, MRP section I.D., and General Terms, Provisions and Prohibitions. Tier 2 Dischargers are also subject to section I.B., and Tier 3 Dischargers are subject to sections I.A., I.B.(if cultivating cannabis), and I.C.
The Executive Officer has sole discretion to determine that a given site belongs in a specific tier, or to require the submittal of an individual report of waste discharge under Water Code section 13260.

A. Standard Conditions, Applicable to All Dischargers

1. Site maintenance, erosion control and drainage features

   a. Roads shall be maintained as appropriate (with adequate surfacing and drainage features) to avoid developing surface ruts, gullies, or surface erosion that results in sediment delivery to surface waters.

   b. Roads, driveways, trails, and other defined corridors for foot or vehicle traffic of any kind shall have adequate ditch relief drains or rolling dips and/or other measures to prevent or minimize erosion along the flow paths and at their respective outlets.

   c. Roads and other features shall be maintained so that surface runoff drains away from potentially unstable slopes or earthen fills. Where road runoff cannot be drained away from an unstable feature, an engineered structure or system shall be installed to ensure that surface flows will not cause slope failure.

   d. Roads, clearings, fill prisms, and terraced areas (cleared/developed areas with the potential for sediment erosion and transport) shall be maintained so that they are hydrologically disconnected[15], as feasible,

[15] Connected roads are road segments that deliver road surface runoff, via the ditch or road surface, to a stream crossing or to a connected drain that occurs within the high delivery potential portion of the active road network. A connected drain is defined as any cross-drain culvert, water bar, rolling dip, or ditch-out that appears to deliver runoff to a defined channel. A drain is considered connected if there is evidence of surface flow connection from the road to a defined channel or if the outlet has eroded a channel that extends from the road to a defined channel. (http://www.forestsandfish.com/documents/Road_Mgmt_Survey.pdf)

from surface waters, including wetlands, ephemeral, intermittent and perennial streams.

e. Ditch relief drains, rolling dip outlets, and road pad or terrace surfaces shall be maintained to promote infiltration/dispersal of outflows and have no apparent erosion or evidence of soil transport to receiving waters.

f. Stockpiled construction materials are stored in a location and manner so as to prevent their transport to receiving waters.

2. Stream Crossing Maintenance

a. Culverts and stream crossings shall be sized to pass the expected 100-year peak streamflow.

b. Culverts and stream crossings shall be designed and maintained to address debris associated with the expected 100-year peak streamflow.

c. Culverts and stream crossings shall allow passage of all life stages of fish on fish-bearing or restorable streams, and allow passage of aquatic organisms on perennial or intermittent streams.

d. Stream crossings shall be maintained so as to prevent or minimize erosion from exposed surfaces adjacent to, and in the channel and on the banks.

e. Culverts shall align with the stream grade and natural stream channel at the inlet and outlet where feasible.[16]

f. Stream crossings shall be maintained so as to prevent stream diversion in the event that the culvert/crossing is plugged, and critical dips shall be employed with all crossing installations where feasible.[17]

3. Riparian and Wetland Protection and Management

a. For Tier 1 Dischargers, cultivation areas or associated facilities shall not be located within 200 feet of surface waters. While 200 foot buffers are preferred for Tier 2 sites, at minimum, cultivation areas and associated facilities shall not be located or occur within 100 feet of any Class I or II watercourse or within 50 feet of any Class III watercourse or wetlands.

---

[16] At a minimum, the culvert shall be aligned at the inlet. If infeasible to align the culvert outlet with the stream grade or channel, outlet armoring or equivalently effective means may be applied.

[17] If infeasible to install a critical dip, an alternative solution may be chosen.

The Regional Water Board or its Executive Officer may apply additional or alternative[18] conditions on enrollment, including site-specific riparian buffers and other BMPs beyond those identified in water resource protection plans to ensure water quality protection.

b. Buffers shall be maintained at natural slope with native vegetation.

c. Buffers shall be of sufficient width to filter wastes from runoff discharging from production lands and associated facilities to all wetlands, streams, drainage ditches, or other conveyances.

d. Riparian and wetland areas shall be protected in a manner that maintains their essential functions, including temperature and microclimate control, filtration of sediment and other pollutants, nutrient cycling, woody debris recruitment, groundwater recharge, streambank stabilization, and flood peak attenuation and flood water storage.

4. Spoils Management

a. Spoils[19] shall not be stored or placed in or where they can enter any surface water.

b. Spoils shall be adequately contained or stabilized to prevent sediment delivery to surface waters.

c. Spoils generated through development or maintenance of roads, driveways, earthen fill pads, or other cleared or filled areas shall not be sidecast in any location where they can enter or be transported to surface waters.

5. Water Storage and Use:

a. Size and scope of an operation shall be such that the amount of water used shall not adversely impact water quality and/or beneficial uses, including and in consideration with other water use by operations, instream flow requirements and/or needs in the watershed, defined at the scale of a HUC-12[20] watershed or at a smaller hydrologic watershed as determined necessary by the Regional Water Board Executive Officer.

---

[18] Alternative site-specific riparian buffers that are equally protective of water quality may be necessary to accommodate existing permanent structures or other types of structures that cannot be relocated.

[19] Spoils are waste earthen or organic materials generated through grading or excavation, or waste plant growth media or soil amendments. Spoils include but are not limited to soils, slash, bark, sawdust, potting soils, rock, and fertilizers.

[20] See definition and link to maps at: http://water.usgs.gov/GIS/huc.html

b. Water conservation measures shall be implemented. Examples include use of rainwater catchment systems or watering plants with a drip irrigation system rather than with a hose or sprinkler system.

c. For Tier 2 Dischargers, if possible, develop off-stream storage facilities to minimize surface water diversion during low flow periods (see also footnote 11).

d. Water is applied using no more than agronomic rates.[21]

e. Diversion and/or storage of water from a stream should be conducted pursuant to a valid water right and in compliance with reporting requirements under Water Code section 5101.

f. Water storage features, such as ponds, tanks, and other vessels shall be selected, sited, designed, and maintained so as to insure integrity and to prevent release into waters of the state in the event of a containment failure.

6. Irrigation Runoff

Implementing water conservation measures, irrigating at agronomic rates, applying fertilizers at agronomic rates and applying chemicals according to the label specifications, and maintaining stable soil and growth media should serve to minimize the amount of runoff and the concentration of chemicals in that water.

In the event that irrigation runoff occurs, measures shall be in place to treat/control/contain the runoff to minimize the pollutant loads in the discharge. Irrigation runoff shall be managed so that any entrained constituents, such as fertilizers, fine sediment and suspended organic particles, and other oxygen consuming materials are not discharged to nearby watercourses. Management practices include, but are not limited to, modifications to irrigation systems that reuse tailwater by constructing off-stream retention basins, and active (pumping) and or passive (gravity) tailwater recapture/redistribution systems. Care shall be taken to ensure that irrigation tailwater is not discharged towards or impounded over unstable features or landslides.

[21] "Agronomic rates" is defined as the rates of fertilizer and irrigation water that a plant needs to enhance soil productivity and provide the crop or forage growth with needed nutrients for optimum health and growth, without having any excess water or nutrient percolate beyond the root zone.

7. Fertilizers and Soil Amendments

   a. Fertilizers, potting soils, compost, and other soils and soil amendments shall be stored in locations and in a manner in which they cannot enter or be transported into surface waters and such that nutrients or other pollutants cannot be leached into groundwater.

   b. Fertilizers and soil amendments shall be applied and used per packaging instructions and/or at proper agronomic rates (see footnote on previous page).

   c. Cultivation areas shall be maintained so as to prevent nutrients from leaving the site during the growing season and post-harvest.

8. Pesticides/Herbicides

   At the present time, there are no pesticides or herbicides registered specifically for use directly on cannabis and the use of pesticides on cannabis plants has not been reviewed for safety, human health effects, or environmental impacts. Under California law, the only pesticide products not illegal to use on cannabis are those that contain an active ingredient that is exempt from residue tolerance requirements and either registered and labeled for a broad enough use to include use on cannabis or exempt from registration requirements as a minimum risk pesticide under FIFRA section 25(b) and California Code of Regulations, title 3, section 6147. For the purpose of compliance with conditions of this Order, any uses of pesticide products shall be consistent with product labelling and any products on the site shall be placed, used, and stored in a manner that ensures that they will not enter or be released into surface or ground waters. (See also Appendix E.)

9. Petroleum products and other chemicals

   a. Petroleum products and other liquid chemicals, including but not limited to diesel, biodiesel, gasoline, and oils shall be stored so as to prevent their spillage, discharge, or seepage into receiving waters. Storage tanks and containers must be of suitable material and construction to be compatible with the substance(s) stored and conditions of storage such as pressure and temperature.

   b. Above ground storage tanks and containers shall be provided with a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation.

   c. Dischargers shall ensure that diked areas are sufficiently impervious to contain discharged chemicals.

d. Discharger(s) shall implement spill prevention, control, and countermeasures (SPCC) and have appropriate cleanup materials available onsite.

e. Underground storage tanks 110 gallons and larger shall be registered with the appropriate County Health Department and comply with State and local requirements for leak detection, spill overflow, corrosion protection, and insurance coverage.

10. Cultivation-related wastes

Cultivation-related wastes including, but not limited to, empty soil/soil amendment/ fertilizer/pesticide bags and containers, empty plant pots or containers, dead or harvested plant waste, and spent growth medium shall, for as long as they remain on the site, be stored[22] at locations where they will not enter or be blown into surface waters, and in a manner that ensures that residues and pollutants within those materials do not migrate or leach into surface water or groundwaters.

11. Refuse and human waste

a. Disposal of domestic sewage shall meet applicable County health standards, local agency management plans and ordinances, and/or the Regional Water Board's Onsite Wastewater Treatment System (OWTS) policy, and shall not represent a threat to surface water or groundwater.

b. Refuse and garbage shall be stored in a location and manner that prevents its discharge to receiving waters and prevents any leachate or contact water from entering or percolating to receiving waters.

c. Garbage and refuse shall be disposed of at an appropriate waste disposal location.

12. Remediation/Cleanup/Restoration

Remediation/cleanup/restoration activities may include, but are not limited to, removal of fill from watercourses, stream restoration, riparian vegetation planting and maintenance, soil stabilization, erosion control, upgrading stream crossings, road outsloping and rolling dip installation where safe and suitable, installing ditch relief culverts and overside drains, removing berms, stabilizing unstable areas, reshaping cutbanks, and rocking native-surfaced roads. Restoration and cleanup conditions and provisions generally apply to

[22] Plant waste may also be composted, subject to the same restrictions cited above for cultivation-related waste storage.

Tier 3 sites, however owners/operators of Tier 1 or 2 sites may identify or propose water resource improvement or enhancement projects such as stream restoration or riparian planting with native vegetation and, for such projects, these conditions apply similarly.

Appendix B accompanying this Order includes environmental protection and mitigation measures that apply to cleanup activities such as: temporal limitations on construction; limitations on earthmoving and construction equipment; guidelines for removal of plants and revegetation; conditions for erosion control, limitations on work in streams, riparian and wetland areas; and other measures.

These protection and mitigation measures have been developed to prevent or reduce the environmental impacts and represent minimum, enforceable standards by which cleanup activities shall be conducted under this Order.

B. Water Resource Protection Plan

Tier 2 Dischargers and Tier 3 Dischargers who intend to cultivate cannabis before, during, or following site cleanup activities shall develop and implement a water resource protection plan that contains the elements listed below. Dischargers must keep this plan on site, and produce it upon request by Regional Water Board staff. Dischargers shall implement plans, including the identified management practices in a manner that is protective of water quality. If time is needed to meet standard conditions, the plan must include a timeline with measurable milestones.[23] Management practices shall be properly designed and installed, and assessed periodically for effectiveness. If a management measure is found to be ineffective, the plan must be adapted and implemented to incorporate new or additional management practices to meet standard conditions. Dischargers shall certify annually to the Regional Water Board individually or through an approved third party program that the plan is being implemented and is effectively protecting water quality, and report on progress in implementing site improvements intended to bring the site into compliance with all conditions of this Order.

Any proposed work in streams and wetlands, as described in 3-5 below shall be submitted to the Regional Water Board for review and authorization 60 days prior to commencement. (See Appendix D.) In the alternative, dischargers may opt to seek authorization for instream work through other individual or general orders.[24]

---

[23] Generally, compliance with standard conditions is expected in the shortest time possible, and no later than the expiration of this Order (five years). However, in recognizing the challenges associated cumulative water use and cleanup of legacy conditions (available resources, studies, additional permitting, etc.), compliance schedules for standard condition I.5.a, and standards for which corrective work is needed under Order section II.5.c may extend beyond Order expiration and continue through any reissuance of the Order.

[24] See e.g. http://www.waterboards.ca.gov/northcoast/water_issues/programs/water_quality_certification.shtml

1. Map of property including areas of operations, roads, water bodies, all cleared/developed areas, and including general drainage patterns and directions.

2. Applicable design drawings and schematics for watercourse structures, fish passages, roads, septic tanks, fill prisms, pads, ponds, or any other constructed feature that has been designed or engineered.

3. Assessment of current conditions and identification of any features needing improvements to correct the function of any roads or developed areas, drainage features or measures, encroachments into riparian buffer areas, controllable sediment delivery sites,[25] including stream crossings in need of correction (undersized, improperly installed, improperly maintained, or otherwise substandard).

4. Detailed list of specific management practices designed to meet standard conditions in I.A., above, incorporating applicable standard BMPs from Appendix B, and any improvement work needed to bring site features into compliance with the standard conditions. Management practices must address erosion control/stability, stream crossing construction/maintenance, riparian protection, road construction and maintenance, spoils storage and disposal, chemical handling and management, waste handling and disposal, irrigation runoff, and water storage and use.

5. If site problems are identified, include a prioritization and implementation schedule for corrective action based on potential impacts to the beneficial uses of water, and a plan to inspect the site to evaluate the effectiveness of corrective action and identify where additional work may be needed. Proposed work in streams and wetlands shall be designed by a qualified registered professional and shall incorporate applicable standard BMPs from Appendix B.

6. List of chemicals stored onsite, and information about use (e.g., quantities used and frequency applied).

7. Monitoring element (see discussion at section I.D.) to ensure that BMPs are being implemented and to evaluate their effectiveness.

8. Water Use: Plan shall record water source, relevant water right documentation, and amount used monthly. [26] Plan must describe water conservation measures and document approach to ensure that the quantity and timing of water use is not impacting water quality objectives and beneficial uses (including cumulative

[25] Controllable sediment delivery sites are generally areas that are discharging or have the potential to discharge sediment to waters of the state, that are caused or affected by human activity, and may feasibly and reasonably respond to prevention and minimization management measures.

[26] All water sources shall be recorded, including alternative sources such as rain catchment and groundwater, and/or hauled water. Hauled water shall be documented as specified in the MRP.

impacts based on other operations using water in the same watershed). Water use will be presumed to not adversely impact water quality under one of the following scenarios:

- No surface water diversions from May 15-Oct 31.
- Water diversion pursuant to a local plan that is protective of instream beneficial uses.
- Other options: (e.g., % of flow present in stream; riffle depth; gage at bottom of Class I stream; AB2121 equations; DFW flow recommendations; promulgated flow objective in Basin Plan).

C. Cleanup and Restoration Plan

Pursuant to Water Code section 13304, Tier 3 Dischargers shall submit to the Regional Water Board a cleanup and restoration plan, prepared by a California registered civil engineer or professional geologist, that contains the elements listed below. Once the cleanup and restoration plan is approved by the Executive Officer, the Discharger shall implement the plan, incorporating any additional conditions or monitoring and reporting provision included in the Executive Officer's approval.

1. Map of property including areas of operations, roads, water bodies, all cleared/developed areas, all structures, and general drainage patterns and directions.

2. Design drawings at 1:12000 or larger scale (e.g., 1:6000) that delineate existing site conditions including existing and buried surface waters , projected restored slopes and surface waters, restoration plan work points, spoil disposal sites, re-vegetation planting areas, and any other features or site construction details to complete the scope of work; design and construction standards for earthen material compaction and stabilization and for re-planting of exposed soils with native vegetation; and erosion control methods and standards for unanticipated precipitation during remediation.

3. Plan and Schedule to accomplish the following:

   a. Remove all earthen material and other discharged or placed debris from surface waters, including instream dams.

   b. Restore the vegetative and hydrological functions of the damaged streams wetlands, and drainages to ensure the long term recovery of the affected surface waters.

   c. Provide for free-draining, dispersed runoff from all disturbed surfaces, such that hydrologic connectivity is eliminated, gullying is prevented, and water is directed to stable slope areas. Unstable sidecast spoil materials shall be removed or stabilized so they do not fail and deliver sediment to a nearby watercourse.

d. Replant the slopes and streamside areas with native vegetation to increase shading, prevent erosion and provide streamside protection.

e. Control erosion and sediment delivery prior to, during, and following site restoration efforts, until vegetation is established.

4. To the extent possible, all work shall be completed prior to the first winter after plan approval. Depending on the extent of the work, the timing of plan submittal and approval, need for permits by other agencies, or other restrictions, it may require more than one construction season to complete work. The plan shall provide details and specifications, both in the narrative plan and as applicable in design drawings, for site winterization as needed to minimize and control erosion and sediment delivery over winter periods while construction is underway.

5. Monitoring and reporting element to document timely completion and effectiveness of specified cleanup actions in the plan, including the implementation and effectiveness of management measures, according to the schedule approved in the plan.

6. The cleanup and restoration plan shall incorporate all applicable management measures identified in the accompanying CEQA document and Appendix B.

7. Development of the cleanup and restoration plan shall include consideration of (and make appropriate provision for) site-specific conditions or features that may warrant additional special BMPs, such as presence of expansive soils, presence of landslides and unstable features, proximity to earthquake faults or 100-year floodplains, or other unique geological or paleontological features. If the cleanup site is located in an Alquist-Priolo Earthquake Fault Zone or an area with substantial evidence of a known fault, the cleanup and restoration plan will consider fault rupture hazard during the siting, design, and monitoring of applicable site features in order to minimize the impact to public safety. The cleanup and restoration plan shall also consider hazards associated with strong seismic ground shaking and seismic-related ground failure, including liquefaction, during the siting, design, and monitoring of applicable site features in order to minimize the impact to public safety.

8. Any hazardous waste generated from the demolition of structures or impoundments shall be disposed of in designated hazardous waste landfills.

D. Monitoring and Reporting Program

Tier 1 Dischargers shall inspect their site periodically and re-certify that it meets Tier 1 characteristics and standard conditions annually (Appendix C). Annual updates to the certification shall be maintained on site with the initial certification and copy of the Order.

Tier 2 Dischargers shall include a monitoring element in the water resource protection plan that at a minimum provides for periodic inspection of the site, checklist to confirm placement and efficacy of management measures, and document progress on any plan elements subject to a time schedule. Tier 2 Dischargers shall submit an annual report (Appendix C) by March 31 of each year that documents implementation and effectiveness of management measures during the previous year. Tier 2 annual reporting is a function that may be provided through an approved third party program.

Under an approved third party program, watershed-scale program effectiveness shall be reported in a consistent/compatible manner (i.e., consistent with how other approved third party programs assisting with implementation of this Order are reporting) that enables region-wide comparison of subwatershed reports. The required summary information includes the following information:

- Number of enrollees in each tier category, by subwatershed;
- Total fees charged;
- Compliance status (for example, how many Tier 2 Dischargers are either in the process of developing water resource protection plans, how many have developed and are implementing plans, how many are in compliance with standard conditions, how effective are BMPs, what changes or improvements are proposed to improve program effectiveness or compliance rate); and
- Monitoring information for each of the parameters listed in the MRP.

Tier 3 Dischargers shall incorporate a monitoring and reporting element into their cleanup and restoration plans for approval by the Executive Officer. At a minimum, the monitoring and reporting must document completion and effectiveness of the specified cleanup actions in the plan. Tier 3 Dischargers shall also submit an annual report (Appendix C) by March 31 of each year.

Regional Water Board staff will develop and implement comprehensive activity tracking by mapping Tier 3 cleanup sites and individual stream crossings proposed for replacement under Tier 2 water resource protection plans. Staff may draw information from Geotracker and SMARTS, the North Coast Region's timber tracking database, and other available sources to help correlate cleanups activities or restoration or remediation work in streams or wetlands that are proposed and underway in individual watersheds and subwatersheds. Regional Water Board staff will direct activity timing under this Order as necessary to limit the number of individual potential construction-related impacts occurring at any given time in any given watershed. Specifically, where cleanup activities or restoration or remediation work in streams or wetlands are proposed to be implemented on several properties within a subwatershed, staff will consult with project consultants and other sources to stagger the timing of implementation.

II. Procedure

A. Tier 1, 2, and 3 Dischargers shall apply for coverage by submitting a completed Notice of Intent (NOI) Form (Appendix A) and monitoring report (Appendix C) by February 15, 2016 (~180 days from adoption of the Order) or upon 30 days of notification from the Regional Water Board staff to comply with requirements of this Order. Dischargers who begin operations after the effective date of this Order must file an NOI prior to commencement of cultivation operations. Tier 1 and 2 Dischargers may enroll through an approved third party program stating their commitment to comply with the conditions of the Order. The submission of the NOI, either directly to the Regional Water Board or an approved third party program constitutes notice that the Discharger requests and receives authorization to discharge pursuant to this Order. If a Discharger ceases operations and wants to terminate permit coverage, the Discharger shall notify the Regional Water Board or an approved third party. The Discharger must demonstrate compliance with standard conditions and water resource protection plans and cleanup and restoration plans, as applicable.

Completed forms shall be signed and sent to the Regional Water Board, to the following address:

Northcoast@waterboards.ca.gov (preferable)

or signed and certified to:

North Coast Regional Water Quality Control Board
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

Dischargers under Tier 2 shall develop and begin implementing a water resource protection plan by 180 days from the submittal date of the NOI. Dischargers under Tier 3 shall develop and submit to the Regional Water Board a cleanup and restoration plan by 45 days from the submittal date of the NOI. Dischargers under Tier 3 shall begin implementation of the cleanup and restoration plan no later than 30 days from the Executive Officer's approval of the plan (unless the approved cleanup plan provides alternative timelines) and complete the cleanup and restoration work consistent with the approved timelines. The Executive Officer has discretion to require plan submittals earlier or later, and may grant a time extension for plan submittal or deadlines in the cleanup and restoration plan for good cause shown.

B. Any third party program must receive approval by the Regional Water Board Executive Officer in order to serve individual dischargers under the Order. The Executive Officer has the authority to deny a third party application based on lack of experience/qualifications, incomplete applications, insufficient detail/scope of proposed work, or at their discretion. To ensure that a third party program is qualified to assist with implementation of this Order for Tier 1

and/or Tier 2 enrollees, third parties must submit a proposal to the Regional Water Board. Third party proposals shall include the following as applicable:

1. Program Purpose: Statement of the functions listed in Order finding 21 which the third party proposes to fulfill, including procedures to implement the proposed functions/roles.

2. Technical experience and qualifications of the third party program necessary for implementation of technical functions/roles.

3. Demonstration of organizational capacity and funding mechanisms to administer the program.

4. Sample water resource protection plan.

5. Framework for annual compliance reporting to CIWQS or other program, as approved by the Executive Officer.

6. Sample liability waiver that demonstrates that the responsibility falls to the landowner/operator of the site to meet the stated terms and conditions of this Order.

7. Framework for confirmation of compliance with standard conditions and developed plans and addressing non-compliance by individual third party enrollees.

C. If a third party proposal is approved, the Executive Officer will send an approval letter that will identify the third party's geographic boundaries and/or applicable responsibilities for coverage of selected Tier(s). All approved third party programs will be listed on the North Coast Regional Water Board website. The approval is conditional and subject to a probationary period.

III. General Terms and Provisions

A. Dischargers shall comply with all mitigation measures identified in the accompanying mitigated negative declaration. CEQA mitigation measures shall constitute enforceable conditions under this Order.

B. All erosion and sediment control devices, management measures and mitigations prescribed in a water resource protection plan shall be maintained in good working order.

C. Compliance with Order conditions will ensure that no significant environmental impact to water quality occurs from an activity covered by this Order. Activities that have potentially significant impacts to water quality that cannot be reduced

to less than significant levels are not eligible for coverage under this Order and the Discharger(s) will need to submit a Report of Waste Discharge to the Regional Water Board and obtain individual authorization for that activity.

D. Dischargers shall obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 2009-0009-DWQ) for construction projects that disturb one or more acres of soil, specifically for new site preparation and development. Dischargers shall submit to Regional Water Board staff a copy of the Stormwater Pollution Prevention Plan (SWPPP) developed for the site in compliance with that Permit.[27]

E. This Order shall not apply to any discharges for which a WDR or waiver of WDR is issued under a separate action of the state or Regional Water Board.

F. Dischargers shall allow Regional Water Board staff entry onto the affected property, for the purposes of observing, inspecting, and/or collecting samples or other monitoring information to document compliance with this Order.

G. Dischargers shall comply with all applicable water quality standards, requirements, and prohibitions specified in the Basin Plan, and policies adopted by the State Water Board.

H. Projects covered under this Order shall not discharge substances in concentrations toxic to human, plant, animal or aquatic life. Projects covered under this Order shall not discharge waste classified as "hazardous" as defined in California Code of Regulations, title 22, section 66261 and Water Code section 13173.

I. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the Federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). Dischargers are responsible for meeting all other applicable requirements of local, state, and federal regulations and/or required permits.

J. Operations shall not occur within 250 feet of: 1) public, preschool, and K-12 facilities; 2) federal or state parks; 3) military bases; and 4) Native American cultural sites.

---

[27] Construction activities subject to the Construction General Permit include clearing, grading and disturbances to the ground such as stockpiling, or excavation, but do not include regular maintenance activities performed to repair roads and related facilities.

K. Dischargers shall not cause a pollution, contamination, or nuisance as defined by Water Code section 13050.

L. This Order does not preclude the need for permits that may be required by other governmental agencies, including necessary certification and permitting for the application of pesticides and herbicides.

M. Nothing in this Order shall be construed to mean that the Regional Water Board is authorizing, permitting, endorsing, or approving the cultivation of cannabis. This Order only places restrictions on waste discharges and other controllable water quality factors from the activity to the extent that the activity is occurring.

N. Subject to approval from the Executive Officer, Dischargers with operations that are similar to or whose potential impacts to water resources are similar to those posed by cannabis cultivation may also elect to enroll and comply with this Order to ensure their discharges are authorized.

O. This Order shall not create a vested right and all such discharges shall be considered a privilege, as provided for in Water Code section 13268.

P. In the event of any violation or threatened violation of the conditions of this Order, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under applicable state law, including but not limited to administrative civil penalties under Water Code section 13350.

Q. Nothing in this Order precludes actions to enforce any directly applicable prohibition or provisions found in the Basin Plan, or to require independent clean up and abatement of existing sources of pollution, where appropriate.

R. This Order expires upon Regional Water Board adoption of a superseding regulatory action or after five years, whichever occurs first. This Order is conditional and may be terminated at any time by the State Water Resources Control Board or Regional Water Board.

S. Appendices A, C, D, and E to this Order are procedural elements that may be updated by Executive Officer at any time.

IV. General Prohibitions

A. The placement or disposal of earthen materials, soil, silt, plant waste, slash, or other organic, or inorganic refuse, rubbish, and solid waste, bio-stimulatory substances and/or water containing elevated temperatures above background conditions, and/or chemicals, such as but not limited to pesticides, fertilizers, or other substances into any stream or watercourse is prohibited .

B. The placing or disposal of earthen materials, soil, silt, plant waste, slash, or other organic, or inorganic refuse, rubbish, and solid waste, water containing elevated temperatures above background conditions, chemicals, bio-stimulatory substances, and/or chemicals such as but not limited to pesticides, fertilizers or other substances in a location where such may discharge into streams or watercourses is prohibited.

C. The discharge of any waste not specifically regulated by this order is prohibited.

V. General 401 Water Quality Certification

THE REGIONAL WATER BOARD HEREBY CERTIFIES that projects in compliance with the conditions of the Order above will comply with sections 301, 302, 303, 306, and 307 of the Clean Water Act, and with applicable provisions of State law, subject to the following additional terms and conditions:

1. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Water Code section 13330 and title 23, California Code of Regulations, section 3867.

2. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to title 23, California Code of Regulations, section 3855, subdivision (b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

3. Certification is conditioned upon total payment of any fee required under California Code of Regulations, title 23, section 3833, subdivision (b)(3). Annual Fee Schedules are detailed in the California Code of Regulation, title 23, section 2200.

4. This general certification applies only to projects subject to the waiver. Dischargers may seek coverage under this Order for similar activities subject to public notice and approval by the Regional Water Board Executive Officer.

5. A Discharger seeking water quality certification coverage for stream crossing replacements or for proposed remediation/cleanup/restoration activities in surface waters shall notify the Regional Water Board 60 days prior to commencement of the activity and submit information regarding the construction schedule and other relevant information including an appropriate fee. Work may not commence until the discharger is provided authorization by the Executive Officer of the Regional Water Board either through coverage under this Order or through another individual or general water quality certification.

6. The authorization of this certification for any General Water Quality Certification or dredge and fill activities expires five (5) years from the date the activity commences.

7. Upon completion of the project, Discharger shall submit a Notice of Completion certifying that all the conditions and monitoring and reporting requirements of this Order have been met.

8. All Order requirements, standard conditions, general terms and provisions, and prohibitions are enforceable conditions of this General Water Quality Certification.

9. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation shall be subject to any remedies, penalties, process, or sanctions as provided for under state law. For purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process, or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification.

10. This General Water Quality Certification portion of the Order may be modified as needed by the Executive Officer of the Regional Water Board.

I, Matthias St. John, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, North Coast Region on August 13, 2015.

Matthias St.John
2015.08.20
10:41:41 -07'00'

Water Boards

Matthias St. John
Executive Officer

Appendices

Appendix A: Enrollment Form
Appendix B: Best Management Practices
Appendix C: Monitoring and Reporting Program
Appendix D: Surface Water Correction Workplan Requirements
Appendix E1: Department of Pesticide Regulation Document – Legal Pest Management Practices for Marijuana Growers in California
Appendix E2: Department of Pesticide Regulation Informational Document - Pesticide Use on Marijuana

NOTICE OF INTENT FORM
FOR ENROLLMENT UNDER
WAIVER OF WASTE DISCHARGE REQUIREMENTS
ORDER NUMBER R1-2015-0023

Submission of this Notice of Intent (NOI) to the North Coast Regional Water Quality Control Board (Regional Water Board) or an approved third party constitutes notice that a discharger, identified in Section I of this form, requests and receives authorization to discharge pursuant to the Waiver of Waste Discharge Requirements Order number R1-2015-0023 (Order). Upon submittal of the NOI, waste discharges are authorized pursuant to the conditions of the Order. Order coverage is required for existing Tier 1, 2, and 3 cultivation sites by February 15, 2016. Dischargers who begin operations after February 15, 2016, must file an NOI prior to commencement of cultivation activities.

To obtain authorization, dischargers must complete and submit this NOI form, encompassing sections I and II, complete and submit the reporting information required in Appendix C of the Order, and submit the appropriate fee. The reporting form in Appendix C must be submitted annually by March 31 thereafter and an annual fee is subject to a separate invoicing from the State Water Board. Any additional documentation required by the Order, such as a water resource protection plan, site map, and monitoring records must be completed and secured on-site, to be made available upon request by the Regional Water Board. This NOI form must be submitted upon enrollment and the discharger shall amend and resubmit the NOI within 30 days of changed site conditions that result in a change in Tier status.

Completed forms must be signed and submitted to the Regional Water Board or an approved third party.

Forms submitted to the Regional Water Board shall be submitted electronically to NorthCoast@waterboards.ca.gov or, if electronic submission is infeasible, hard copies can be submitted to: North Coast Regional Water Quality Control Board 5550 Skylane Boulevard, Suite A, Santa Rosa, CA 95403.

Fee payments shall be made payable either to an approved third party or the State Water Resource Control Board (SWRCB) according to the schedule in section 2200.7 of the Water Code. Approved third parties that collect fees from their enrollees are required to submit the fees to the Regional Water Board. Initial payments shall be submitted to: North Coast Regional Water Quality Control Board 5550 Skylane Boulevard, Suite A, Santa Rosa, CA 95403. Invoices will be issued annually, thereafter.

I. Discharger Information

First Name, Middle Initial

Last Name

Mailing Address:

Street

City

State ZIP **Phone Number:**

Email:

II. Site Information

Site Address:

Street

City

State ZIP

Subwatershed (HUC-12)

*12-digit HUC-12 code available at http://iaspub.epa.gov/apex/grts/f?p=110:95:::NO::APP_SHOW_HIDE:

Assessor's Parcel Number (APN)

Please check one of the following boxes to indicate which Tier you are enrolling under:

☐ Tier 1 ☐ Tier 2 ☐ Tier 3

Under Tier 2, water resource protection plans must be developed within 180 days of submittal of this NOI form. Under Tier 3, cleanup and restoration plans must be submitted to the Regional Water Board within 45 days of submittal of this NOI form. Tier 3 enrollees that are cultivating must also be enrolled and comply with Tier 2 conditions.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. The information contained in this document and all attachments is, to the best of my knowledge and belief, true, accurate, and complete. I agree to monitor and report on my site in compliance with the Order, including the Monitoring and Reporting Program (Appendix C) truthfully, accurately, and completely; complete Sections I and II, above; keep a copy of the Order, this NOI, the annual monitoring and reporting documents and, if applicable, the water resource protection plan and cleanup and restoration plan document(s) on site, and make them available to Water Board staff upon request. If there is a change in Tier status based on changed site conditions, the changes must be documented, appended to this document, and resubmitted to either the Regional Water Board or, if applicable, an approved third party.

Print name: _____

Signature: _____ **Date:** _____

Best Management Practices for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or Operations with Similar Environmental Effects

I. Introduction

Best management practices (BMPs) provided here may be applicable to prevent, minimize, and control the discharge of waste and other controllable water quality factors associated with site restoration/cleanup/remediation and site operations and maintenance. These BMPs are all considered enforceable conditions under the Order as applicable to a given site, and are referenced by and made conditions in the mitigated negative declaration (CEQA document) for the Order, as well.

This appendix to Order No. R1-2015-0023 includes section II. Standard BMPs for Construction, section III. BMPs for Site Maintenance and Operations (per standard conditions), and section IV. References. For additional BMP suggestions, staff encourage consultation of the various manuals listed in section IV. References, many of which are available online for free.

II. Standard BMPs for Construction

Where applicable during restoration, remediation, cleanup, or site maintenance activities, the following BMPs will be used.

A. General BMPs to Avoid or Minimize Adverse Impacts

Temporal Limitations on Construction

1. To avoid impacting migrating fish and causing erosion and sedimentation of the stream channel, the project work season shall be from May 1 to October 15. If operations are to be conducted during the winter period from October 15 to May 1, a winter period operating plan must be incorporated into the project work plan. This plan shall include specific measures to be taken in the winter operating period to avoid or substantially lessen erosion and sedimentation into surface waters.
2. A 2-day (48-hour) forecast[1] of rain shall be the trigger for temporary cessation of project activities and winterization/erosion protection of the work site.

[1] Any weather pattern that is forecasted by NOAA to have a 50% or greater probability of producing precipitation in the project area. The permittee shall obtain and keep for record likely precipitation forecast information from

Limitation on Earthmoving

3. Disturbance to existing grades and vegetation shall be limited to the actual site of the cleanup/remediation and necessary access routes.
4. Placement of temporary access roads, staging areas, and other facilities shall avoid or minimize disturbance to habitat.
5. Disturbance to native shrubs, woody perennials or tree removal on the streambank or in the stream channel shall be avoided or minimized. If riparian trees over six inches dbh (diameter at breast height) are to be removed, they shall be replaced by native species appropriate to the site at a 3:1 ratio. Where physical constraints in the project area prevent replanting at a 3:1 ratio and canopy cover is sufficient for habitat needs, replanting may occur at a lesser replacement ratio.
6. If shrubs and non-woody riparian vegetation are disturbed, they shall be replaced with similar native species appropriate to the site.
7. Whenever feasible, finished grades shall not exceed 1.5:1 side slopes. In circumstances where final grades cannot achieve 1.5:1 slope, additional erosion control or stabilization methods shall be applied as appropriate for the project location.
8. Spoils and excavated material not used during project activities shall be removed and placed outside of the 100-year floodplain, and stored/disposed of in compliance with Order conditions related to spoils management.
9. Upon completion of grading, slope protection of all disturbed sites shall be provided prior to the rainy season through a combination of permanent vegetative treatment, mulching, geotextiles, and/or rock, or equivalent.
10. Vegetation planting for slope protection purposes shall be timed to require as little irrigation as possible for ensuring establishment by the commencement of the rainy season.
11. Only native plant species shall be used with the exception of non-invasive, non-persistent grass species used for short-term vegetative cover of exposed soils.
12. Rock placed for slope protection shall be the minimum necessary to avoid erosion, and shall be part of a design that provides for native plant revegetation and minimizes bank armoring.

Limitations on Construction Equipment

13. Dischargers and/or their contractors shall ensure that chemical contamination (fuel, grease, oil, hydraulic fluid, solvents, etc.) of water and soils is prohibited during routine equipment operation and maintenance.
14. Heavy equipment shall not be used in flowing water. Please refer to BMPs 57 through 64 for dewatering of live streams.

---

the National Weather Service Forecast Office (e.g. by entering the zip code of the project's location at http://srh.noaa.gov/forecast).

15. When possible, existing ingress or egress points shall be used or work shall be performed from the top of the creek banks.
16. Use of heavy equipment shall be avoided or minimized in a channel bottom with rocky or cobbled substrate.
17. If project work or access to the work site requires heavy equipment to travel on a channel bottom with rocky or cobbled substrate, wood or rubber mats shall be placed on the channel bottom prior to use by heavy equipment.
18. Heavy equipment shall not introduce chemicals or foreign sediment to the channel (e.g., remove mud from tracks or cover channel work area with plastic sheeting prior to heavy equipment entry).
19. The amount of time this equipment is stationed, working, or traveling within the channel shall be minimized.
20. When heavy equipment is used, any woody debris and stream bank or streambed vegetation disturbed shall be replaced to a pre-project density with native species appropriate to the site. If riparian trees over six inches dbh are to be removed, they shall be replaced by native species appropriate to the site at a 3:1 ratio per BMP 5.
21. The use or storage of petroleum-powered equipment shall be accomplished in a manner that prevents the potential release of petroleum materials into waters of the state (Fish and Game Code 5650). To accomplish this, the following precautionary measures shall be followed:
    - Schedule excavation and grading activities for dry weather periods.
    - Designate a contained area for equipment storage, short-term maintenance, and refueling. Ensure it is located at least 50 feet from waterbodies.
    - Inspect vehicles for leaks and repair immediately.
    - Clean up leaks, drips and other spills immediately to avoid soil or groundwater contamination.
    - Conduct major vehicle maintenance and washing offsite (except as necessary to implement BMP 18).
    - Ensure that all spent fluids including motor oil, radiator coolant, or other fluids and used vehicle batteries are collected, stored, and recycled as hazardous waste offsite.
    - Ensure that all construction debris is taken to appropriate landfills and all sediment disposed of in upland areas or offsite, beyond the 100-year floodplain.
    - Use dry cleanup methods (e.g., absorbent materials, cat litter, and/or rags) whenever possible. If necessary for dust control, use only a minimal amount of water.
    - Sweep up spilled dry materials immediately.

Revegetation and Removal of Exotic Plants

22. The work area shall be restored to pre-project work condition or better.

23. All exposed soil resulting from the cleanup/restoration activities shall be revegetated using live planting, seed casting or hydroseeding.
24. Any stream bank area left barren of vegetation as a result of cleanup/restoration activities shall be stabilized by seeding, replanting, or other means with native trees, shrubs, and/or grasses appropriate to the site prior to the rainy season in the year work was conducted.
25. Soil exposed as a result of project work, soil above rock riprap, and interstitial spaces between rocks shall be revegetated with native vegetation by live planting, seed casting, or hydroseeding prior to the rainy season of the year work is completed.
26. The spread or introduction of exotic plant species shall be avoided to the maximum extent possible by avoiding areas with established native vegetation during cleanup/restoration activities, restoring disturbed areas with appropriate native species, and post-project monitoring and control of exotic species.
27. Removal of invasive exotic species is strongly recommended. Mechanical removal (hand tools, weed whacking, hand pulling) of exotics shall be done in preparation for establishment of native perennial plantings.
28. Revegetation shall be implemented after the removal of exotic vegetation occurs. Erosion control implementation shall be timed in accordance with BMPs 1 and 2.
29. Native plants characteristic of the local habitat shall be used for revegetation when implementing and maintaining cleanup/restoration work in riparian and other sensitive areas. Non-invasive, non-persistent grass species (e.g., barley grass) may be used for their temporary erosion control benefits to stabilize disturbed slopes and prevent exposure of disturbed soils to rainfall.
30. Annual inspections for the purpose of assessing the survival and growth of revegetated areas and the presence of exposed soil shall be conducted for three years following project work.
31. Dischargers and/or their consultant(s) or third party representative(s) shall note the presence of native/non-native vegetation and extent of exposed soil, and take photographs during each inspection.
32. Dischargers and/or their consultant(s) or third party representative(s) shall provide the location of each work site, pre- and post-project work photos, diagram of all areas revegetated and the planting methods and plants used, and an assessment of the success of the revegetation program in the annual monitoring report as required under the Order.

Erosion Control

33. Erosion control and sediment detention devices and materials shall be incorporated into the cleanup/restoration work design and installed prior to the end of project work and before the beginning of the rainy season. Any continuing, approved project work conducted after October 15 shall have erosion control works completed up-to-date and daily.

34. Erosion control materials shall be, at minimum, stored on-site at all times during approved project work between May 1 and October 15.
35. Approved project work within the 5-year flood plain shall not begin until all temporary erosion controls (straw bales or silt fences that are effectively keyed-in) are installed downslope of cleanup/restoration activities.
36. Non-invasive, non-persistent grass species (e.g., barley grass) may be used for their temporary erosion control benefits to stabilize disturbed slopes and prevent exposure of disturbed soils to rainfall.
37. Upon work completion, all exposed soil present in and around the cleanup/restoration sites shall be stabilized within 7 days.
38. Soils exposed by cleanup/restoration operations shall be seeded and mulched to prevent sediment runoff and transport.

Miscellaneous

39. During temporary stream crossing siting, locations shall be identified where erosion potential is low. Areas where runoff from roadway side slopes will spill into the side slopes of the crossing shall be avoided.
40. Vehicles and equipment shall not be driven, operated, fueled, cleaned, maintained, or stored in the wet or dry portions of a waterbody where wetland vegetation, riparian vegetation, or aquatic organisms may be impacted.
41. Riparian vegetation, when removed pursuant to the provisions of the work, shall be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation shall be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble shall be removed upon completion of project activities.
42. Avoidance of earthwork on steep slopes and minimization of cut/fill volumes, combined with proper compaction, shall occur to ensure the area is resilient to issues associated with seismic events and mass wasting. If cracks are observed, or new construction is anticipated, consultation with a qualified professional is appropriate.
43. Operations within the 100-year floodplain shall be avoided. Refuse and spoils shall not be stored within the hundred-year floodplain. If roads are located within the 100-year floodplain, they shall be at grade; bridges shall have vented approaches and bridge deck shall be above anticipated 100-year flood water surface elevations. Consultation with a qualified professional is required for project work within the floodplain. .
44. Project work-related dust shall be controlled. Dust control activities shall be conducted in such a manner that will not produce sediment-laden runoff. Dust control measures, including pre-watering of excavation/grading sites, use of water trucks, track-out prevention, washing down vehicles/equipment before leaving site, and prohibiting grading/excavation activities during windy periods, shall be implemented as appropriate.

45. Short term impacts from project work-related emissions can be minimized via retrofitting equipment and use of low emissions vehicles when possible.
46. Position vehicles and other apparatus so as to not block emergency vehicle access.

B. BMPs for Specific Activities

Critical Area Planting, Channel Vegetation and Restoration and Management of Declining Habitats

The following measures shall be employed:

47. Plant materials used shall be native to the site and shall be locally collected if possible.
48. Straw mulch shall be applied at a rate of 2 tons per acre of exposed soils and, shall be secured to the ground.
49. When implementing or maintaining a critical area planting above the high water line, a filter fabric fence, straw wattles, fiber rolls and/or hay bales shall be utilized to keep sediment from flowing into the adjacent water body.

Structure for Water Control and Stream Crossings

These practices shall be used generally to replace or retrofit existing culverts and to install culverts where water control is needed at a stream crossing or road ditch to restore natural hydrology, and to reduce potential diversions and road-related erosion. In addition to the general limitations set forth in the previous section, the following measures shall be employed for these types of projects:

50. Culvert fill slopes shall be constructed at a 2:1 slope or shall be armored with rock.
51. All culverts in fish-bearing streams and in streams where fish have historically been found and may potentially re-occur, shall be designed and constructed consistent with NMFS Southwest Region's Guidelines for Salmonid Passage at Stream Crossings (NMFS 2000) and CDFG's Culvert Criteria for Fish Passage (CDFG 2002).

Limitations on Work in Streams and Permanently Ponded Areas

52. If it is necessary to conduct work in or near a live stream, the work space shall be isolated to avoid project activities in flowing water.
53. Water shall be directed around the work site.
54. Ingress/egress points shall be utilized and work shall be performed from the top of the bank to the maximum extent possible.
55. Use of heavy equipment in a channel shall be avoided or minimized. Please refer to BMPs 57 through 64 for dewatering of live streams. The amount of time construction equipment is stationed, working or traveling within the creek bed shall be minimized.

56. If the substrate of a seasonal pond, creek, stream or water body is altered during work activities, it shall be returned to approximate pre-construction conditions after the work is completed.

Temporary Stream Diversion and Dewatering: All Live Streams

57. For project work in a flowing or pooled stream or creek reach, or where access to the stream bank from the channel bottom is necessary, the work area shall be isolated with the use of temporary cofferdams upstream and downstream of the work site and all flowing water shall be diverted around the work site throughout the project period.
58. Other approved water diversion structures shall be utilized if installation of cofferdams is not feasible.
59. Cofferdam construction using offsite river-run gravel and/or sand bags is preferred. If gravel materials for cofferdams are generated onsite, measures shall be taken to ensure minimal disturbance to the channel, such as careful extraction from elevated terraces. The upstream end of the upstream cofferdam shall also be reinforced with thick plastic sheeting to minimize leakage.
60. Gravity diversions are preferred to pumping as dewatering techniques. If pumping is required to supplement gravity diversions, care shall be taken to minimize noise pollution and prevent the pump or generator-borne pollution to the watercourse.
61. The diversion pipe shall consist of a large plastic HDPE or ADS pipe or similar material, of a sufficient diameter to safely accommodate expected flows at the site during the full project period.
62. The pipe shall be protected from project activities to ensure that bypass flows are not interrupted.
63. Continuous flow downstream of the work site shall be maintained at all times during project work.
64. When project work is complete, the flow diversion structure shall be removed in a manner that allows flow to resume with a minimum of disturbance to the substrate.

Protection of Sensitive Species

65. Sensitive species - Consult with federal, state and local agencies regarding location of rare, threatened or endangered species.
66. Prior to commencing work, designate and mark a no-disturbance buffer to protect sensitive species and communities.
67. All work performed within waters of the state shall be completed in a manner that minimizes impacts to beneficial uses and habitat. Measures shall be employed to minimize land disturbances that shall adversely impact the water quality of waters of the state. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete Project implementation.

68. All equipment, including but not limited to excavators, graders, barges, etc., that may have come in contact with extremely invasive animals (e.g. zebra mussels or new Zealand mud snails) or plant (e.g., Arundo donax, scotch broom, pampas grass) or the seeds of these plants, shall be carefully cleaned before arriving on site and shall also be carefully cleaned before removal from the site, to prevent spread of these plants.
69. Vegetation shall be established on disturbed areas with an appropriate mix of California native plants and/or seed mix. All initial plantings and seed shall be installed prior to completion of the project work.

III. BMPs for Site Maintenance and Operations (per standard conditions)

The following BMPs are intended to address compliance with the standard conditions. Individual or multiple BMPS may be selected to address compliance with a given standard condition depending on site-specific conditions. BMPs are considered enforceable conditions as applicable to a given site.

A. Site Maintenance, Erosion Control, Drainage Features

70. Drainage of roads, clearings, fill prisms, and terraced areas is critical to ensuring their integrity and to prevent or minimize sediment discharges to watercourses. Proper design and location of roads and other features is critical to ensuring that a road or other feature be adequately drained and is best accomplished through consultation with a qualified professional. If inspection identifies surface rills or ruts, surfacing and drainage likely needs maintenance.
71. Surfacing of exposed/disturbed/bare surfaces can greatly reduce erosion associated with runoff. BMP features such as vegetative ground cover, straw mulch, slash, wood chips, straw wattles, fiber rolls, hay bales, geotextiles, and filter fabric fences may be combined and implemented on exposed/disturbed/bare surfaces as appropriate to prevent or minimize sediment transport and delivery to surface waters. Non-invasive, non-persistent grass species (e.g. barley grass) may be used for their temporary erosion control benefits to stabilize bare slopes and prevent exposure of bare soils to rainfall. If utilized, straw mulch shall be applied at a rate of 2 tons per acre of exposed soils and, if warranted by site conditions, shall be secured to the ground. Consultation with a qualified professional is recommended for successful site-specific selection and implementation of such surface treatments. Guidance literature pertaining to such BMPs is referenced in section IV. of this document.
72. Road surfacing, especially within a segment leading to a watercourse, is critical to prevent and minimize sediment delivery to a watercourse and maintain road integrity for expected uses. Road surfacing can include pavement, chip-seal, lignin, rock, or other material appropriate for timing and nature of use. Steeper sections of road require higher quality rock (e.g. crushed angular versus river-run) to remain in place.

73. Road shaping to optimize drainage includes out-sloping and crowning; shaping can minimize reliance on inside ditches. Drainage structures can include rolling dips and water bars within the road surface and ditch-relief culverts to drain inside ditches. Adequate spacing of drainage structures is critical to reduce erosion associated with runoff. Generally speaking, steep slopes require greater frequency of drainage structures. The drainage structures shall be maintained to ensure capture of and capacity for expected flow. The outlets of the structures shall be placed in such a manner as to avoid discharge onto fill, unstable areas, or areas that can enter a watercourse. If site conditions prohibit drainage structures at an adequate interval to avoid erosion, bioengineering techniques[2] are the preferred solution (e.g. live fascines), but other techniques may also be appropriate including armoring (i.e. rock of adequate size and depth to remain in place under traffic and flow conditions) and velocity dissipaters (e.g. gravel-filled "pillows" in an inside ditch to trap sediment). In the case that inside ditches need maintenance, grade ditches only when and where necessary, since frequent routine mechanical grading can cause erosion of the ditch, undermine banks, and expose the toe of the cutslope to erosion. Do not remove more leaves and vegetation than necessary to keep water moving, as vegetation prevents scour and filters out sediment.
74. Road drainage shall be discharged to a stable location away from a watercourse. Use sediment control devices, such as check dams, sand/gravel bag barriers, and other acceptable techniques, when it is neither practical nor environmentally sound to disperse ditch water immediately before the ditch reaches a stream. Within areas with potential to discharge to a watercourse (i.e. within riparian areas of at least 200 feet of a stream) road surface drainage shall be filtered through vegetation, slash, or other appropriate material or settled into a depression with an outlet with adequate drainage. Caution should always be exercised with catchment basins in the event of failure.
75. Any spoils associated with site maintenance shall be placed in a stable location where it cannot enter a watercourse. Sidecasting shall be minimized and shall be avoided on unstable areas or where it has the potential to enter a watercourse.
76. Do not sidecast when the material can enter the stream directly or indirectly as sediment. Sidecast material can indirectly enter the stream when placed in a position where rain or road runoff can later deliver it to a channel that connects with the stream.
77. Disconnect road drainage from watercourses (drain to hill slopes), install drainage structures at intervals to prevent erosion of the inboard ditch or gull formation at the hill slope outfall, outslope roads.

[2] A Primer on Stream and River Protection for the Regulator and Program Manager: Technical Reference Circulare W.D. 02-#1, San Francisco Bay Region, California Regional Water Quality Control Board (April 2003) http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stream_wetland/streamprotectioncircular.pdf

78. Ditch-relief culverts shall also be inspected regularly, and cleared of debris and sediment. To reduce plugging, 15 to 24-inch diameter pipes shall be the minimum size considered for ditch relief culverts and shall be informed by site-specific conditions.
79. Grade ditches only when and where necessary, since frequent routine mechanical grading can cause erosion of the ditch, undermine banks, and expose the toe of the cutslope to erosion. Do not remove more grass and weeds than necessary to keep water moving, as vegetation prevents scour and filters out sediment.
80. Use sediment control devices, such as check dams, sand/gravel bag barriers, and other acceptable techniques, when it is neither practical nor environmentally sound to disperse ditch water immediately before the ditch reaches a stream.

B. Stream Crossing Maintenance

81. Proper maintenance of stream crossings is critical to ensure support of beneficial uses of water. Regular inspection and maintenance is necessary to identify, in a timely manner, if problems are occurring. Crossings include rock fords[3], armored fills with culverts[3], and bridges[3].
82. Rock fords are appropriate when temporary and minor moisture or over-land flow is expected, not typically when a bed and bank is present; exceptions may be justified if warranted by site specific conditions. Additionally, rock fords are appropriate if aquatic life is not present. An adequate layer of crushed angular rock shall be maintained at rock fords such that soil compaction is minimized under expected traffic levels.
83. Stream crossings consisting of armored fills with culverts and bridges are appropriate for streams with defined bed and bank[2]. They shall be sized to ensure the 100-year streamflow event can pass unimpeded. Additionally, crossings shall allow migration of aquatic life during all life stages potentially supported by that stream reach; water depth and velocity can inhibit migration of adult and juvenile fish species.
84. Stream crossing design and installation is best accomplished with the assistance of a qualified professional. Site conditions can change over time (e.g. channel filling or incision); consultation with a qualified professional is appropriate to evaluate maintenance or replacement needs and opportunities.
85. Regular inspection of the stream crossing is appropriate to identify changed conditions within the stream channel (e.g., bank erosion, headward incision, and channel filling).
    - If large wood is accumulated upstream or within the crossing that could impede or deflect flow and result in erosion or debris capture, the wood

[3] Explanation of term, available within the following document (as of the date of the Order): http://www.pacificwatershed.com/sites/default/files/handbook_chapter_download_page.pdf

should generally be removed. In some cases, it may be appropriate to re-orient debris with the streamflow.

- If sediment or debris is accumulated within a culvert and limits flow capacity, the short term solution should generally be to clean out the culvert and place the debris and sediment in a stable location with no potential to discharge into a stream. In some cases a trash rack, post, or other deflection structure at the culvert inlet can reduce plugging.
- If sediment is accumulated in a culvert without other debris accumulation and limits flow capacity, the long term solution may generally involve changing the culvert's slope, diameter, or embedment in the streambed.

86. The roadway adjacent to and over the crossing is an area of potential discharge. All road surfaces approaching a crossing shall be drained before the crossing, adequately filtered through vegetation or other material, and not discharged to a watercourse. If turbid water is discharged at a stream crossing, additional measures to control erosion at the source(s) or to remove sediment prior to discharge shall be implemented. Road surfaces shall be of rock, pavement, or other material appropriate for type and level of use.

87. If a culvert is used, the approaches and fill slopes shall be properly compacted during installation and shall be stabilized with rock or other appropriate surface protection to minimize surface erosion and slumping to the receiving waters. If possible, the road surface over the culvert shall have a critical-dip to ensure that if the culvert becomes plugged, water can flow over the road surface without washing away the fill prism. If site-specific conditions do not allow for a critical dip, alternatives such as emergency overflow culverts, oversized culvers, flared inlets, and debris racks may be warranted.

C. Riparian and Wetland Protection and Management:

88. Buffer width will be in compliance with Tier category.

89. Trees within riparian areas shall be retained for natural recruitment to streams. Large woody debris (LWD) shall be retained in stream or within riparian areas. The size of wood that can be beneficial to the stream will vary depending on the size of the stream (i.e., larger pieces of wood are necessary to withstand flows in large streams). In the event that LWD or trees are disturbed during excavation, care shall be taken to separate the LWD from soil. The pieces shall be stockpiled separately until they can be replaced in appropriate locations to enhance instream or riparian conditions. Placement of instream wood for habitat enhancement should be done under the consultation of a qualified professional and in conformance with applicable regulatory permits.

90. Avoidance of disturbance in riparian areas (within 200 feet of a watercourse) should result in protection and restoration of the quality/health of the riparian stand so as to promote: 1) shade and microclimate controls; 2) delivery of wood to channels, 3) slope stability and erosion control, 4) ground cover, and 5) removal of excess nutrients. This recognizes the importance of the riparian zone

with respect to temperature protection, sediment delivery, its importance with respect to the potential for recruitment of large wood, and removal of nutrients transported in runoff. In the event that past disturbance has degraded riparian conditions, replanting with native species capable of establishing a multi-storied canopy will ensure these riparian areas can perform these important ecologic functions.

D. Spoils Management

To ensure spoil pile stability and to reduce the potential for spoil pile slope failure or transport to waters of the state, the following measures shall be implemented when placing or disposing of spoils onsite:

91. Rip compacted soils prior to placing spoils to prevent the potential for ponding under the spoils that could result in spoil site failure and subsequent sedimentation;
92. Compact and contour stored spoils to mimic the natural slope contours and drainage patterns to reduce the potential for fill saturation and failure;
93. Ensure that spoil materials are free of woody debris, and not placed on top of brush, logs or trees.
94. Spoils shall not be placed or stored in locations where soils are wet or unstable, or where slope stability could be adversely affected.
95. Do not locate spoil piles in or immediately adjacent to wetlands and watercourses.
96. Store spoil piles in a manner (e.g. cover pile with plastic tarps and surround base of pile with straw wattle) or location that would not result in any runoff from the spoil pile ending up in wetlands and watercourses.
97. Separate organic material (e.g., roots, stumps) from the dirt fill and store separately. Place this material in long-term, upland storage sites, as it cannot be used for fill.
98. Keep temporary disposal sites out of wetlands, adjacent riparian corridors, and ordinary high water areas as well as high risk zones, such as 100-year floodplain and unstable slopes.
99. After placement of the soil layer, track walk the slopes perpendicular to the contour to stabilize the soil until vegetation is established. Track walking creates indentations that trap seed and decrease erosion of the reclaimed surfaces.
100. Revegetate the disposal site with a mix of native plant species. Cover the seeded and planted areas with mulched straw at a rate of 2 tons per acre. Apply jute netting or similar erosion control fabric on slopes greater than 2:1 if site is erosive.

E. Water Storage and Use

WATER USE

101. Conduct operations on a size and scale that considers available water sources and other water use and users in the planning watershed.
102. Implement water conservation measures such as rainwater catchment systems, drip irrigation, mulching, or irrigation water recycling. (Also see BMPs for Irrigation, below)
103. Take measures to minimize water diversion during low flow periods.
104. Options for documentation of water diversions and/or water usage may include the use of water meter devices and date-stamped photographs of water meter readings.
105. Hauled water utilized for irrigation shall be documented via receipt or similar, and show the date, name, and license plate of the water hauler, and the quantity of water purchased.
106. Apply water at agronomic rates (do not overwater plants).

WATER STORAGE

107. If using a water storage tank, do not locate the tank in a flood plain or next to equipment that generates heat. Locate the tank so it is easy to install, access, and maintain.

108. Vertical tanks should be installed according to manufacturer's specifications and placed on firm, compacted soil that is free of rocks/sharp objects and capable of bearing the weight of the tank and its maximum contents. In addition, a sand or pea gravel base with provisions for preventing erosion is highly recommended. Installation sites for tanks 8,000 gallons or more must be on a reinforced concrete pad providing adequate support and enough space to attach a tank restraint system (anchor using the molded-in tie down lugs with moderate tension, being careful not to over-tighten), especially where seismic or large wind forces are present.

109. Horizontal tanks shall be secured with bands and/or hoops to prevent tank movement.
110. Design and construct storage ponds in properly sited locations, off-stream. Plant vegetation along the perimeter of the pond. Construct berms or excess freeboard space around the perimeter of the pond to allow for sheet flow inputs.
111. Provide adequate outlet drainage for overflow of ponds, including low impact designs, to promote dispersal and infiltration of flows.
112. Place proper lining or sealing in ponds to prevent water loss.

113. Storage bladders are not encouraged for long term water storage reliability. If they are utilized, ensure that they are designed to store water, and that they are sited to minimize potential for water to flow into a watercourse in the event of a catastrophic failure. Used bladders (e.g. military surplus bladders) shall be checked for interior residual chemicals and integrity prior to use. Inspect bladder and containment features periodically to ensure integrity.

F. Irrigation Runoff

114. Irrigate at rates to avoid or minimize runoff.
115. Regularly inspect for leaks in mains and laterals, in irrigation connections, or at the ends of drip tape and feeder lines. Repair any found leaks.
116. Design irrigation system to include redundancy (i.e., safety valves) in the event that leaks occur, so that waste of water is prevented and minimized.
117. Recapture and reuse irrigation runoff (tailwater) where possible, through passive (gravity-fed) or active (pumped) means.
118. Construct retention basins for tailwater infiltration; percolation medium may be used to reduce pollutant concentration in infiltrated water. Constructed treatment wetlands may also be effective at reducing nutrient loads in water. Ensure that drainage and/or infiltration areas are located away from unstable or potentially unstable features.
119. Regularly replace worn, outdated or inefficient irrigation system components and equipment.
120. Use mulches (e.g. wood chips or bark) in cultivation areas that do not have ground cover to prevent erosion and minimize evaporative loss.
121. Leave a vegetative barrier along the property boundary and interior watercourses to act as a pollutant filter.
122. Employ rain-triggered shutoff devices to prevent irrigation after precipitation.

G. Fertilizers, Soil Amendments, Pesticides, Petroleum Products, and Other Chemicals

123. Evaluate irrigation water, soils, growth media, and plant tissue to optimize plant growth and avoid over-fertilization.
124. Reference Department of Pesticide Regulations Guidance (see Attachments E-1 and E-2 of Order No. R1-2015-0023)
125. All chemicals shall be stored in a manner, method, and location that ensures that there is no threat of discharge to waters of the state.
126. Products shall be labeled properly and applied according to the label.
127. Use integrated pest management strategies that apply pesticides only to the area of need, only when there is an economic benefit to the grower, and at times when runoff losses are least likely, including losses of organic matter from dead plant material.

128. Periodically calibrate pesticide application equipment.
129. Use anti-backflow devices on water supply hoses, and other mixing/loading practices designed to reduce the risk of runoff and spills.
130. Petroleum products shall be stored with a secondary containment system.
131. Throughout the rainy season, any temporary containment facility shall have a permanent cover and side-wind protection, or be covered during non-working days and prior to and during rain events.
132. Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
133. Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.
134. Have proper storage instructions posted at all times in an open and conspicuous location.
135. Prepare and keep onsite a Spill Prevention, Countermeasures, and Cleanup Plan (SPCC Plan) if applicable[4].
136. Keep ample supply of appropriate spill clean-up material near storage areas.

H. Cultivation-Related Wastes

137. Cultivation-related waste shall be stored in a place where it will not enter a stream. Soil bags and other garbage shall be collected, contained, and disposed of at an appropriate facility, including for recycling where available. Pots shall be collected and stored where they will not enter a waterway or create a nuisance. Plant waste and other compostable materials be stored (or composted, as applicable) at locations where they will not enter or be blown into surface waters, and in a manner that ensures that residues and pollutants within those materials do not migrate or leach into surface water or groundwaters.
138. Imported soil for cultivation purposes shall be minimized. The impacts associated with importation of soil include, but are not limited to increased road maintenance and the increased need for spoils management. Use of compost increases the humic acid content and water retention capacity of soils while reducing the need for fertilizer application. In the event that containers (e.g. grow bags or grow pots) are used for cultivation, reuse of soil shall be maximized to the extent feasible.

[4] SPCC plans are required for over 1,320 gallons of petroleum stored aboveground or 42,000 gallons below ground. Additionally, any type of storage container requires an SPCC if it is larger than 20,000 gallons, or if the cumulative storage capacity on-site exceeds 100,000 gallons (Health and Safety Code section 25270-25270.13) A sample SPCC can be found here: http://www.calcupa.net/civica/filebank/blobdload.asp?BlobID=3186

139. Spent growth medium (i.e. soil and other organic medium) shall be handled to minimize discharge of soil and residual nutrients and chemicals to watercourses. Proper handling of spent soil could include incorporating into garden beds, spreading on a stable surface and revegetation, storage in watertight dumpsters, covering with tarps or plastic sheeting prior to proper disposal, and use of techniques to reduce polluted runoff described under Item F. Irrigation Runoff.
140. Other means of handling cultivation-related waste may be considered on a site-specific basis.

I. Refuse and Human Waste

141. Trash containers of sufficient size and number shall be provided and properly serviced to contain the solid waste generated by the project. Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers. Use lined bins or dumpsters to reduce leaking of liquid waste. Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater. Make sure trash container areas are screened or walled to prevent off-site transport of trash. Consider using refuse containers that are bear-proof and/or secure from wildlife. Refuse shall be removed from the site on a frequency that does not result in nuisance conditions, transported in a manner that they remain contained during transport, and the contents shall be disposed of properly at a proper disposal facility.
142. Ensure that human waste disposal systems do not pose a threat to surface or ground water quality or create a nuisance. Onsite treatment systems should follow applicable County ordinances for human waste disposal requirements, consistent with the applicable tier under the State Water Resources Control Board Onsite Waste Treatment System Policy[5].

[5] Available at: http://www.waterboards.ca.gov/water_issues/programs/owts/docs/owts_policy.pdf (as of the date of the Order).

IV. References

Handbook for Forest, Ranch, & Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining, and Closing Wildland Roads
http://www.pacificwatershed.com/sites/default/files/handbook_chapter_download_page.pdf

A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds
http://www.5counties.org/roadmanual.htm

Construction Site BMP Fact Sheets
http://www.dot.ca.gov/hq/construc/stormwater/factsheets.htm

EPA Riparian/Forested Buffer
http://water.epa.gov/polwaste/npdes/swbmp/Riparian-Forested-Buffer.cfm

Creating Effective Local Riparian Buffer Ordinances
http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf

How to Install Residential Scale Best Management Practices (BMPs) in the Lake Tahoe Basin
http://www.tahoebmp.org/Documents/Contractors%20BMP%20Manual.pdf

Spoil Pile BMPs
http://michigan.gov/documents/deq/deq-wb-nps-sp_250905_7.pdf

Sanctuary Forest Water Storage Guide
http://agwaterstewards.org/images/uploads/docs/1213661598_Water_Storage_Guide.pdf

Natural Resources Conservation Service-USDA, "Ponds – Planning, Design, Construction", Agriculture Handbook
http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030362.pdf

Division of Safety of Dams size requirements
http://www.water.ca.gov/damsafety/jurischart/

Water Tanks: Guidelines for Installation and Use
http://dnn7.snydernet.com/_pdf/_septic/Septic%20Catalog%202010.pdf

BEST MANAGEMENT PRACTICES (BMP's) University of California Cooperative Extension
http://www.waterboards.ca.gov/sandiego/water_issues/programs/wine_country/docs/updates081910/ucce_bmps.pdf

California Stormwater Quality Association
Section 4: Source Control BMPs
https://www.casqa.org/sites/default/files/BMPHandbooks/sd-12.pdf

CA DOT Solid Waste Management Plan
http://www.dot.ca.gov/hq/construc/stormwater/WM-05.pdf

State Water Resources Control Board Onsite Wastewater Treatment System (OWTS) policy
http://www.waterboards.ca.gov/water_issues/programs/owts/docs/owts_policy.pdf

California Stormwater Quality Association
Section 4: Source Control BMPs
https://www.casqa.org/sites/default/files/BMPHandbooks/sd-32.pdf

California Riparian Habitat Restoration Handbook
http://www.conservation.ca.gov/dlrp/watershedportal/InformationResources/Documents/Restoration_Handbook_Final_Dec09.pdf

The Practical Streambank Bioengineering Guide
http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmcpu116.pdf

150728_KVG_ef_AppendixB_BMP

MONITORING AND REPORTING PROGRAM
FOR
WAIVER OF WASTE DISCHARGE REQUIREMENTS
ORDER NUMBER R1-2015-0023

The Monitoring and Reporting Program has two components (Monitoring and Reporting), reflected in the two sections below. The information collected through site monitoring and inspections, per Section I and reporting forms completed per Section II must be retained on site and made available upon request by Regional Water Board staff. As part of the initial enrollment, a filled copy of the Annual Reporting form in Section II must be submitted, in addition to the Notice of Intent and filing fee. Following enrollment, the Annual Reporting form shall be submitted annually by March 31.

Monitoring, including periodic site inspections and reviews of operational practices, helps to ensure that standard conditions are being met, that management measures and controls are effectively protecting water resources, and that any newly developing problems representing a water quality concern are identified and corrected quickly. Whether submitted directly to the Regional Water Board or through an approved third party program, the required reporting elements allow the Regional Water Board to assess general program implementation and compliance by tier category and by subwatershed. For example, reporting form information can allow staff to determine how many Tier 2 Dischargers are in the process of developing water resource protection plans, how many have developed and are implementing plans, how many are in compliance with standard conditions, how effectively BMPs are performing, and what changes or improvements are needed to improve program effectiveness or compliance rate.

On a sub-watershed-wide scale, this information enables the Regional Water Board staff to comprehensively track activity from Tier 3 cleanup and restoration sites and individual instream work proposed under Tier 2 water resource protection plans to help correlate cleanups and activities or restoration or remediation work in streams or wetlands that are proposed and underway in individual watersheds and subwatersheds. It may be necessary to limit the number of individual potential construction-related impacts occurring at any given time in any given subwatershed.

I. Monitoring

This information below is applicable to all sites and may also be part of or incorporated into the water resource protection plan for Tier 2 sites.

A. Site Map:

Please create a legible map identifying the features listed below where applicable. You may need to use a full-page satellite map (e.g. Bing, Google, or similar) and one or more additional maps at appropriate scales. The map(s) may be preliminary upon enrollment and refined upon completion of a thorough site inventory:

1. Property topography
2. Perimeter of land owned or leased
3. Watercourses and stream crossings
4. Roads, clearings, and developed areas
5. Perimeters of cultivation areas
6. Water source types and locations (surface water diversion, well, rainwater catchment) and water storage types and locations (storage tanks, ponds, bladders)[1]
7. Nutrient and chemical storage locations (i.e. fertilizers, pesticides, petroleum)
8. Buildings
9. Garbage/refuse storage facilities/locations
10. Human waste facilities (e.g. septic tanks and leach fields, privy, composting toilet)
11. Unstable earthen features
12. Soil or spoils storage/stockpile/disposal areas
13. Controllable sediment discharge sources identified for upgrade, cleanup, remediation, or restoration (as part of Tier 2 Water Resource Protection Plan or Tier 3 Cleanup and Restoration Plan)
14. Mark or highlight those locations where wastes or pollutants, whether spilled, placed, or stored could be transported into surface water or leached into groundwater
15. Management measures to control wastes and other water quality factors
16. Map legend

[1] A basis of water right and relevant documentation shall be kept on site with the site map and monitoring records. Relevant documentation may include:

- A letter, or email from the State Water Board acknowledging that a statement has been filed with the State Water Board in support of a pre-1914 or riparian water right claim.
- A copy of an appropriative water permit, license, registration, or filed statement.
- A true and correct copy of an application, or other documentation verifying that an application has been submitted to the State Water Board to obtain such a right, permit, registration, or license.
- Explanation of why such documentation cannot be provided.

Note: Copies of documents may be downloaded from the State Water Board's Electronic Water Rights Information Management System (eWRIMS).

B. Monitoring Inspections:

Sites shall be inspected periodically to ensure conformance with standard conditions. Site inspections should include visual inspection of the site, including any management measures, to ensure they are being implemented and are functioning as expected. Inspections include photographic documentation of any controllable sediment discharge sites, as identified on the site map, and a visual inspection of those locations on the site where pollutants or wastes, if uncontained, could be transported into receiving waters, and those locations where runoff from roads or developed areas drains into or towards surface water. At a minimum, sites shall be inspected at the following times to ensure timely identification of changed site conditions and to determine whether implementation of additional management measures is necessary to prevent or minimize discharges of waste to surface water:

1. Before and after any significant alteration or upgrade to a given stream crossing, road segment, or other controllable sediment discharge site. Inspection should include photographic documentation, with photo records to be kept on site.
2. Prior to October 15 to evaluate site preparedness for storm events and stormwater runoff.
3. By December 15.
4. Following any rainfall event with an intensity of 3 inches precipitation in 24 hours Precipitation data can be obtained from the National Weather Service by entering the site zip code at http://www.srh.noaa.gov/forecast.

Note that Tier 2 Dischargers must include a monitoring element in their water resource protection plan that at a minimum provides for periodic inspection of the site, checklist to confirm placement and efficacy of management measures, and document progress on any plan elements subject to a time schedule. Tier 3 Dischargers must incorporate monitoring and reporting elements into their cleanup and restoration plans for approval by the Executive Officer.

II. Annual Reporting

The information in the following form must be submitted upon initial enrollment, and annually thereafter by March 31. The reported information shall be reflective of site conditions.

Enrollees shall submit this information either directly to the Regional Water Board or through an approved third party program.

The preferred method of submittal is electronically via e-mail to NorthCoast@waterboards.ca.gov or on disk (CD or DVD) in Portable Document Format (PDF) file in lieu of paper-sourced documents. The guidelines for electronic submittal of documents can be found on the Regional Water Board website at http://www.waterboards.ca.gov/northcoast.

If electronic submission is infeasible, hard copies may be submitted to: North Coast Regional Water Quality Control Board, 5550 Skylane Blvd. Suite A, Santa Rosa, CA 95403.

The Regional Water Board is developing a method for submittal of reporting information directly to the CIWQS Program Web site at http://www.waterboards.ca.gov/ciwqs/index.html. Information about this alternative submittal process will be made available on the North Coast Regional Water Board website at: http://www.waterboards.ca.gov/northcoast/water_issues/programs/cannabis/. Once this method is established, direct submittal to CIWQS will be available for enrollees and approved third party programs, and will become the preferred reporting mechanism.

✂ ---------- ✂ ---------- ✂ ----------

REPORTING FORM BEGINS ON NEXT PAGE. PLEASE COMPLETE AND SUBMIT THE REPORTING FORM UPON ENROLLMENT AND ANNUALLY THEREAFTER

Order No. R1-2015-0023
REPORTING FORM

A. Site WDID:_____

B. Subwatershed (HUC-12)[2]: _____

C. Enrollment date: _____

D. Reporting date: _____

E. Please check the box corresponding to the enrolled site's current tier (Tier 3 sites with cultivation must also check Tier 2).

☐ Tier 1 ☐ Tier 2 ☐ Tier 3

Has the site's tier status changed since the last reporting period? Y☐/N☐
If YES, briefly explain:_____

F. Check all fields that apply to the enrolled site:

i. Tier 1 sites:
(see Order at page 6 for details on Tier 1 characteristics)
- ☐ Average slope of each individual cultivation area is no more than 35% slope.
- ☐ Total cultivation area is no more than 5,000 square feet.
- ☐ No cultivation areas or associated facilities are located within 200 feet of a surface water. (Surface waters include wetlands and Class I, II, and III watercourses.)
- ☐ No surface water diversion from May 15 through October 31.
- ☐ The site is in compliance with all Standard Conditions under Order R1-2015-0023, section I.A.

ii. Tier 2 sites:

a. A Water Resource Protection Plan has been developed and is being implemented? Y☐/N☐

If NO, expected date when plan will be ready and implementation will begin:
_____

If YES, have there been changes to the implementation schedule since the prior year of reporting? Y☐/N☐

[2] 12-digit HUC-12 subwatershed codes are available online at http://iaspub.epa.gov/apex/grts/f?p=110:95:::NO::APP_SHOW_HIDE:

REPORTING FORM
Page 2/5

ii. Tier 2 sites continued:

b. Check below as to whether or not the site meets Standard Conditions under Order R1-2015-0023, section I.A. If a standard condition is not yet met, please indicate the expected date of compliance as identified in the Water Resource Protection Plan. Upon initial enrollment, provide an estimated expected date of compliance.

Standard Condition Met	If NO, expected date of compliance
1. Site maintenance, erosion control, and drainage features Y☐/N☐	
2. Stream crossing maintenance Y☐/N☐	
3. Riparian and wetland protection and management Y☐/N☐	
4. Spoils management Y☐/N☐	
5. Water storage and use Y☐/N☐	
6. Irrigation runoff Y☐/N☐	
7. Fertilizers and soil amendments Y☐/N☐	
8. Pesticides and herbicides Y☐/N☐	
9. Petroleum products and other chemicals Y☐/N☐	
10. Cultivation-related wastes Y☐/N☐	
11. Refuse and human waste Y☐/N☐	

c. All management measures are being implemented as part of the Water Resource Protection Plan? Y☐/N☐

If YES, do management measures appear to be effective in preventing and minimizing discharges of waste to surface water? Y☐/N☐

If management measures do not appear to be effective, are additional measures being implemented iteratively to prevent and minimize discharges of waste to surface water? Y☐/N☐

If NO, describe management measures or practices that have not been effective in preventing and minimizing discharges of waste to surface water, if applicable. Describe plans for new or additional management measures to prevent and minimize discharges of waste, if applicable. Attach additional sheets as necessary.

REPORTING FORM
Page 3/5

d. Will work to bring site into compliance with Standard Conditions require disturbance to a stream or wetland over the coming year? Y☐/N☐

If YES, indicate status of work authorization by Regional Water Board. Specifically, check one or more of the following and provide the date if/as applicable.

☐ I plan to submit my project plans to the Regional Water Board by the following date:_____

☐ I submitted my project plans to the Regional Water Board on the following date:_____

☐ The Regional Water Board Executive Officer authorized my project plans on the following date:_____

☐ I have elected to receive authorization for instream work under a different Regional Water Board permitting mechanism as follows:
_____

☐ Instream work anticipated to occur between the following dates: _____

iii. Tier 2* sites:

Total cultivation area is less than 10,000 square feet? Y☐/N☐

Water resource protection plan developed and fully implemented? Y☐/N☐

All Standard Conditions met? Y☐/N☐

Site was inspected and verified as Tier 2* by Regional Water Board staff (NAME)_____ or approved third party program (NAME): _____ on (DATE) _____.

iv. Tier 3 Sites:

☐ A Cleanup and Restoration Plan has been submitted to the Regional Water Board for approval.

☐ The Cleanup and Restoration Plan has been approved by the Regional Water Board.

☐ The timeline for the approved Cleanup and Restoration plan is being followed.

Will restoration work require disturbance to a stream or wetland in the coming year? Y☐/N☐

Instream work anticipated to occur between the following dates:_____

☐ Cannabis cultivation is occurring or will occur on the site over the coming year. (If this box is checked, ensure that Tier 2 portions of the reporting form are completed as well).

REPORTING FORM
Page 4/5

v. For All Sites:

Annual Reporting Period (Calendar Year), or CHECK HERE ☐ if this is the report accompanying initial enrollment.

0	1	0	1			TO	1	2	3	1		
Month/Day/Year							Month/Day/Year					

(See Order at page 6 for details regarding cultivation area and slope measurements, and watercourse definitions).

Total cultivation area (square feet)	
Distance to surface waters (feet) from nearest edge of each cultivation area or associated facility. Provide distance measurement for each cultivated area separately, as appropriate.	
Average slope (percent slope) of each cultivated area List each cultivated area separately, as appropriate.	
Total number of road crossings of surface waters Surface waters include wetlands and Class I, II, or III watercourses.	
Annual soil amendment and chemical use (pounds or gallons). Total mass and/or volume of soil amendment and/or chemical usage by type, product name, and nutrient content such as N-P-K ratio, if applicable.*	
Total water storage capacity (gallons or acre feet)	

Total surface water diversion by month (gallons or acre feet)*

Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Water input to storage by source and month (gallons or acre-feet) Report water volume input to storage, listing each source separately. This may include inputs from rainfall catchment, surface water diversions, groundwater pumping, or water delivery. If water is delivered, list delivery date, delivery volume, and name and address of water purveyor.*

Source	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec

Water use by source and month (gallons or acre feet) Report water volume used, listing each source separately. This may include use of stored water, immediate use of pumped groundwater, diverted surface water, or delivered water. If water is delivered, list delivery date, delivery volume, and name and address of water purveyor*

Source	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec

* Upon initial enrollment only, a best estimate is acceptable for reporting annual soil amendment and chemical use, monthly water stored, and monthly water use. Attach additional sheets if more space is needed for your responses.

REPORTING FORM
Page 5/5

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. The information contained in this document and all attachments is, to the best of my knowledge and belief, true, accurate, and complete.

Print name: _____

Signature: _____ **Date:** _____

Preparer: Complete if MRP was prepared by someone other than the discharger, including an approved third-party

Organization Name (if applicable):

Prepared by:
First Name, Middle Initial

Last Name

Preparer Address:
Street

City

State ZIP

Phone Number:

Email:

TIER 2 SURFACE WATER CORRECTION WORKPLAN REQUIREMENTS FOR COVERAGE OF REMEDIATION AND RESTORATION WORK IN STREAMS AND WETLANDS UNDER WAIVER OF WASTE DISCHARGE REQUIREMENTS ORDER NUMBER R1-2015-0023

In order to obtain authorization, enrollees under Order No. R1-2015-0023 with restoration or remediation work in streams or wetlands identified in Tier 2 water resource protection plans shall submit the following information and any applicable fees according to the California Code of Regulations, title 23, section 2200 (a)(3),[1] at least 60 days prior to proposed work. No work shall be performed without prior authorization. Alternatively, enrollees may elect to obtain coverage for remediation or restoration work in streams or wetlands from the Regional Water Quality Control Board, North Coast Region, under an individual or other general Order. Information on the Clean Water Act Section 401 Water Quality Certification program and the application packet are available on the Regional Water Board's website at:
http://waterboards.ca.gov/northcoast/water_issues/programs/water_quality_certification.shtml

CHECKLIST OF REQUIRED ELEMENTS:

- ☐ **Site Address and Latitude / Longitude**
- ☐ **Property Owner & Project Proponent Name, Address, and Contact Information**
- ☐ **Licensed professional consultant and contractor Name, Address, and Contact information**
- ☐ **Detailed Project Description**
  - ☐ Proposed Schedule: Start & Completion Dates
  - ☐ Site Map Including Locations of Proposed Work
  - ☐ Erosion Control / Construction BMPs
  - ☐ Design Specifications
  - ☐ Calculations
- ☐ **Project Purpose and Final Goal**
- ☐ **Receiving Waters Identified**
- ☐ **Other Relevant Local, State and Federal Permits (CDFW Lake and Streambed Alteration Agreement and Army Corps of Engineers 404)**
- ☐ **Acreage and/or Linear Feet Impacted (Permanent or Temporarily)**
  - ☐ **Type of Waterbody (Wetland, Creek, Spring/Seep, Etc.)**
  - ☐ **Use of Avoidance, Minimization or Mitigation Measures**
- ☐ **Mitigation Proposal** (total areas and types of waters restored, created etc.)
  - ☐ Planting plan
  - ☐ Monitoring Plan

[1] Correction work in streams or wetlands can be considered enforcement actions similar to Tier 3 cleanup work required pursuant to Water Code section 13304. In some enforcement cases the Army Corps of Engineers (ACE) may consider alternatives to requiring an after-the-fact dredge and fill permit pursuant to the Clean Water Act section 404, such as voluntary restoration at the site or an order requiring completion of initial corrective measures to alleviate any imminent adverse impacts to aquatic resources. In the event that the ACE does assert its Clean Water Act 404 jurisdiction, water quality certification is required, along with applicable fees.

- ☐ Success Criteria
- ☐ Reporting
- ☐ Comparable Habitat/Type/Size/Function
- ☐ Temporal Loss Accounted For

OTHER PLAN ELEMENTS MAY BE REQUIRED AT THE DISCRETION OF THE EXECUTIVE OFFICER AND DEPENDING ON OTHER AGENCY DETERMINATIONS.

Appendix D_Instream Correction Workplan Requirements

LEGAL PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWERS IN CALIFORNIA

PESTS OF MARIJUANA IN CALIFORNIA

Marijuana pests vary according to cultivar (variety), whether the plants are grown indoors or outdoors, and where the plants are grown geographically. The pests included in this review are based on two sources: a presentation given in 2013 by Whitney Cranshaw, an extension entomologist at Colorado State University, and a review article by John M. McPartland, a professor of family medicine at the University of Vermont.

HOW TO INTERPRET THE TABLES

Table 1 lists active ingredients not illegal to use on marijuana and the pests that these active ingredients target.

These active ingredients are exempt from **residue tolerance requirements**[1] *and* either exempt from **registration requirements**[2] or registered for a use that's broad enough to include use on marijuana. Residue tolerance requirements are set by U.S. EPA for each pesticide on each food crop and is the amount of pesticide residue allowed to remain in or on each treated crop with "reasonable certainty of no harm." Some pesticides are exempted from the tolerance requirement when they're found to be safe. Some of these pesticides are bacterial-based insect pathogens (e.g., *Bacillus thuringiensis*) or biofungicides (e.g., *Bacillus subtilis*, *Gliocladium virens*).

Active ingredients exempt from registration requirements are mostly food-grade essential oils such as peppermint oil or rosemary oil.

Tables 2 and 3 list pests of marijuana grown outdoors and indoors, and **Table 3** shows pests arranged by the portion of the plant they attack. An explanation of the column labels for Tables 2 and 3 follow.

PESTS. The tables show the most likely pests in California based on Cranshaw's presentation and McPartland's list and gleaned from California-based web sites and blogs. Some pests that drew attention on several blogs (e.g., hemp russet mite) may be worse during drought years. Many have cyclic population fluctuations and others are mainstays of general greenhouse cultivation (e.g., whiteflies, thrips, and fungus gnats). We'll add weeds to this compendium when we have more information.

DAMAGE. For damage caused by greenhouse pests, we derived information from Cranshaw's presentation; for that of outdoor pests when there wasn't any overlap, McPartland's list was used and information from UC IPM for various crops. Accounts of damage by rodents is anecdotal.

IPM PRACTICES. Most of these are standard practices for pests on hosts other than marijuana. For more detailed explanations, see information compiled by the University of California Statewide IPM Program (UC IPM) at www.ipm.ucdavis.edu. You can enter a pest name in the search box (e.g., cutworm) and read about IPM practices for the pest on crops other than marijuana. For marijuana grown indoors, go to the UC IPM home page, click on Agricultural Pests and scroll down the alphabetical list until you reach ornamental nurseries.

Some practices were excluded because they apply to nearly all of the pests. For example, when targeting aphids, whiteflies, and thrips, growers can attract predaceous and parasitic arthropods by planting cover crops (e.g., California buckwheat) and insectary plants—especially those in the carrot, mustard, and sunflower families.

LEGAL PESTICIDES. These are covered above in the Table 1 description and are exempt from **residue tolerance requirements** *and* either exempt from **registration requirements** or registered for a use that is broad enough to include use on marijuana.

Table 4 shows marijuana pests by plant part. Not all of these pests are important, but their collective damage may affect the overall health of the plant.

REFERENCES

Cranshaw, Whitney. 2013. Challenges and opportunities for pest management of medical marijuana in Colorado. Presentation.

McPartland, J.M. 1996. *Cannabis* pests. J. Internatl. Hemp Assoc. 3(2): 49, 52–55.

[1] 40 CFR (Code of Federal Regulations)
[2] under FIFRA section 25(b) and 3 CCR section 6147

Table 1. Active ingredients that are exempt from residue tolerance requirements[a] and either exempt from registration requirements[b] or registered for a use broad enough to include use on marijuana.

ACTIVE INGREDIENT	PEST OR DISEASE
azadirachtin[a]	aphids, whiteflies, fungus gnats, leafminers, cutworms
Bacillus subtilis QST[a1]	root diseases, powdery mildew
Bacillus thuringiensis[a2] subsp. *aizawai* or *kurstaki*	moth larvae (e.g., cutworms, budworms, hemp borer)
Bacillus thuringiensis[a2] subsp. *israelensis*	fly larvae (e.g., fungus gnats)
Beauveria bassiana[a3]	whiteflies, aphids, thrips
cinnamon oil[b]	whiteflies
Gliocladium virens[a1]	root diseases
horticultural oils[a] (petroleum oil)	mites, aphids, whiteflies, thrips; powdery mildew
insecticidal soaps[a] (potassium salts of fatty acids)	aphids, whiteflies, cutworms, budworms
iron phosphate[a]; sodium ferric EDTA[a]	slugs and snails
neem oil[a]	mites; powdery mildew
potassium bicarbonate[a]; sodium bicarbonate[a]	powdery mildew
predatory nematodes[a]	fungus gnats
rosemary + peppermint essential oils[b]	whiteflies
sulfur[a]	mites, hemp flea beetles
Trichoderma harzianum[a1]	root diseases

[a] 40 CFR (Code of Federal Regulations)

[b] FIFRA §25(b) and 3 CCR §6147 [FIFRA = the Federal Insecticide, Fungicide, and Rodenticide Act; CCR = California Code of Regulations]

[1] Biofungicides

[2] Bacterial-based insect pathogen

[3] Fungal-based insect pathogen

Table 2. PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWN OUTDOORS

PEST	DAMAGE	IPM PRACTICES (monitoring; cultural, physical, mechanical, biological)	PESTICIDES
MITES & INSECTS			
two-spotted spider mites *Tetranychus urticae*	Suck plant sap; stipple **leaves**	▪ Keep dust down by hosing off plants (if dust is a problem) ▪ Release predatory mites	neem oil, horticultural oil, sulfur
hemp russet mites *Aculops cannabicola*	Suck plant sap; kill **leaves** and **flowers**	▪ Release predatory mites	neem oil, horticultural oil, sulfur
crickets (field & house) *Gryllus desertus, G. chinensis, Acheta domesticus*	Eat **seedlings**	▪ Use floating row covers or cones on individual plants	—
termites	Eat **roots**	▪ Flood nests	—
leafhoppers	Suck plant sap; weaken plants	▪ Encourage natural enemies by planting nectar sources	horticultural oil or insecticidal soaps for nymphs
aphids *Phorodon cannabis, Myzus persicae, Aphis fabae*	Suck plant sap; weaken plants *P. cannabis* (bhang aphid) vectors tobacco mosaic virus	▪ Hang up yellow sticky cards (alates) ▪ Hose off plants	azadirachtin, horticultural oil, insecticidal soaps, *Beauveria bassiana*
whiteflies *Trialeurodes vaporariorum, Bemisia tabaci, B. argentifolii*	Suck plant sap; weaken plants	▪ Hang up yellow sticky cards ▪ Reflective plastic mulch	azadirachtin, horticultural oil, insecticidal soaps, rosemary + peppermint oils, *Beauveria bassiana*
leafminers *Liriomyza* spp.	Bore into **roots** and **leaves**	▪ Remove older infested leaves ▪ Use biocontrol: release *Diglyphus* parasitoids	azadirachtin

PEST		DAMAGE	IPM PRACTICES (monitoring; cultural, physical, mechanical, biological)	PESTICIDES
LEPIDOPTERA	**cutworms** *Agrotis ipsilon, A. segetum, Spodoptera litura, S. exigua, Mamestra brassicae* (Noctuidae)	Eat **seedlings**	▪ Use pheromone traps to detect adults. ▪ Remove weeds, which serve as a reservoir for cutworms and other noctuids	Vegetative stage only: Use *Bacillus thuringiensis kurstaki* if egg-laying adults found, insecticidal soap; azadirachtin
	budworms *Helicoverpa armigera, H. zea* (Noctuidae)	Eat flowering **buds**	▪ Shake plants to dislodge larvae ▪ Remove infested buds ▪ Plant corn as trap crop	Vegetative stage only: Use *Bacillus thuringiensis kurstaki*, insecticidal soap
	hemp borers (= hemp moth) *Grapholita delineana* (Tortricidae)	Bore through **stalks** (caterpillars)	▪ Plow crop under in fall; remove plants still standing; remove nearby hemp and hop plants ▪ Use light traps at night for monitoring ▪ Use biocontrol: *Trichogramma*	*Bacillus thuringiensis kurstaki*
COLEOPTERA	**hemp flea beetles** *Psylliodes attenuata* (Chrysomelidae)	Bore into **stems** (grubs); feed on seedlings and **leaves** of larger plants (beetles)	▪ Use reflective mulches ▪ Plant trap crops (e.g., radish or Chinese mustard)	sulfur
	scarab grubs (possibly other beetles)	Bore into **stems**	▪ Use parasitic nematodes	—
MAMMALS				
mice (e.g., house mice)		Eat **young sprouts** and **seeds**	▪ Double wrap a 3'-tall chicken wire fence around plants ▪ Trap (minus rodenticides) ▪ Mount barn owl boxes	Rodenticides (see footnote below)
roof rats, *Rattus rattus* **wood rats**, *Neotoma* spp.		Strip bark from **stems** to build nests		
pocket gophers, *Thomomys* spp.		Tunnel through planting areas; feed on plants; gnaw on irrigation lines	▪ Install underground fencing (hardware cloth or ¾" mesh poultry wire) ▪ Mount barn owl boxes	
Columbian black-tailed deer, *Odocoileus hemionus columbianus*		Knock over plants; leave dander, droppings, and ticks behind	▪ Install deer fencing	—
black bears, *Ursus americana*		Knock over plants	▪ Install electric fencing	—

Rodenticides that are not DPR-restricted materials or federally restricted use pesticides *and* are registered for a broad enough use to include use in or around marijuana cultivation sites. If using a rodenticide always read and follow the label and check to make sure that the target rodent is listed. Second-generation anticoagulant products are DPR-restricted materials not labeled for field use and as such, should never be used in or around marijuana cultivation sites.

Table 3. PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWN INDOORS
(e.g., greenhouses, sheds, and grow rooms)

PEST	DAMAGE	IPM PRACTICES (monitoring; cultural, physical, mechanical, biological)	PESTICIDES
DISEASES			
powdery mildew *Sphaerotheca macularis*	Grow on **leaves** as white and gray powdery patches	▪ Use fans to improve air circulation	horticultural oil; neem oil; sodium bicarbonate, potassium bicarbonate; *Bacillus subtilis*
pythium root rots *Pythium* spp.	Attack root tips and worsens when plants grow in wet soil	▪ Avoid hydroponic production or wet soil conditions	Incorporate biocontrol agents into root-growing media (e.g., *Gliocladium virens, Trichoderma harzianum, Bacillus subtilis*)
MITES & INSECTS			
two-spotted spider mite *Tetranychus urticae*	Suck plant sap; stipple **leaves**	▪ Disinfest cuttings before introducing to growing area ▪ Release predatory mites	neem oil, horticultural oil, sulfur
leafhoppers	Suck plant sap; weaken plants	▪ Encourage natural enemies by planting nectar sources	horticultural oil or insecticidal soaps for nymphs
whiteflies *Trialeurodes vaporariorum, Bemisia tabaci, B. argentifolii*	Suck plant sap; weaken plants	▪ Hang up yellow sticky cards ▪ Use biocontrol: *Encarsia formosa*	azadirachtin, *Beauveria bassiana*, cinnamon oil, horticultural oil
thrips *Heliothrips haemorrhoidalis, Frankliniella occidentalis, Thrips tabaci*	Stipple **leaves** and vector viruses	▪ Hang up yellow or blue sticky cards	
dark-winged fungus gnats (Diptera: Sciaridae) *Bradysia* spp.	Damage **roots** and stunt plant growth	▪ Avoid overwatering ▪ Use growing media that deters gnat development ▪ Hang up yellow sticky cards ▪ Use biocontrol: soil-dwelling predatory mites	*Bacillus thuringiensis israelensis* (BTI); predatory nematodes; azadirachtin soil drenches

Table 4. PESTS OF MARIJUANA BY PLANT PART

Seedlings	Flower & Leaf (grown outdoors)	Flower & Leaf (grown indoors)	Stalk & Stem	Root
cutworms	hemp flea beetle	spider mites	hemp borer	hemp flea beetle
birds	hemp borer	aphids	rats	white root grubs
hemp flea beetle	budworms	whiteflies		root maggots
crickets	leafminers	thrips		termites & ants
slugs		leafhoppers		fungus gnats
rodents				wireworms

PESTICIDE USE ON MARIJUANA

The following is being provided for informational purposes only and does not authorize, permit, endorse, or in any way approve the use, sale, cultivation, or any other activity associated with marijuana. Any such activity is subject to prosecution under federal law.

PESTICIDE REGISTRATION REQUIREMENTS

- Pesticides must be registered by both the U.S. Environmental Protection Agency (U.S. EPA) and the California Department of Pesticide Regulation (DPR) before they can be sold and used in California.
- There are no pesticides registered specifically for use directly on marijuana and the use of pesticides on marijuana plants has not been reviewed for safety or human health effects.
- Under California law, the only pesticide products not illegal to use on marijuana are those that contain an active ingredient that is exempt from residue-tolerance requirements (*See* Attachment); and
  - Registered and labeled for a use that is broad enough to include use on marijuana (e.g. unspecified green plants); or
  - Exempt from registration requirements as a minimum risk pesticide under FIFRA section 25(b) and 3 CCR § 6147. (FAC §§ 12973, 12995; 3 CCR § 6490.)

PESTICIDE USE REQUIRMENTS

- Before using any pesticide, ALWAYS read and follow the pesticide label. **The label is the law**
- If you apply pesticides to a field, you must obtain an operator identification number from the County Agricultural Commissioner and submit monthly pesticide use reports to that office. (FAC § 11408; 3 CCR § 6622; 3 CCR § 6627.) Note: No operator identification number will be issued in any local jurisdiction that prohibits marijuana cultivation.
- U.S. EPA designates certain pesticide products as federally "Restricted Use" products when they determine those products may cause unreasonable adverse effects even when used as directed on the product labeling. Restricted Use pesticides are limited to use by certified applicators, or to those under the supervision of a certified applicator.
- DPR designates certain pesticide active ingredients as California "Restricted Materials" when they determine those pesticides are especially hazardous to human health or the environment. Restricted Materials require a permit issued by the County Agricultural Commissioner. Permits will not be issued for marijuana cultivation sites. (FAC § 14001, et seq.; 3 CCR § 6400.)
- Employers must protect their workers from exposure to pesticides. State law requires that employers follow the pesticide label and:
  - Provide required personal protective equipment;
  - Provide required training and access to pesticide labels and safety information; and
  - Properly store, handle, and dispose of pesticides.

(*See* Compliance Assistance Booklet; 3 CCR § 6670, et seq.; 3 CCR § 6700, et seq.; < http://www.cdpr.ca.gov/docs/enforce/cmpliast/bkltmenu.htm >.)

RODENTICIDE USE

- Rodenticides that are designated as California Restricted Materials cannot be used; and those that are only designated as federally Restricted Use products can only be used by a certified commercial applicator. See Above.
- There are some rodenticides labeled for below ground applications that are not designated as California Restricted Materials or federally Restricted Use pesticides that can be used if consistent with the label.
- The following rodent repellants may be used in and around marijuana cultivation sites consistent with the label:
  - Capiscum Oleoresin
  - Garlic
  - Putrescent Whole Egg Solids

ATTACHMENT H. WATERBOARD ENROLLMENT DOCUMENTS

ENROLLMENT NOTICE OF INTENT FORM
FOR
WAIVER OF WASTE DISCHARGE REQUIREMENTS
ORDER NUMBER R1-2015-0023

Submission of this Notice of Intent (NOI) to the North Coast Regional Water Quality Control Board (Regional Water Board) or an approved third party constitutes notice that a discharger, identified in Section I of this form, requests and receives authorization to discharge pursuant to the Waiver of Waste Discharge Requirements Order number R1-2015-0023. Upon submittal of the NOI, waste discharges are authorized pursuant to the conditions of the Order. Order coverage is required for existing Tier 1, 2, and 3 cultivation sites by February 15, 2016. Dischargers who begin operations after the effective date of this Order must file an NOI prior to commencement of cultivation operations.

To obtain authorization, dischargers must submit a complete and accurate NOI form, encompassing sections I and II, as well as complete the MRP in Appendix C of the Order. Any additional documentation required by the Order, such as a water resource protection plan, must be completed and secured on-site, to be made available upon inspection by the Regional Water Board. This NOI form must be submitted upon enrollment and the discharger shall amend and resubmit the NOI within 30 days if there is a change in Tier status based upon changed site conditions.

Completed forms shall be signed and submitted to the Regional Water Board or an approved third party.

Forms submitted to the Regional Water Board shall be submitted electronically to northcoast@waterboards.ca.gov. If electronic submission is infeasible, hard copies can be submitted to: North Coast Regional Water Quality Control Board 5550 Skylane Boulevard, Suite A, Santa Rosa, CA 95403.

I. Discharger Information

First Name, Middle Initial

TRISTAN

Last Name

STRAUSS

Mailing Address:

Street

PO BOX 38

City

SAMOA

State: CA ZIP: 95564

Phone Number:

707 - 601 - 6070

Email:

tristanmstrauss@gmail.com

II. Site Information

Site Address:

Street

1	2	0	1	9		W	I	L	D	E	R		R	I	D	G	E		R	D										

City

W	H	I	T	E	T	H	O	R	N																					

State ZIP

C	A		9	5	5	8	9

Assessor's Parcel Number (APN)

1	0	8	0	1	2	1	0																							

Please check the Box from the following options to state which Tier you are registering as:

☐ Tier 1 ☒ Tier 2 ☐ Tier 3

Under Tier 2, water resource protection plans must be developed within 180 days of submittal of this NOI form. Under Tier 3, cleanup and restoration plans must be submitted to the Regional Water Board within 45 days of submittal of this NOI form.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. The information contained in this document and all attachments is, to the best of my knowledge and belief, true, accurate, and complete. I agree to monitor my site in compliance with the Waiver Monitoring and Reporting Program; complete Sections I and II, above; keep the NOI, the annual monitoring and reporting documents and, if applicable, the water resource protection plan and cleanup and restoration plan document(s) on site, and make them available to Water Board staff upon request.

If there is a change in Tier status based on changed site conditions, the changes must be documented, appended to this document, and resubmitted to either the Regional Water Board or, if applicable, an approved third party.

Print name: TRISTAN STRAUSS

Signature: _____ **Date:** 2/17/16

MONITORING AND REPORTING PROGRAM
FOR
WAIVER OF WASTE DISCHARGE REQUIREMENTS
ORDER NUMBER R1-2015-0023

This form must be submitted to the Regional Water Board or approved third party program upon initial enrollment in the Order (NOI) and annually thereafter by March 31.

Forms submitted to the Regional Water Board shall be submitted electronically to northcoast@waterboards.ca.gov. If electronic submission is infeasible, hard copies can be submitted to: North Coast Regional Water Quality Control Board, 5550 Skylane Boulevard, Suite A, Santa Rosa, CA 95403.

Monitoring

Site Map (to be kept onsite):

Please create legible map(s) identifying the following items where applicable. You may need to use a full-page satellite map (e.g. Bing, Google, or similar) and one or more additional maps at appropriate scales:

1. Site topography
2. Perimeter of land owned
3. Perimeter of land leased
4. Buildings with use identified
5. Storage locations of chemicals used, if any (i.e. fertilizer, pesticide, petroleum)
6. Production area(s) perimeter (e.g. Cultivation areas, greenhouses)
7. Cleared and developed areas
8. Surface watercourses and water conveyances (e.g. ditches, piping)
9. Drainage patterns & flow path directions
10. Roads, including specific markings for all stream crossings
11. Features scheduled for upgrade, cleanup, remediation, and restoration
12. Points of diversion of water sources
13. Locations of water pumps and associated facilities
14. Water storage type and location (storage tanks, ponds, bladders)
15. Unstable features
16. Human waste facilities (e.g. septic tanks and leach fields, privy, composting toilet)
17. Map legend

General Requirements for Monitoring:

Monitoring of the site includes visual inspection and photographic documentation of each feature of interest listed on the site map, with new photographic documentation recorded with any notable changes to the feature of interest. At a minimum, all site features must be monitored annually, to provide the basis for completion of the annual re-certification process. Additionally, sites shall be monitored at the following times to ensure timely identification of changed site conditions and to determine whether implementation of additional management measures is necessary to iteratively prevent, minimize, and mitigate discharges of waste to surface water: 1) just prior to October 15 to evaluate site

preparedness for storm events and stormwater runoff, 2) following the accumulation of 3" total precipitation or by November 15, whichever is sooner, and 3) following any rainfall event with an intensity of 3" precipitation in 24 hours. Precipitation data can be obtained from the National Weather Service Forecast Office (e.g. by entering the zip code of the parcel location at http://www.srh.noaa.gov/forecast).

Reporting

I. Site Information

CIWQS ID:

Please check the Box from the following options to state which Tier your site is enrolled and reporting as:

☐ Tier 1 ☒ Tier 2 ☐ Tier 3

Total cultivation area[1] (square feet)	>5000 ft2
Distance[2] of closest cultivation area or associated facility to surface waters (i.e. wetland, Class I, II, or III streams)[3] (feet)	NA
Average slope of[4] the cultivation area on parcel (percent slope or degrees) (list each cultivated area separately)	<35%
Total number of stream crossings on parcel	NA
Average amount of fertilizer used per season listed individually by N-P-K value (pounds)	NA
Total surface water diversion volume by month (gallons or acre feet)	NA
Total water used per month from each source with specific source listed separately (e.g. rainfall catchment, surface water, groundwater well, water hauler[5])	NA
Total amount of utilized water storage capacity by type (e.g. pond, storage tank, bladder)	NA

*Attach additional sheets if more space is needed for your responses.

[1] Cultivation area: the areal measurement of the perimeter of cannabis cultivation or operations with similar environmental effects.

[2] As measured along the ground surface between the nearest stream bank or wetland and nearest edge of cultivation area or associated facility.

[3] See footnote 8 of the Order for definitions.

[4] Slopes shall be measured as the natural slopes of the cultivation area; if the cultivation area has been terraced, the slope shall be calculated as the average of the up and down gradient slopes.

[5] Include name and address of water purveyor, and specific dates and amounts of delivery.

For Tier 1 sites, answer the following questions (Note: signature below constitutes self-certification requirement described in Finding 32 of the Order):

Does your site meet all Tier 1 characteristics under Order R1-2015-0023, finding 17?

☐ Cultivation area ≤ 5000 square feet.
☐ Average Slopes ≤ 35%; measured as natural slopes in the cultivation area unless terraced then the average of the up and down gradient slopes.
☐ No surface water diversion from May 15 through October 31.
☐ Distance of closest cultivation area to surface water is no less than 200 feet.

Does your site meet all Standard Conditions under Order R1-2015-0023, I.A.?

☐ Compliance with all standard conditions

Enforcement Warning: Be advised that the Order requires that Tier 1 sites meet these characteristics and conditions. Tier 1 enrollment of a site not meeting the specified characteristics or conditions represents noncompliance with the Order and is subject to administrative enforcement.

For Tier 2 sites, answer the following questions:

Has a water resource protection plan been developed[6]? Yes ☐ No ☒
Is the site in compliance with all standard conditions in the Order? Yes ☐ No ☒
If answered no, has a timeline been established to bring the site into compliance with the standard conditions? Yes ☐ No ☒
If answered yes, have there been changes to the implementation schedule since the prior year of reporting? Yes ☐ No ☐
Are all management measures that are being implemented effective to prevent, minimize, and mitigate discharges of waste to surface water? Yes ☐ No ☒
If answered no, are additional measures being implemented iteratively to prevent, minimize, and mitigate discharges of waste to surface water? Yes ☐ No ☒
How many inspections of the site have occurred within the last calendar year? 0 by whom?_____
Describe the results of monitoring performed to ensure that BMPs are implemented and effective and include photo documentation of any ineffective BMPs and associated fixes: (Attach additional sheets as necessary.)

No monitoring has been conducted as of this initial filing.

[6] Water resource protection plans must be developed within 180 days of submittal of the Notice of Intent form (Appendix A of the Order).

Has an inventory of controllable sediment discharge sources (CSDS) been completed? Yes ☐ No ☒
Has a prioritization of controllable sediment discharge sources been completed? Yes ☐ No ☒
Has an implementation schedule for corrective action for each CSDS of controllable sediment discharge sources been completed? Yes ☐ No ☒
Has the site been inspected according to the plan to evaluate effectiveness of corrective action? Yes ☐ No ☒
Did the inspections identify any areas where corrective action was not effective? Yes ☐ No ☒
If yes, describe and provide photo documentation of the ineffective corrective action and the fix: (Attach additional sheets as necessary.)

No inventory has been conducted. No monitoring has been conducted as of this initial filing.

For Tier 3 Sites, answer the following questions:

Has a Cleanup and Restoration Plan been submitted to the Regional Water Board for approval[7]? Yes ☐ No ☒
If answered yes, is the timeline for the plan being followed? Yes ☐ No ☐
Are management measures that are being implemented effective? Yes ☐ No ☐

For All Sites:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision. The information contained in this document and all attachments is, to the best of my knowledge and belief, true, accurate, and complete. I agree to monitor my site in compliance with this Monitoring and Reporting Program, complete the checklist, above, maintain update-to-date monitoring records on site, maintain record of changes to proposed schedules (as applicable), and make it available to Water Board staff upon request.

If there is a change in Tier status based upon changed site conditions, the changes must be documented, appended to this document, and resubmitted to either the Regional Water Board or an approved third party.

Print name: TRISTAN STRAUSS

Signature: _____ **Date:** 2/17/16

[7] Cleanup and Restoration plans must be submitted to the Regional Water Board within 45 days of submittal of Notice of Intent form (Appendix A of the Order).

Preparer: Complete if MRP was prepared by someone other than the discharger, including an approved third-party

Organization Name (if applicable):

Manhard Consulting

Prepared by:

First Name, Middle Initial

Tyler S

Last Name

Ledwith

Preparer Address:

Street

611 Street Suite A

City

Eureka

State ZIP

CA 95501

Phone Number:

707 - 444 - 3800

Email:

tledwith@manhard.com