SITE MANAGEMENT PLAN

In fulfillment of
Order WQ 2017-0023-DWQ

General Waste Discharge Requirements and Waiver of Waste Discharge Requirements for Discharges of Waste Associated with Cannabis Cultivation Activities

Prepared for:

Maromo, LLC

and
State Water Resources Control Board

Prepared by:

NORTHPOINT
CONSULTING GROUP, INC.

Britney Newby
Environmental Scientist II
Britney@northpointeureka.com
(707) 798-6438

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INTRODUCTION

Effective June 24, 2019, Maromo, LLC ("Discharger") enrolled with the State Water Resources Control Board (SWRCB) for cannabis cultivation activities classified as Tier 1, Low Risk under Order No. WQ 2017-0023-DWQ *General Waste Discharge Requirements and Waiver of Waste Discharge Requirements for Discharges of Waste Associated with Cannabis Cultivation Activities* ("Order"). This Site Management Plan (SMP) has been developed to satisfy conditions of the Tier 1 enrollment requirements in the Order. The purpose of the Order is to implement the requirements for waste discharges associated with cannabis cultivation as described in SWRCB's *Cannabis Cultivation Policy – Principles and Guidelines for Cannabis Cultivation* ("Policy"). The Policy provides a structure for managing water quality and instream flow impacts associated with cannabis cultivation. It also establishes criteria for personal use and site conditional exemptions and includes a tiered approach for permitting discharges of waste. All eligible dischargers developing land for cannabis cultivation activities are required to enroll in the program under the Order. Dischargers must implement Best Practical Treatment or Control (BPTC) measures and submit technical and monitoring reports to assure compliance with the Order. The SMP describes how the discharger is complying with the applicable BPTC measures listed in the Policy and how they are being implemented property wide.

SITE INFORMATION

Discharger: Maromo, LLC
P.O. Box 93
Honeydew, CA 95545

Site Address: 2250 Wilder Ridge Rd.
Honeydew, CA 95545

County: Humboldt

WDID: 1B170015CHUM

Parcel: Assessor Parcel Number: 107-144-020 ("lower" parcel)
107-144-021 ("upper" parcel)

Lat/Long: 40.2138°, -124.1154° (lower)
40.2083°, -124.1133° (upper)

Size: 86 acres (lower) (*Humboldt County WebGIS*)
65 acres (upper)

USGS 7.5' Quad: Name: Honeydew

APN 107-144-020: T3S R1E, NW ¼ of NW ¼ of Sec. 18
APN 107-144-021: T3S R1E, SE ¼ of NW ¼ of Sec. 18

Zoning: General Plan: APN 107-144-020 - Residential Agriculture (RA40-160);
APN 107-144-021 - Residential Agriculture & Timberland (RA40-160; T)

Zone: APN 107-144-020 - Agriculture Exclusive with Building Site & Unclassified [AE-B-5 (40); (U+)];
APN 107-144-021 - Timber Production Zone & Unclassified (TPZ; U)

Disturbed Area: Approximately 0.53 acres

Location: The project site is in the town of Honeydew, approximately 65 miles south of Eureka. To reach the site from Eureka, travel on highway 101-S for 41 miles, take exit 663, and turn right onto Mattole road. Travel on Mattole road for 23 miles, cross the Mattole river, and continue straight onto Wilder Ridge road. The subject property is approximately 2 miles further on the right.

SITE DESCRIPTION

Environmental Setting and Site Overview

The project site is in the shadow of the King Range within the temperate montane Northern California Coast ecoregion. The sub-watershed is Honeydew Creek (HUC-12 #180600100703) and the land cover mainly consists of evergreen and mixed forest species such as Douglas fir, tanoak, and Pacific madrone. A Class I tributary to the Mattole River, Honeydew Creek, originates in the King Range, a National Conservation Area, and flows northeast through the lower parcel, APN 107-144-020.

The soils of the mountain slopes on the upper parcel consist mostly of well-drained gravelly loam soils. They are derived from sandstone/mudstone colluvium parent material within Map Unit #5505, the Crazycoyote-Sproulish-Canoecreek complex, 30-50% slopes (NRCS Web Soil Survey). The alluvium on the lower parcel consists of moderately well-drained, gravelly loam soils of Map Unit #151, the Parkland-Garberville complex, 2-9% slopes. The topography ranges from 440 ft. along Honeydew creek to approximately 1,000 ft. on the upper parcel.

Honeydew Creek is home to culturally and ecologically important and threatened fish species like steelhead (*Oncorhynchus mykiss irideus*), coho salmon (*Oncorhynchus kisutch*), and chinook salmon (*Oncorhynchus tshawytcha*) (CDFW CNDDB). The Mattole, Sinkyone, and other local tribes depended on these once abundant salmon species of the Mattole river watershed until 1850s, when their lives and livelihoods were destroyed settlers. Thereafter, intense logging and ranching dramatically altered the landscape.

Existing Land Use

The project site was logged in 1960 by the previous landowner. Old-growth trees were removed by tractor skidding. The existing road network was constructed specifically for the harvesting of timber in 1960. The lower parcel has remained a homestead since, with the current landowner living there since 1997. The upper parcel was acquired in 1998. Existing development on the lower parcel is concentrated on the river terrace on the south side of Honeydew Creek. It includes two residences, a garage and storage shed, a barn and horse corral, pasture, an orchard, domestic and cannabis gardens, and a small aesthetic pond (site map, Appendix A). The development on the upper parcel is in three separate areas along the main access road. There are two residences, storage sheds, a small cabin, and adjacent

cultivation areas. The third area has a small cabin used as a retreat space. The combined existing cultivation area for the three cannabis gardens (Cultivation Areas A-C), one on the lower parcel and two on the upper parcel, is approximately 12,192 ft^2. Associated infrastructure throughout the property includes domestic and irrigation water diversion and storage systems, greenhouses, septic systems at each residence, and electricity provided by PG&E. Back-up power and heating is provided by propane and diesel generators.

The springs were originally developed by the prior landowner for domestic purposes. The applicant directly diverts to the residences for domestic use and diverts to storage for irrigation of cannabis. An Initial Statement of Diversion and Use (ISDU) has been filed with the State Water Resources Control Board (SWRCB) for both springs. The spring point of diversion (POD) on the lower parcel (POD-1) has been assigned #S027231, the upper parcel spring POD (POD-2) was assigned #S027233. A Small Irrigation Use Registration (SIUR) has been filed for POD-2 for diversion to storage for the purposes of cannabis cultivation (#H503797, Appendix J). Approximately 0.38 ac-ft/yr is diverted for cultivation. A rooftop rain-catchment system is being used for the irrigation of cannabis on the lower parcel. In addition, the applicant has an appropriative right (#A021479) to draw from Honeydew creek. Approximately 5.6 ac-ft annually is used for irrigation of crops, watering of animals, fire protection, and other incidental uses. Current annual domestic water use is 0.2 acre-feet.

Proposed Land Use

The project proposal for a Zoning Clearance Certificate for each parcel includes 10,000 ft^2 of cannabis cultivation, for a total of 20,000 ft^2. The lower parcel will have all outdoor cultivation; the upper parcel will have 6,000 ft^2 of outdoor and 4,000 ft^2 of mixed-light cultivation. Proposed site development includes the construction of a non-commercial nursery greenhouse, the installation of solar power systems, relocation of cultivation areas to environmentally-superior locations, and road improvement and maintenance according to the guidance provided by the *Handbook for Forest, Ranch, and Rural Roads* ("Road Handbook") by Pacific Watershed Associates. Stream crossing projects include new construction, culvert replacement, bank stabilization, and restoration. Pursuant to the California Fish and Game Code section 1602, a Streambed Alteration Agreement (SAA) (Notification No. 1600-2017-0877-R1) has been issued by the CA Department of Fish and Wildlife (CDFW) (Appendix I). All in-stream work and water diversions will be conducted according to the conditions of the SAA. The condition of the main access roads will be improved and maintained as part of the site management plan. To meet the forbearance period for cannabis cultivation, water storage will continue to be increased on both parcels. Additional rooftop rain-catchment systems may be installed to reduce water diversion from the springs. Other land use improvements may be made to the property for agriculture, domestic purposes, and other facilities appurtenant to the cultivation activities.

TIER AND RISK DESIGNATION

The Policy provides criteria for evaluating threats to water quality for cannabis cultivation sites based on three site characteristics: proximity to water body, total disturbed area, and slope of the disturbed area. Based on the criteria and site characteristics the subject property is classified as a **Low Risk, Tier 1 Discharger**. The total disturbed area is 0.59 acres, all of which is at least 50 ft. from a water body and is located on slopes of less than 30% (Table 1).

Table 1: Disturbed Area Size, Slopes, and Setbacks

Disturbed Area Type	Area (ft^2)	Disturbed Area Slope (%)	Distance to Water Body (ft.)	Water Body Type
Cultivation Area A1	1,990	10	50	Class III
Cultivation Area A2	360	10	50	Class III
Cultivation Area B1	1,995	13	330	Class III
Cultivation Area B2	1,090	13	280	Class III
Cultivation Area B3	400	13	260	Class III
Cultivation Area C1	3,072	4	270	Class III
Cultivation Area C2	3,165	4	350	Class III
Cultivation Area C3	120	4	350	Class III
Graded Flat 1	3,938	13	140	Class III
Graded Flat 2	3,110	4	260	Class III
Storage Shed	380	16	50	Class III
Storage Garage	870	10	230	Class III
Residence 1	880	13	210	Class III
Residence 2	1,925	4	240	Class III
Cabins 1	360	13	315	Class III
Cabins 2	730	8	50	Class III
Generator Sheds	240	13	230	Class III
Water Storage Tanks	752	15	90	Class III
Cultivation Waste/Compost	200	10	250	Class III
Total Disturbed Area	**0.59 acres**			

The main entrance and access roads were constructed prior to cultivation activities and are maintained according to the guidance provided by the Road Handbook. Thus, the area of the road network is not included in the total disturbed area. See Appendix B for a map of disturbed areas.

BEST PRACTICAL TREATMENT OR CONTROL (BPTC) MEASURES

BPTC measures are being utilized as part of the road maintenance program to protect water quality. The *Construction Site Best Management Practices (BMPs) Manual* by the CA Department of Transportation (Caltrans) and the 5C Roads Manual, *A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds,* are being referenced for the correct installation, maintenance, and monitoring of all applicable erosion control and sediment capture BPTC measures.

All straw mulch must be free of noxious weeds and all seed/plants must be non-invasive. A list of prohibited species can be found in the CA Invasive Plant Council's database. Erosion control measures shall not include synthetic monofilament netting, including photo- and biodegradable plastic netting. All netting shall be made of jute, coir fiber, hemp, or another product without welded weaves.

A schedule of BPTC measures to be implemented and maintained throughout the site is shown in Appendix C, which also empty record sheets for scheduling. Appendix D can be referred to for specifications on recommended BPTCs.

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1. SEDIMENT DISCHARGE BPTC MEASURES

1.1. SITE CHARACTERISTICS

1.1.1. SITE MAP

The site map shows all relevant site features: streams, storage areas, roads, buildings, water diversion and use infrastructure, cultivation areas, and other disturbed areas related to cultivation activities. Erosion prevention and sediment control BPTC measures are identified on the Site Map (Appendix A) and associated BPTC Site Map (Appendix B).

1.1.2. ROAD CONDITIONS

The main entrance road receives approximately 6 daily vehicle trips in the peak season (May - October) and 3 vehicle trips in the winter season. The main entrance road to both parcels is constructed on a >20% gradient and the road surface consists of rocky soil. Much of the road is insloped, which drains stormwater into long inboard ditches. To reduce the contribution of stormwater runoff to each stream crossing, numerous Ditch Relief Culverts (DRCs) and rolling dips will be installed. To improve drainage and capture sediment, rolling dips, critical dips, outsloping, and armoring of inboard ditches will constructed in conjunction with the implementation of stream crossing projects approved by the CDFW. There is no existing erosion of the road surface. Currently, road maintenance activities consist of clearing inboard ditches and culverts of debris. Additional road maintenance is prescribed in section 1.2. below.

1.1.3. STREAMS, STREAM CROSSINGS, RIPARIAN SETBACKS

There are 21 streams or stream crossings on the property. A mentioned earlier, the discharger has an SAA with CDFW (Appendix I) for 18 in-stream projects and 3 Points of Diversion (POD). The projects include culvert replacement and installation, bank stabilization, and stream restoration. The projects will be implemented in conjunction with the road work during the dry summer months of 2019-2020. The approved projects will improve streamflow and reduce sedimentation in the event of a 100-year storm. Various BPTCs listed in Appendix D will be utilized to protect water quality.

Existing cultivation-related facilities are located away from waterbodies and outside the required riparian setbacks. All proposed structures, watertanks, and cultivation areas will meet setback requirements in the Order.

1.1.4. SOIL DISTURBANCE

The site has no areas of active soil disturbance. All historic graded areas are stable and vegetated, and there are no active slides or earth movement on site. Any projects that disturb soil during future site development will incorporate erosion prevention and sediment capture BPTC measures to protect waters of the state.

1.2. SEDIMENT EROSION PREVENTION AND SEDIMENT CAPTURE

1.2.1. EROSION PREVENTION BPTC MEASURES

1.2.1.1. ROADS

Both main access roads have few erosional issues. The existing inboard ditches are generally well vegetated, and some sections have filled in with sediment. Many, however, are too lengthy and have downcut in some places. To break up the concentration of runoff, numerous DRC's and rolling dips will be installed on the main access roads. Approaches to stream crossings will be rocked where necessary to prevent erosion (per SAA). All culvert inlets and outlets will be maintained and cleared of sediment buildup. Inboard ditches will be redefined, cleared, and rocked as needed. Erosion prevention BPTC measures for roads will be implemented prior to the rainy winter months. The road construction standards described in the "Road Handbook" will be adhered to for all road improvements. See Appendix C for the Schedule of BPTC Implementation and Maintenance.

1.2.1.2. DISTURBED AREAS

There are no existing erosion issues in the disturbed areas. Graded flats and cultivation areas have been stabilized with living mulch/grasses. Proposed staging areas for stream crossing construction or timber management are expected to disturb soil. These areas will be stabilized with straw/rock after the projects are complete. Any other areas for planned disturbance/development will be surveyed for sensitive species, wildlife, and communities, and appropriate BPTC measures will be utilized. (Appendix C).

1.2.1.3. STREAMS AND STREAM CROSSINGS

The are 21 stream crossings on the subject parcels, 18 of which require work. Many culverts are undersized and need to be put on grade. Also, many of the contributing inboard ditches require some sediment erosion prevention and all culvert inlets and outlets will be armored appropriately. All stream crossing work will adhere to the project specifications in the SAA and all crossings will be designed according to the standards in CDFW's *CA Salmonid Stream Habitat Restoration Manual*.

Stream crossing inspection and maintenance, such as the removal of debris, will be regularly conducted throughout the year, and after a significant storm event (0.5 in/day or 1 in/7 days of rain). All cultivation operations comply with setbacks from streams and riparian areas. Certain biological or structural BPTC measures will be implemented as required in the SAA.

1.2.1.4. WINTERIZATION

Winterization measures will be implemented annually by November 1st and interim erosion prevention BPTC measures will be utilized as needed throughout the year. To prevent erosion and sediment transport to streams, numerous measures for soil stabilization, runoff management, erosion and sediment prevention/retention are utilized throughout the seasonally dry period and prior to the onset of winter. Section 5 "Winterization BPTC Measures" has more information on proposed actions to protect water quality in the winter season.

1.2.2. SEDIMENT CAPTURE BPTC MEASURES

1.2.2.1. ROADS, STREAM CROSSINGS, AND SOIL DISTURBANCE

Minor sediment control measures such as armoring of inboard ditches and the installation of rolling dips and DRCs will be used to prevent sediment from entering the streams that cross the main access roads. During stream crossing construction and road maintenance activities, sediment control devices (e.g. straw wattles, gravel bag berms) will be installed during the dry season around culvert inlets and outlets to prevent sediment transport. Stockpiled materials for construction and road maintenance will be stored in stable locations and contained using appropriate BPTC measures. Spent potting soil and cultivation waste are composted and stabilized in a location outside of riparian setbacks. See Appendix C for the schedule of all sediment control BPTC measures being employed on site.

1.2.3. MAINTENANCE ACTIVITIES – EROSION PREVENTION AND SEDIMENT CAPTURE

1.2.3.1. MONITORING

All long-term and interim erosion prevention and sediment capture BPTC measures that have been implemented will be monitored for effectiveness on a monthly basis at a minimum (Table 2). Especially, all culverts and inboard ditches require monthly maintenance and monitoring to prevent potential plugging and erosion. Any vegetation planted on disturbed areas will be monitored for success and replanted if necessary. The cultivator/discharger will monitor erosion and sediment control measures during and after each storm event that produces at least 0.5 in/day or 1 in/7 days of precipitation. In addition, winterization measures that are implemented will be monitored for effectiveness (inspected during the first major winter storm event) before the site is closed for the winter. See Appendix H for a log of monthly BPTC monitoring and maintenance records.

Table 2. BPTC Effectiveness Monitoring

Observations	Description	Monitoring Frequency
Erosion Prevention and Sediment Capture Maintenance	Report activities for maintaining the effectiveness of erosion prevention and sediment retention/capture measures	Monthly
Active Erosion	Report any indications of soil erosion	Monthly
Surface Water Runoff Maintenance	Report the conditions of any surface water (stormwater, irrigation) and include the location, source of runoff, duration	Monthly

1.2.3.2. MAINTENANCE

Year-round maintenance of all erosion prevention and sediment capture measures is required. All existing measures shall be maintained, repaired, or replaced as needed. Exotic or invasive species found in revegetated or disturbed areas shall be removed. Remaining exposed soil shall be reseeded/revegetated and have 2-4” of weed-free mulch reapplied. Any captured sediment in inboard ditches/drainageways, culvert outfalls, or against silt fences/straw wattles will be removed and stabilized on a designated flat area. The sediment may be used for site improvement where

it will not threaten water quality. Interim measures for sediment retention, such as mulching and installing fiber rolls, require more regular monitoring and maintenance. See Appendix H for a log of monthly BPTC monitoring and maintenance records.

2. FERTILIZER, PESTICIDE, HERBICIDE, AND RODENTICIDE BPTC MEASURES

2.1. CULTIVATION PRODUCT STORAGE, USE, AND DISPOSAL

2.1.1. STORAGE

Fertilizers and pesticides are being stored in a separate location from petroleum products. The products are being stored in storage sheds and generator sheds respectively (Appendix A). No rodenticides are being used on site. All liquid products are being stored in secondary containment to prevent leachate or spills from entering surface waters.

Appropriate BPTC measures will be utilized when storing, handling, mixing, applying, and disposing of all fertilizers, pesticides, herbicides, and rodenticides. Each year an inventory will be conducted prior to the beginning of and periodically during the grow season. Necessary products will be delivered to the site as needed. See Appendix G for a list of fertilizers and pesticides/herbicides used on site.

2.1.2. APPLICATION

Mixing of fertilizers, spent soil, and amendments is conducted in a designated upland area where the mix will not enter surface waters. The application of any agricultural chemical products is conducted according the manufacturer's recommendation.

2.1.3. DISPOSAL AND SPILL PREVENTION/CLEANUP

Trash and recycling containers are located near the residences and are contained to prevent surface water contamination and wildlife intrusion. Excess soil not slated to be reused or mulched will be disposed of properly along with other cultivation products. Spent product containers are carefully transferred from the mixing area to the refuse area. A spill kit with plenty of sorbent pads is kept on site in the event of a spill. All trash, empty product containers, and other recycling will be hauled off-site every 2-4 weeks, approximately, to the Petrolia waste management facility.

3. PETROLEUM PRODUCT BPTC MEASURES

3.1. PETROLEUM STORAGE, USE, AND DISPOSAL

3.1.1 STORAGE

All propane is used for domestic purposes. The discharger currently has (2) 1,000-gallon and (4) 50-gallon propane tanks on site (Table 3). The smaller tanks are stored next to the residences and cabins (Appendix A). The large propane tanks are serviced by a licensed professional as needed. Smaller 5-gallon gas cans, lubricants, and other petroleum products are being stored in sheds separately from fertilizers and are in secondary containment when not in use. All generators have drip pans and are stored in sheds. Vehicles and machines are regularly monitored for leakage and when not in use are being stored in a designated location outside riparian setbacks and >50 ft. from drainageways.

Table 3. Petroleum Product List, Storage, and Use

Petroleum Product	Delivery Period	Storage Method	Use Type
Gasoline	Refilled as needed throughout the year	(Proposed) 1,000-gallon metal petroleum storage tank with secondary containment	Generators, ATV's, vehicles, maintenance equipment
Propane Tank	Serviced as needed throughout the year	(2) 500-gallon metal and (2) 1,000-gallon metal propane tanks	Refrigeration, lighting, heating for cabins and residences
Lubricants	Delivered as needed throughout the year	In storage shed/carport within secondary containment	Equipment and car maintenance

3.1.2. APPLICATION

Fueling and maintenance of the generators, cars, and other machines is being conducted in a designated area that prohibits discharge to waters of the state.

3.1.3. DISPOSAL AND SPILL PREVENTION/CLEANUP

Special care is taken when transporting and handling all petroleum products. Spill prevention/cleanup BPTC measures are being utilized; a spill kit with plenty of sorbent pads is kept on site in the event of a spill. Spent petroleum products and related trash are kept in secondary containment, specifically for hazardous waste, before being transferred to the Petrolia waste management facility.

4. TRASH/REFUSE AND DOMESTIC WASTEWATER BPTC MEASURES

4.1. HOUSEHOLD TRASH AND CULTIVATION-RELATED WASTE

All household trash/refuse generated on site will be kept in adequate trash bins near the residences/cabins (Appendix A) where it will not migrate or leach into waters of the state. They will also be secured to prevent wildlife intrusion. Household organic waste is fed to livestock or composted along with the cannabis organic waste.

Cultivation-related organic waste and spent potting soil is composted in a designated area on the lower parcel (Appendix A) and stabilized with the appropriate BPTC measures. Other cultivation-related waste and recycling are temporarily stored in wildlife-impenetrable storage containers. All refuse and cultivation waste are then transported to the Petrolia waste management facility landfill approximately 1-2 times per month.

4.2. RESIDENTS, EMPLOYEES, AND VISITORS

Approximately 2-3 residents are on site during the growing season, and a maximum of 2 employees are on site during the peak operation season. There are two residents on site in the winter season. Visitors/family/neighbors mostly come to the lower parcel site during the summer.

4.2.1 DOMESTIC WASTEWATER – GENERATION

Each residence and cabin have a kitchen sink and shower that produce greywater, and toilets that produce blackwater.

4.2.2 DOMESTIC WASTEWATER – DISPOSAL

There are unpermitted septic tanks and leach fields at two of the residences and a permitted septic system at the main residence. The property owner is in the process of applying for septic permits through the Humboldt County Department of Environmental Health and should receive approval by the end of 2020. See the site map in Appendix A for locations of wastewater treatment locations. During the peak work season, a portable toilet is temporarily used on the lower parcel and is serviced regularly by a licensed servicing company. In addition, the cultivator is ensuring that no substances that are hazardous to fish and wildlife (e.g. trash, paint, concrete washings, treated wood) are used, located, or disposed of where they can contaminate waters of the state.

5. WINTERIZATION BPTC MEASURES

5.1. ACTIVITIES AND MAINTENANCE

5.1.1. ROADS AND DRAINAGEWAYS

Appropriate erosion prevention and sediment control measures will be installed, maintained, and monitored for effectiveness prior to the winter season. Road work requiring heavy machinery, such as the stream crossing projects, shall be conducted only during the dry season unless the cultivator is authorized by an agency with jurisdiction to make emergency repairs. Winterization of the main access roads include temporary and long-term runoff management and soil stabilization measures, such as the application of mulch, clearing of inboard ditches, and rocking the road surface (Table 4). All winterization BPTC measures will be monitored and maintained prior to the winter rainy season. Culverts and ditches will be inspected for erosion or clogging prior to and after a significant storm event. Any debris and sediment found to be clogging culverts, inlets/outlets, or drainageways will be removed and appropriately stored, reused, or disposed of.

Table 4. Winterization BPTC Measures

Description	Current Condition	Corrective Action	BPTC Implementation Time Schedule
Winterization	Sediment/debris inside inboard ditches and culvert inlets	Remove built up sediment and other debris	Ongoing maintenance; remove sediment/debris prior to winter annually
Winterization	Rocky dirt roads in good condition	Cover road surface with 3/4” angular rock as needed	Ongoing maintenance; reapply prior to winter annually
Winterization	Disturbed soil around cultivation areas and residences	Rock or mulch surface with weed-free straw or plant living mulch	Ongoing maintenance; reapply prior to winter annually
Winterization	Cultivation-related products, machines uncovered or not in storage	Store products in storage sheds with secondary containment/drip pans	Prior to winter closure annually

5.1.2. DISTURBED AREAS

Areas that have exposed soil shall be mulched and/or seeded to prevent erosion and sediment delivery to a waterbody (Table 4). Any revegetation shall take place at the onset or at the end of the precipitation season to ensure establishment. Any exposed slopes created from site operations or maintenance shall have linear sediment controls installed, such as fiber rolls or silt fences, to interrupt sheet flow lengths. All disturbed areas will be inspected for potential and active erosion issues. Such sites will be repaired/controlled as needed using appropriate BPTC measures. For all areas of concern, if any BPTC measures cannot be installed prior to winter, the Regional Water Board must be contacted to establish a compliance schedule to protect water quality.

5.1.3. STORAGE AND STOCKPILED MATERIALS

5.1.3.1. CULTIVATION-RELATED PRODUCTS AND WASTE

All fertilizers, pesticides, herbicides, and rodenticides need to be stored where they will not enter surface waters or pose a threat to wildlife. The cultivator will have all liquid products stored in secondary containment and stored along with all other cultivation-related products, protected from the elements (Table 4). Waste associated with cultivation will be removed from the site and taken to the Petrolia waste management facility prior to winter rainy season.

5.1.3.2. VEHICLES, MACHINES, AND PETROLEUM PRODUCTS/WASTE

Prior to winter, any remaining vehicles or machines on-site will be stored out of the elements where any potential leaks will not enter surface waters or pose a threat to wildlife. Petroleum products will be kept in compatible secondary containment within a storage shed. Any spent petroleum containers and related trash will be removed and appropriately disposed of at the Petrolia waste management facility.

5.1.3.3. STOCKPILED MATERIALS

Appropriate BPTC measures shall be used for all stockpiled materials that have the potential to migrate to surface waters or that may be hazardous to wildlife. Stockpiled materials include bark, sawdust, potting soil, amendments, rock, compost, treated wood, polytube and other irrigation equipment, greenhouse plastic sheeting, and any other materials used for cultivation and site development, improvement, and management. They shall be stabilized in an upland area, covered, and/or stored in a storage shed.

APPENDIX A: SITE MAPS

MAROMO, LLC

SITE MANAGEMENT PLAN

SITE PLAN OVERVIEW
APN: 107-144-020 "LOWER", 107-144-021 "UPPER"

VICINITY MAP
NOT TO SCALE

DIRECTIONS TO SITE:

FROM EUREKA, CA
-SOUTHBOUND ON US-101
(APPROX. 41.6 MILES)
-TAKE EXIT 663 FOR CA-254
-TURN RIGHT ONTO BULL CREEK FLATS RD
(APPROX. 1.4 MILES)
-TURN RIGHT ONTO MATTOLE RD
(APPROX. 16.3 MILES)
-STRAIGHT ONTO WILDER RIDGE RD
(APPROX. 2.3 MILES) TO SITE

PROJECT DESCRIPTION:

THE PROJECT SITE IS IN THE TOWN OF HONEYDEW, APPROXIMATELY 65 MILES SOUTH OF EUREKA. THE SITE WAS ENROLLED WITH THE STATE WATER RESOURCES CONTROL BOARD IN JUNE 2019 AS A TIER 1, LOW RISK DISCHARGER (WDID:1B170015CHUM)

GENERAL NOTES:

1. DRAWING SCALE AS NOTED. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
2. THIS IS NOT A BOUNDARY SURVEY. BOUNDARY INFORMATION DEPICTED HAS BEEN OBTAINED FROM HUMBOLDT COUNTY 2015 GIS DATA. NORTHPOINT CONSULTING GROUP, INC. HAS NOT VERIFIED THIS PROPERTY BOUNDARY.

PROJECT INFORMATION:

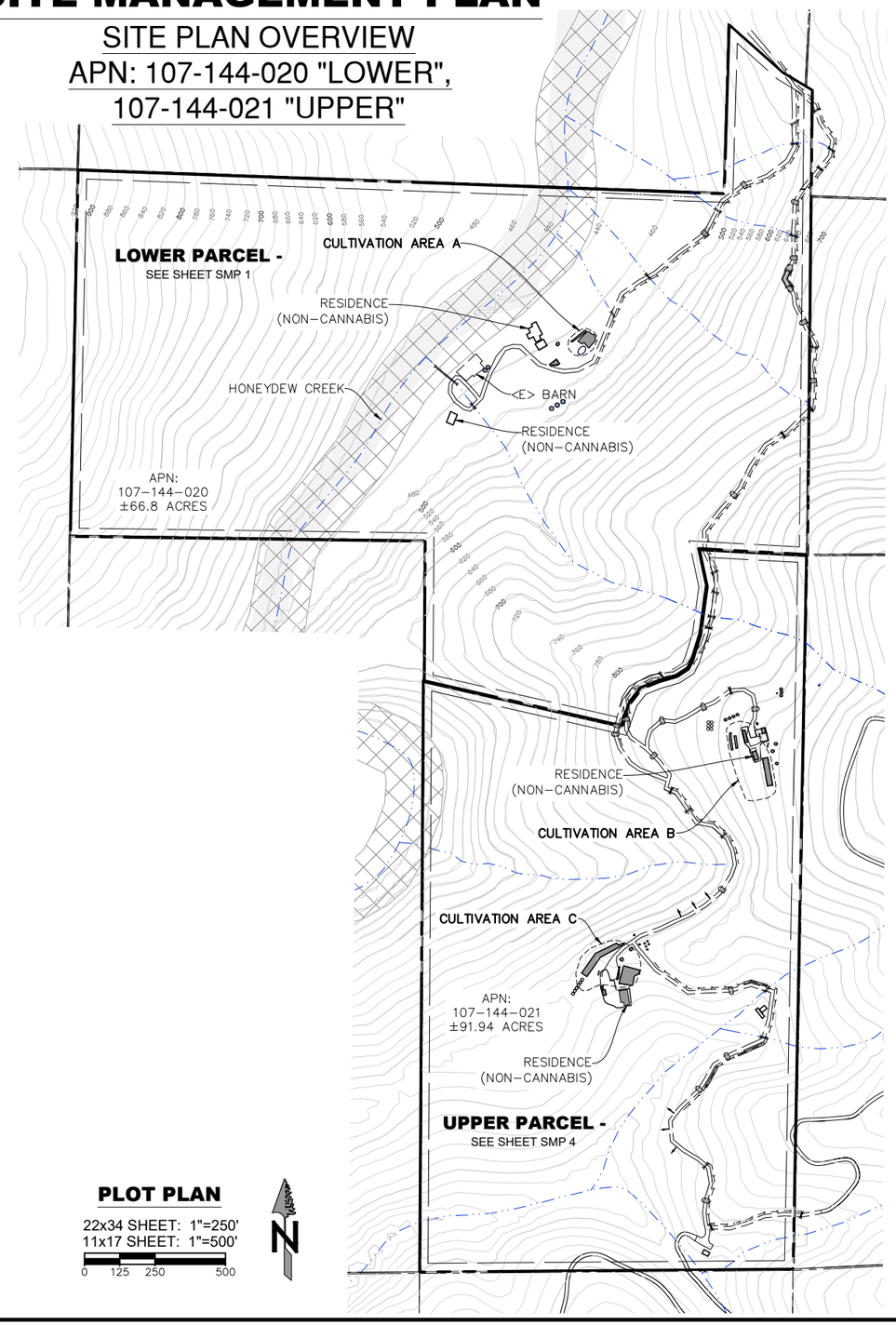
APPLICANT:
MAROMO, LLC
PO BOX 43
HONEYDEW, CA 95545

PROPERTY OWNER:
MAUREEN CATALINA
PO BOX 93
HONEYDEW, CA 95545

APPLICANTS AGENT:
RAIN AND ZEPP
517 3RD ST
EUREKA, CA 95501

SITE ADDRESS:
APN: 107-144-020 ("LOWER" PARCEL); 107-144-021 ("UPPER" PARCEL)
2250 WILDER RIDGE RD
HONEYDEW, CA 95545

PARCEL SIZE = ±91.94 ACRES (LOWER)
= ±66.80 ACRES (UPPER)



PLOT PLAN
22x34 SHEET: 1"=250'
11x17 SHEET: 1"=500'
0 125 250 500

SHEET INDEX:

SMP0 - SITE MANAGEMENT PLAN - OVERVIEW
SMP1 - LOWER SITE
SMP2 - LOWER BPTC AREA 1
SMP3 - LOWER BPTC AREA 2
SMP4 - UPPER SITE
SMP5 - UPPER BPTC AREA 1
SMP6 - UPPER BPTC AREA 2

DATE	REVISIONS	DRAWN BY

NORTHPOINT CONSULTING GROUP, INC.
1117 Samoa Blvd., Arcata, CA 95521

MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
SITE MANAGEMENT PLAN - OVERVIEW

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP0
18-038/18-039

September 23, 2019 - 10:38 Dwg Name: P:\18-038 - Maromo - Honeydew Lower- Maureen Catalina\CAD\MAROMO -020-021 - SMP.dwg Updated By: Chong Chang

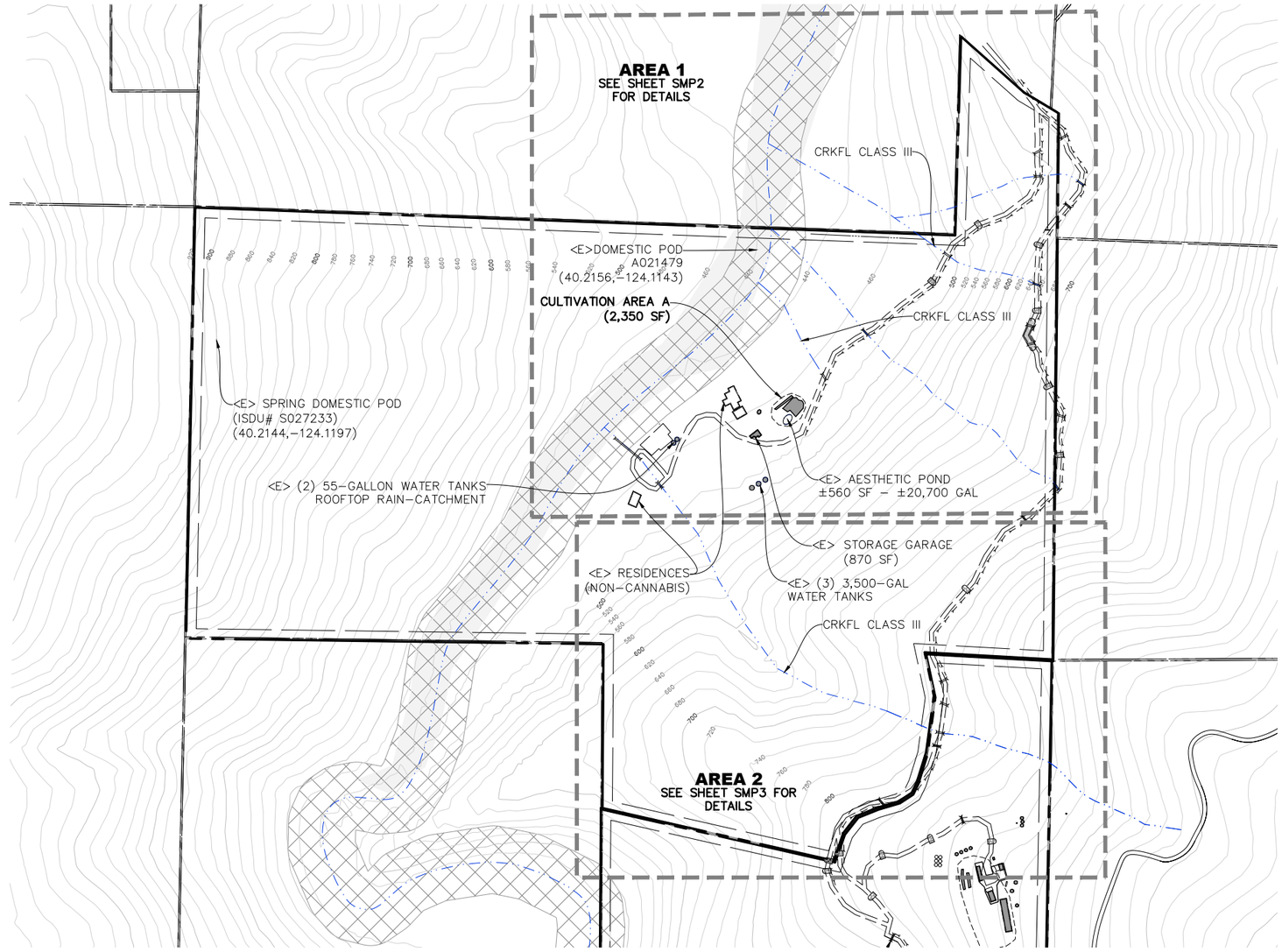
MAROMO, LLC

SITE MANAGEMENT PLAN

SITE PLAN OVERVIEW
APN: 107-144-020
(LOWER PARCEL)

LEGEND

<P>	PROPOSED
<E>	EXISTING
POD	POINT OF DIVERSION
	OUTSLOPE (OS)
	WATER COURSE
	INBOARD DITCH (IBD)
200'	USGS CONTOUR
	PROPOSED ROLLING DIP
	STREAM CROSSING
	18" DITCH RELIEF CULVERT
	DISTURBED AREA



PLOT PLAN

22x34 SHEET: 1"=200'
11x17 SHEET: 1"=400'

0 100 200 400

N

SHEET INDEX:

SMP0 - SITE MANAGEMENT PLAN - OVERVIEW
SMP1 - LOWER SITE
SMP2 - LOWER BPTC AREA 1
SMP3 - LOWER BPTC AREA 2
SMP4 - UPPER SITE
SMP5 - UPPER BPTC AREA 1
SMP6 - UPPER BPTC AREA 2

DATE	REVISIONS	DRAWN BY

NORTHPOINT CONSULTING GROUP, INC.
1117 Samoa Blvd., Arcata, CA 95521

MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
SITE PLAN OVERVIEW - LOWER PARCEL

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP1
18-038/18-039

September 23, 2019 - 10:38 Dwg Name: P:\18-038 - Maromo - Honeydew Lower- Maureen Cotelino\CAD\MAROMO -2020-021 - SMP.dwg Updated By: Chong Chang

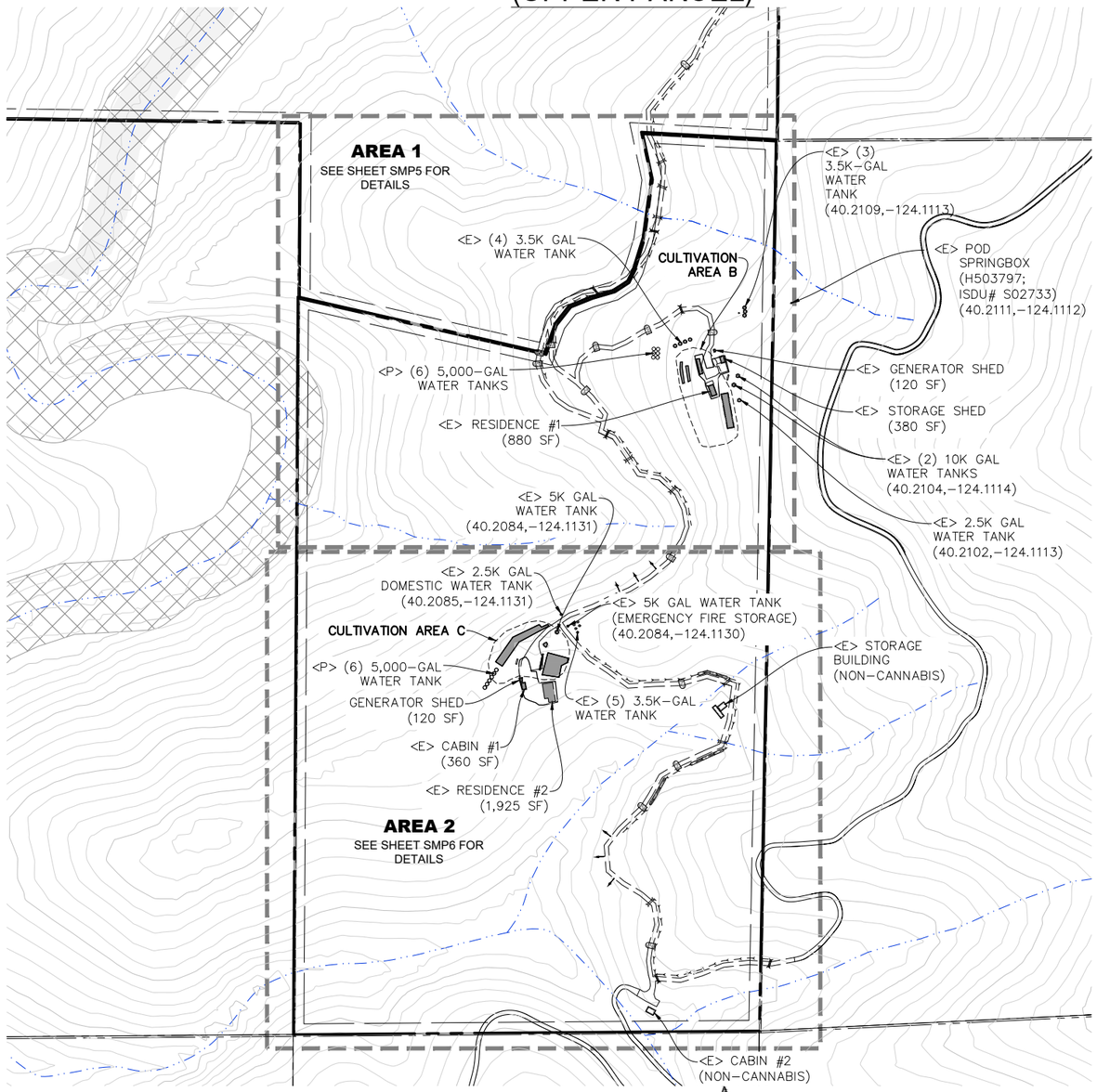
MAROMO, LLC

SITE MANAGEMENT PLAN

SITE PLAN OVERVIEW
APN: 107-144-021
(UPPER PARCEL)

LEGEND

<P>	PROPOSED
<E>	EXISTING
POD	POINT OF DIVERSION
	OUTSLOPE (OS)
	WATER COURSE
	INBOARD DITCH (IBD)
200'	USGS CONTOUR
	PROPOSED ROLLING DIP
	STREAM CROSSING
	18" DITCH RELIEF CULVERT
	DISTURBED AREA



PLOT PLAN

22x34 SHEET: 1"=200'
11x17 SHEET: 1"=400'

0 100 200 400

N

SHEET INDEX:

SMP0 – SITE MANAGEMENT PLAN – OVERVIEW
SMP1 – LOWER SITE
SMP2 – LOWER BPTC AREA 1
SMP3 – LOWER BPTC AREA 2
SMP4 – UPPER SITE
SMP5 – UPPER BPTC AREA 1
SMP6 – UPPER BPTC AREA 2

DATE	REVISIONS	DRAWN BY

NORTHPOINT CONSULTING GROUP, INC.
1117 Samoa Blvd., Arcata, CA 95521

MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
SITE PLAN OVERVIEW - UPPER PARCEL

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP4
18-038/18-039

September 23, 2019 – 10:38 Dwg Name: P:\18-038 – Maromo – Honeydew Lower – Maureen Catalina\CAD\MAROMO -220-021 – SMP.dwg Updated By: Chong Chang

APPENDIX B: DISTURBED AREA & BPTC MAPS

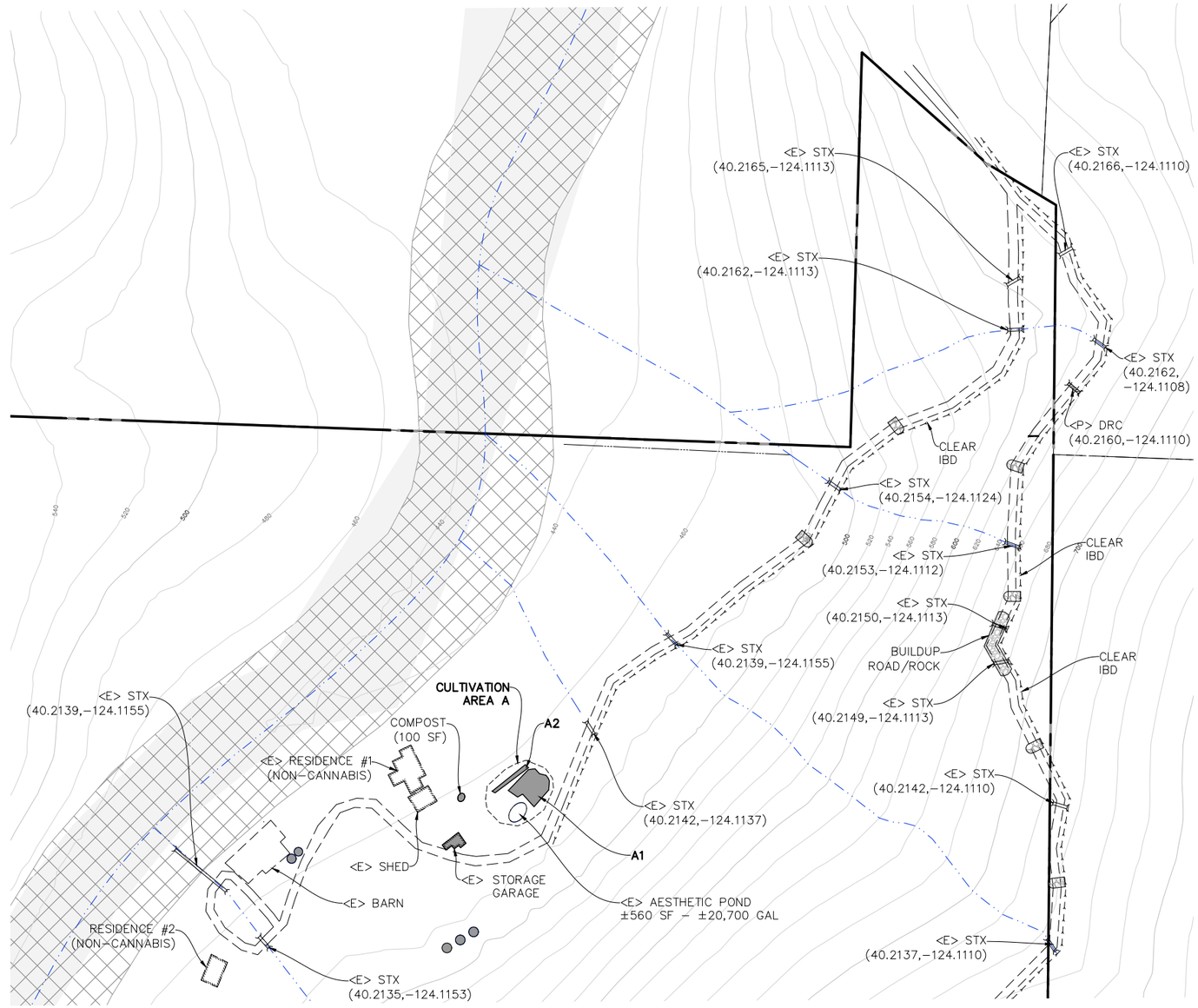
MAROMO, LLC

DISTURBED AREA AND BPTCS AREA 1

APN: 107-144-020
(LOWER PARCEL)

LEGEND

<P>	PROPOSED
<E>	EXISTING
	WATER COURSE
	INBOARD DITCH (IBD)
200'	USGS CONTOUR
	PROPOSED ROLLING DIP
	STREAM CROSSING
	18" DITCH RELIEF CULVERT
	DISTURBED AREA



BPTC AREA 1

22x34 SHEET: 1"=100'
11x17 SHEET: 1"=200'

0 50 100 200

N

DATE	REVISIONS	DRAWN BY

NORTHPOINT
CONSULTING GROUP, INC.
1117 Samoa Blvd., Arcata, CA 95521

MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
LOWER PARCEL - DISTURBED AREA & BPTC 1

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP2
18–038/18–039

September 23, 2019 – 10:38 Dwg Name: P:\18-038 – Maromo – Honeydew Lower– Maureen Collins\CAD\MAROMO –020–021 – SMP.dwg Updated By: Cheng Cheng

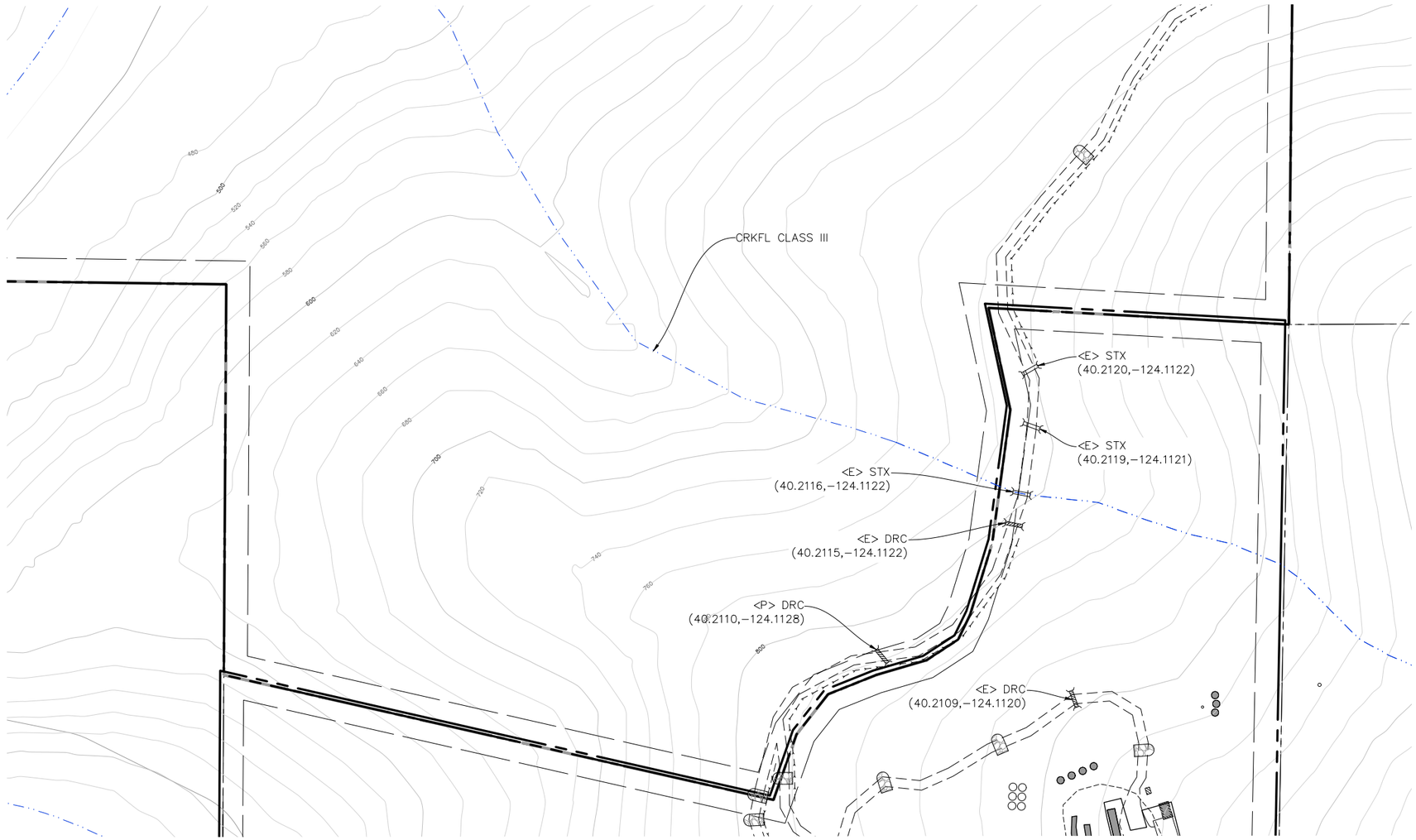
MAROMO, LLC

DISTURBED AREA AND BPTCS AREA 2

APN: 107-144-020
(LOWER PARCEL)

LEGEND

<P>	PROPOSED
<E>	EXISTING
	WATER COURSE
	INBOARD DITCH (IBD)
200'	USGS CONTOUR
	PROPOSED ROLLING DIP
	STREAM CROSSING
	18" DITCH RELIEF CULVERT
	DISTURBED AREA



BPTC AREA 2

22x34 SHEET: 1"=80'
11x17 SHEET: 1"=160'

0 40 80 160

N

DATE	REVISIONS	DRAWN BY

NORTHPOINT CONSULTING GROUP, INC.
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MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
LOWER PARCEL - DISTURBED AREA & BPTCS 2

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP3
18–038/18–039

September 23, 2019 – 10:38 Dwg Name: P:\18-038 – Maromo – Honeydew Lower– Maureen Catalina\CAD\MAROMO –020–021 – SMP.dwg Updated By: Chong Chang

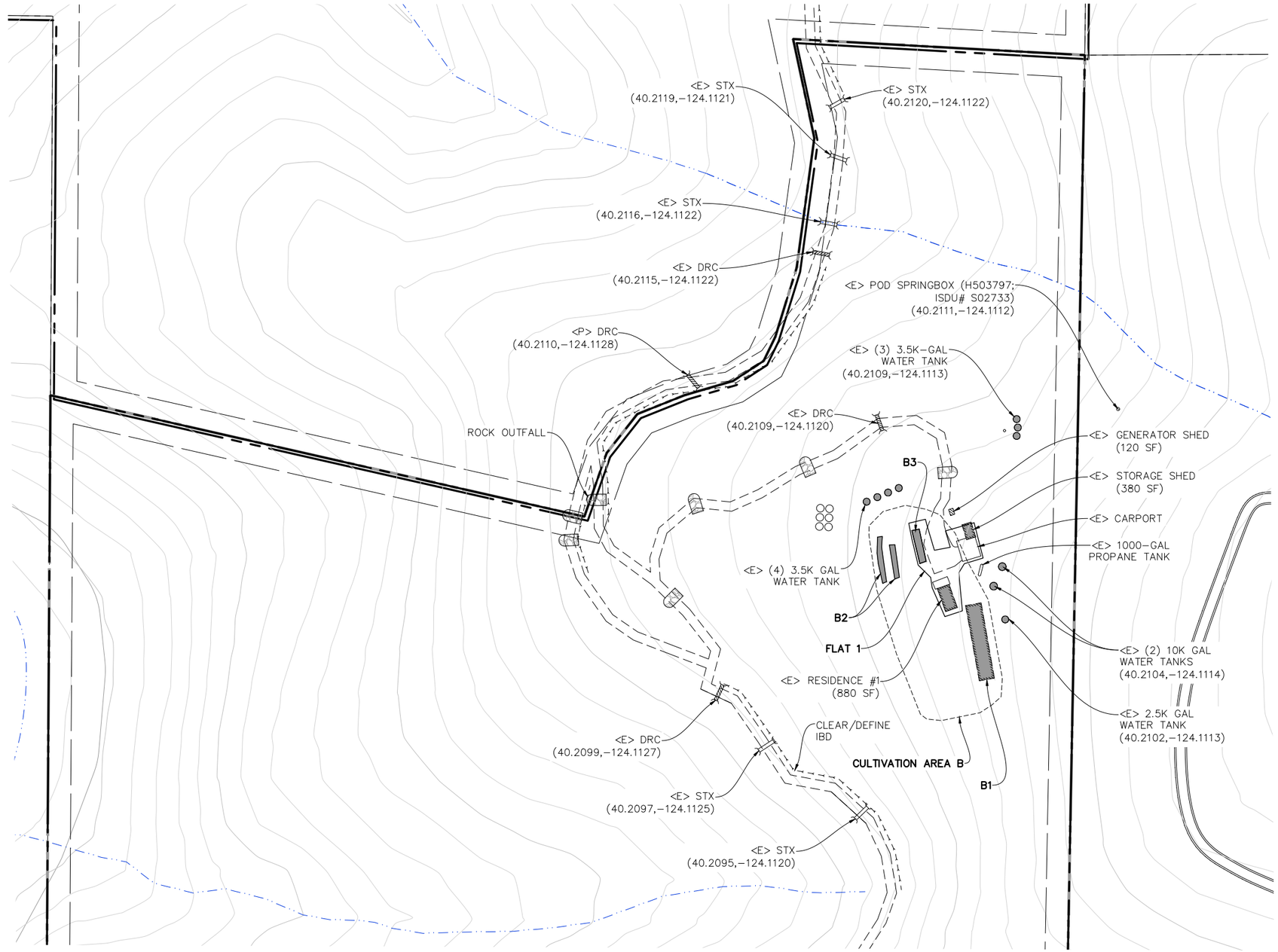
MAROMO, LLC

DISTURBED AREA AND BPTCS AREA 1

APN: 107-144-021
(UPPER PARCEL)

LEGEND

<P>	PROPOSED
<E>	EXISTING
POD	POINT OF DIVERSION
	WATER COURSE
	INBOARD DITCH (IBD)
200'	USGS CONTOUR
	PROPOSED ROLLING DIP
	STREAM CROSSING
	DITCH RELIEF CULVERT
	DISTURBED AREA



BPTC AREA 1

22x34 SHEET: 1"=75'
11x17 SHEET: 1"=150'

0 37.5 75 150

N

DATE	REVISIONS	DRAWN BY

NORTHPOINT CONSULTING GROUP, INC.
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MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
DISTURBED AREA & BPTCS 1

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP5
18–038/18–039

September 23, 2019 – 10:38 Dwg Name: P:\18-038 – Maromo – Honeydew Lower– Maureen Cotsifas\CAD\MAROMO –020-021 – SMP.dwg Updated By: Chong Chang

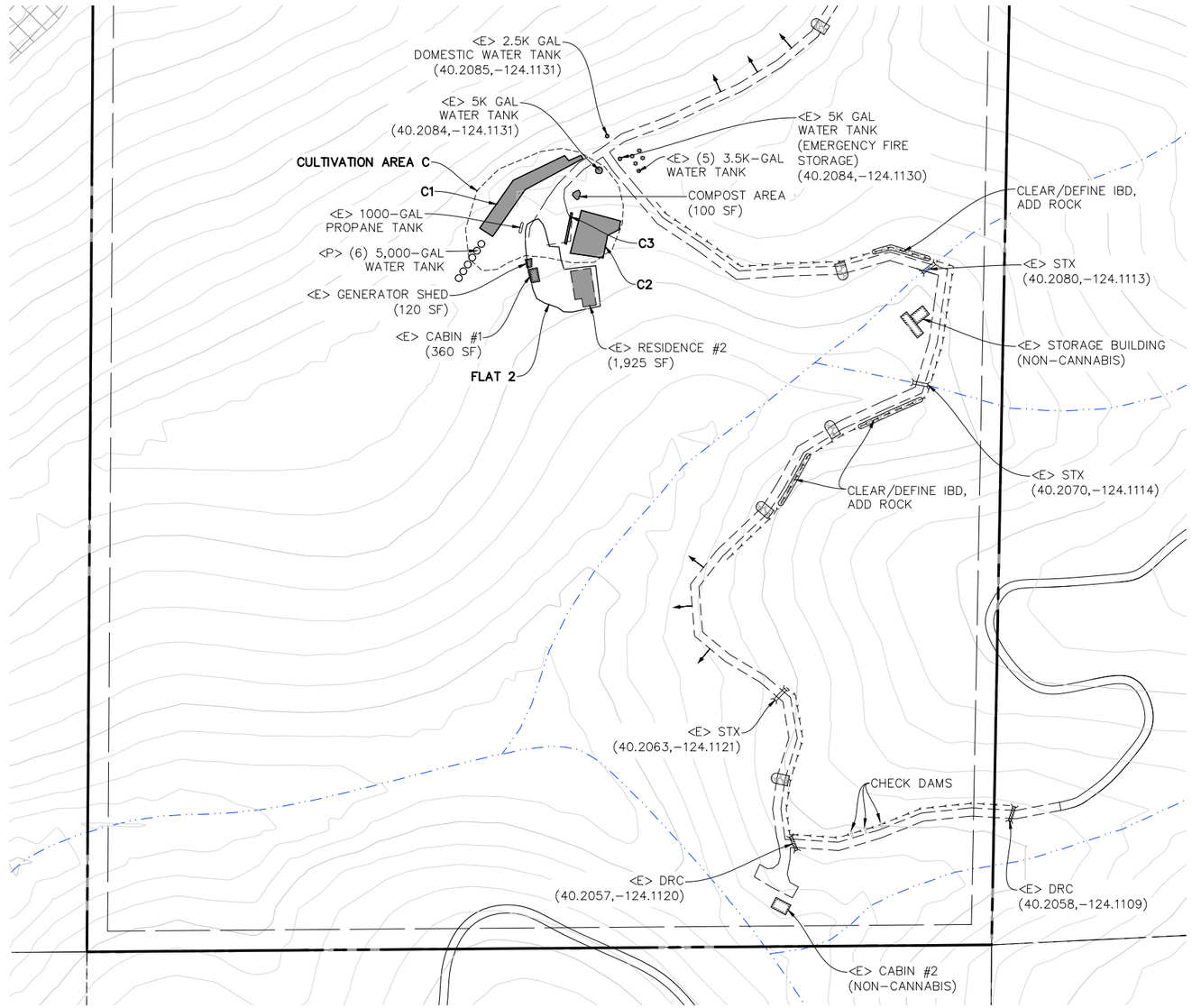
MAROMO, LLC

DISTURBED AREA AND BPTCS AREA 2

APN: 107-144-021
(UPPER PARCEL)

LEGEND

<P>	PROPOSED
<E>	EXISTING
	OUTSLOPE (OS)
	WATER COURSE
	INBOARD DITCH (IBD)
200'	USGS CONTOUR
	PROPOSED ROLLING DIP
	ROCK
	STREAM CROSSING
	DITCH RELIEF CULVERT (DRC)
	CHECK DAM
	DISTURBED AREA



BPTC AREA 2

22x34 SHEET: 1"=100'
11x17 SHEET: 1"=200'

0 50 100 200

N

DATE	REVISIONS	DRAWN BY

NORTHPOINT CONSULTING GROUP, INC.
1117 Samoa Blvd., Arcata, CA 95521

MAROMO, LLC / APN: 107-144-020 & 107-144-021
2250 WILDER RIDGE RD. HONEYDEW, CA 95545
DISTURBED AREA AND BPTCS 2

PROJ. MGR.: RJ
DRAWN BY: CC
DATE: 09/20/19
SCALE: AS SHOWN

SHEET
SMP6
18–038/18–039

September 23, 2019 – 10:38 Dwg Name: P:\18-038 – Maromo – Honeydew Lower– Maureen Catalina\CAD\MAROMO –020-021 – SMP.dwg Updated By: Chong Chang

APPENDIX C:
BPTC IMPLEMENTATION SCHEDULE

BPTC IMPLEMENTATION & MAINTENANCE SCHEDULE

Type			Measures	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EROSION PREVENTION	Physical	Runoff Management	Diversions - Perimeter Dikes, Swale, Check Dams, Water Bars, Rolling Dips Conveyance - Lined Waterway, Grade Stabilization Structures												
		Soil Stabilization	Non-Vegetative Soil Cover - Mulching, Soil Tackifiers, Slope Protection, Riprap, Fiber Rolls and other Rolled Erosion Control Products (RECP), Plastic Cover, Surface Roughening												
		Structural	Retaining Wall, Sediment Basins/Traps, Silt Fences; Armoring and Velocity Dissipators; Inlet, Outlet, and Streambank Protection/Stabilization												
	Biological	Runoff Management	Diversion/Conveyance - Grassed Waterway												
		Soil Stabilization	Temporary/Permanent Seeding, Hydroseeding, Topsoiling, Live Mulching, Vegetation Preservation/Replacement												
		Biotechnical	Biotechnical - Wattling, Brush Layering, Branch Packing, Live Cribwalls, Live Fascines, Live Plantings, Vegetated Streambank Protection, Vegetated Gabions												
SEDIMENT CONTROL	Physical	Runoff Management	Sediment Conveyance - Lined Drainageways												
		Sediment Retention	Retaining Wall, Sediment Basins/Traps - Pipe Outlet Traps, Embankment and Debris Basins, Settling Ponds, Rock Dams												
		Sediment Barriers	Straw Bale Dikes, Drain Inlet Filters, Gravel Bag Berms, Fiber Rolls, Silt Fences, Turbidity Curtain												
		Mud and Dust Control	Construction Entrance and Road Stabilization, Dust Control, Waterway Crossing												
	Biological	Soil Stabilization	Hydroseeding, Vegetated Outfalls												
INTERIM EROSION & SEDIMENT CONTROL MEASURES			Installed and Maintained as Needed												

Highlight or check off the months when the following activities will take place.

BPTC IMPLEMENTATION & MAINTENANCE SCHEDULE

Type			Measures	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EROSION PREVENTION	Physical	Runoff Management	Diversions - Perimeter Dikes, Swale, Check Dams, Water Bars, Rolling Dips Conveyance - Lined Waterway, Grade Stabilization Structures												
		Soil Stabilization	Non-Vegetative Soil Cover - Mulching, Soil Tackifiers, Slope Protection, Riprap, Fiber Rolls and other Rolled Erosion Control Products (RECP), Plastic Cover, Surface Roughening												
		Structural	Retaining Wall, Sediment Basins/Traps, Silt Fences; Armoring and Velocity Dissipators; Inlet, Outlet, and Streambank Protection/Stabilization												
	Biological	Runoff Management	Diversion/Conveyance - Grassed Waterway												
		Soil Stabilization	Temporary/Permanent Seeding, Hydroseeding, Topsoiling, Live Mulching, Vegetation Preservation/Replacement												
		Biotechnical	Biotechnical - Wattling, Brush Layering, Branch Packing, Live Cribwalls, Live Fascines, Live Plantings, Vegetated Streambank Protection, Vegetated Gabions												
SEDIMENT CONTROL	Physical	Runoff Management	Sediment Conveyance - Lined Drainageways												
		Sediment Retention	Retaining Wall, Sediment Basins/Traps - Pipe Outlet Traps, Embankment and Debris Basins, Settling Ponds, Rock Dams												
		Sediment Barriers	Straw Bale Dikes, Drain Inlet Filters, Gravel Bag Berms, Fiber Rolls, Silt Fences, Turbidity Curtain												
		Mud and Dust Control	Construction Entrance and Road Stabilization, Dust Control, Waterway Crossing												
	Biological	Soil Stabilization	Hydroseeding, Vegetated Outfalls												
INTERIM EROSION & SEDIMENT CONTROL MEASURES			Installed and Maintained as Needed												

APPENDIX D:
BPTC MEASURES

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RD1.1 Modified Low Water Rock Ford

RD1.2 Fords

RD1.3 Outsloped Roads w/ Inboard Swale

RD1.4 Outsloped Road

RD1.5 Inslope Road

RD1.6 Thru Cut Road

RD1.7 Critical Dips

RD1.8 Rolling Dip

RD1.9 Grading Unpaved Road Surfaces

RD1.10 Water Bars

RD1.11 Ditch Relief Culverts (DRC)

RD1.12 Stream Crossing Installation

RD1.13 Drainage for Unpaved Roads

RD1.14 Road Surface Upgrade

RD1.15 Routing and Location

RD1.16 Understanding Road Removal

RD1.17 Road Closure

EC1.1 Jute Mat Blanket

EC1.2 Culvert Outlet Energy Dissipater

EC1.3 Outlet Protection

EC1.4 Stockpile Management

SS-6 Straw and Mulch

SS-7 Geotextiles, Mats, Plastic Covers, and Erosion Control Blankets

SS-10 Outlet Protection

SS-11 Slope Drains

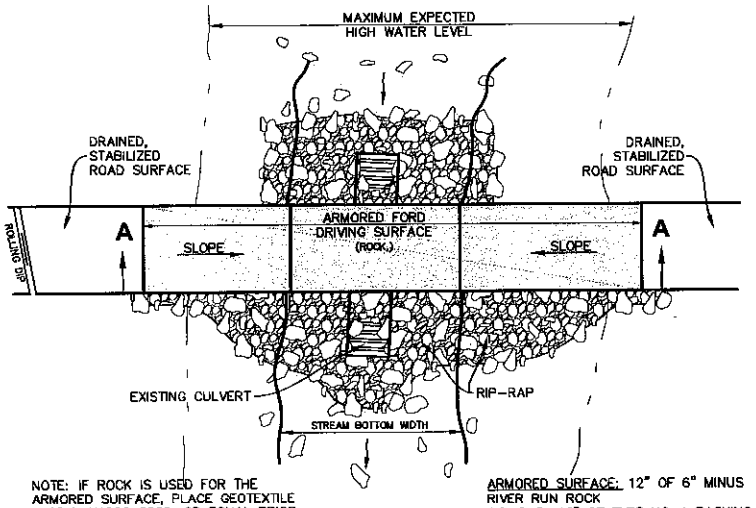
SC1.1 Check Dams

SC1.2 Sediment Basin

SC1.3 Fiber Rolls

Road BMP Resources

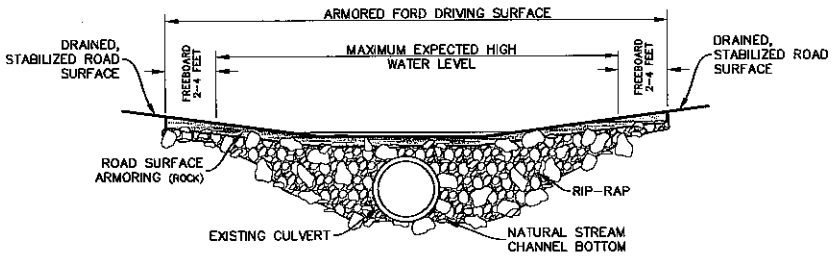
RD-1.1 MODIFIED LOW WATER ROCK FORD



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

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)

PLAN VIEW



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).

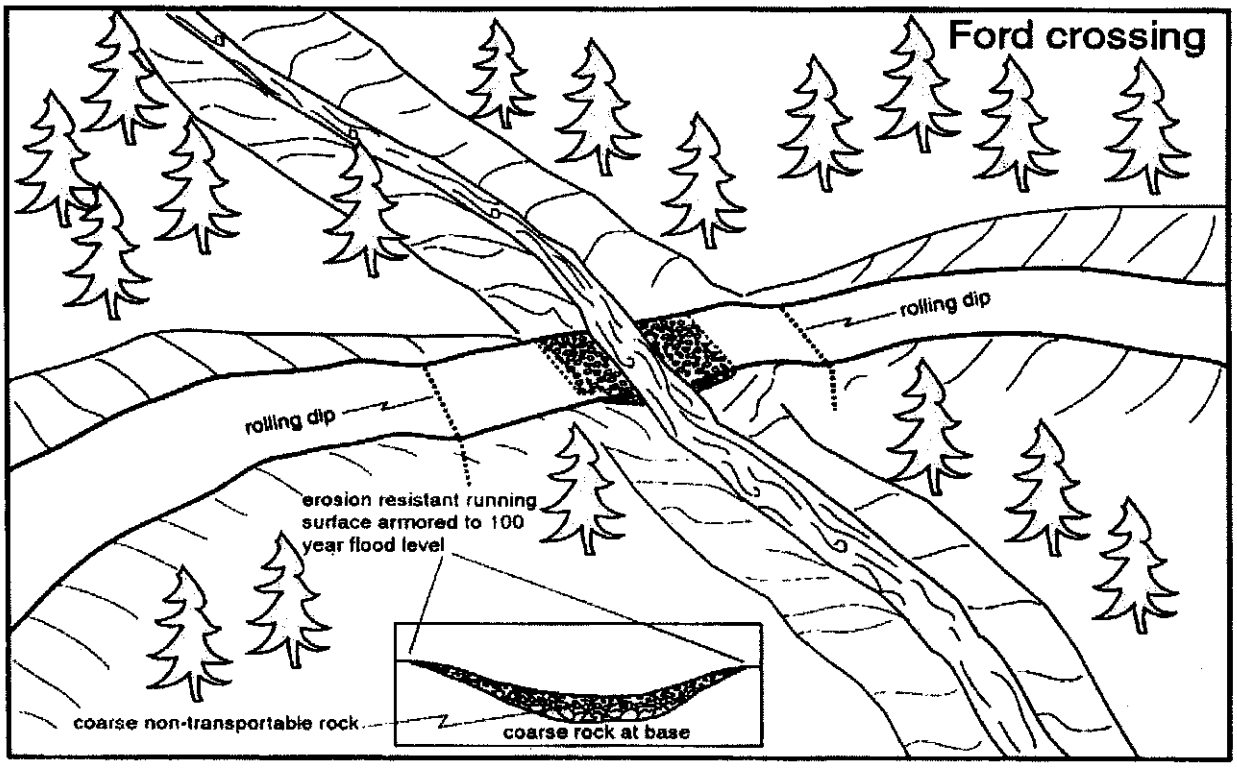


Figure 2. Typical ford stream crossing. From CDFG (2006).

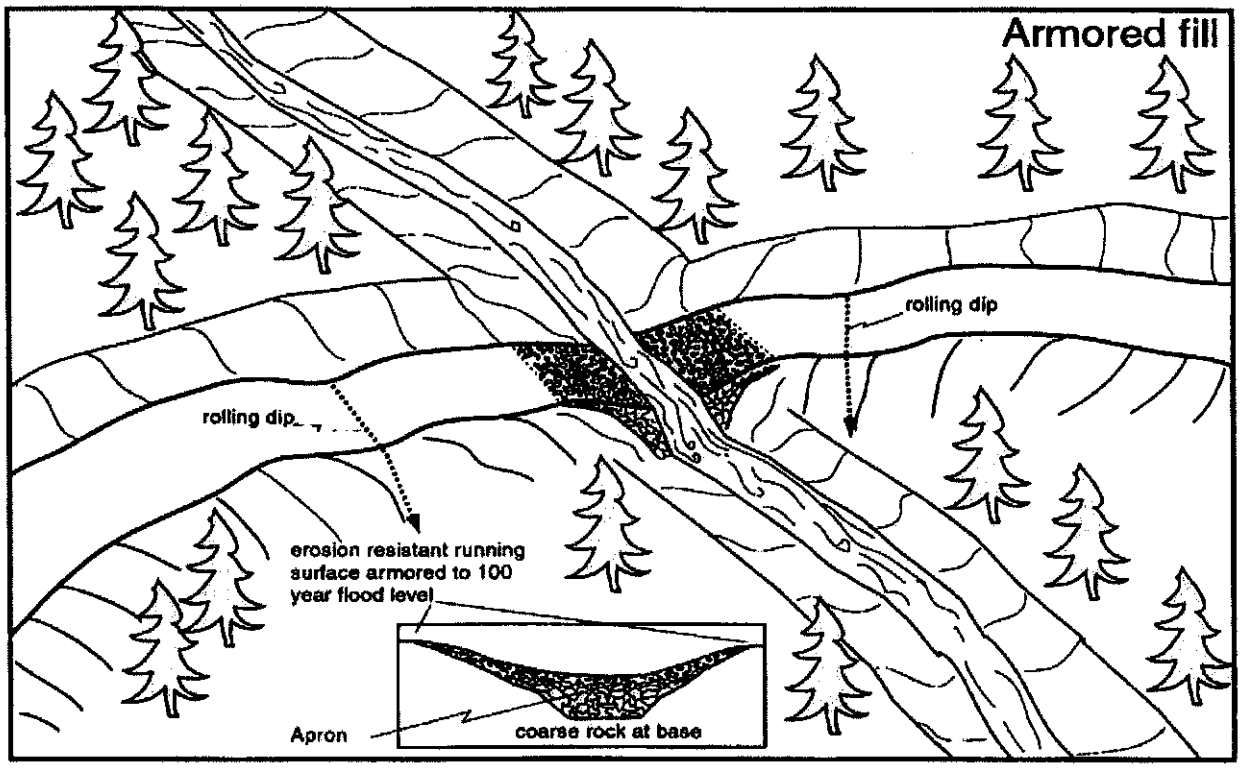


Figure 3. Typical armored stream crossing. From CDFG (2006).

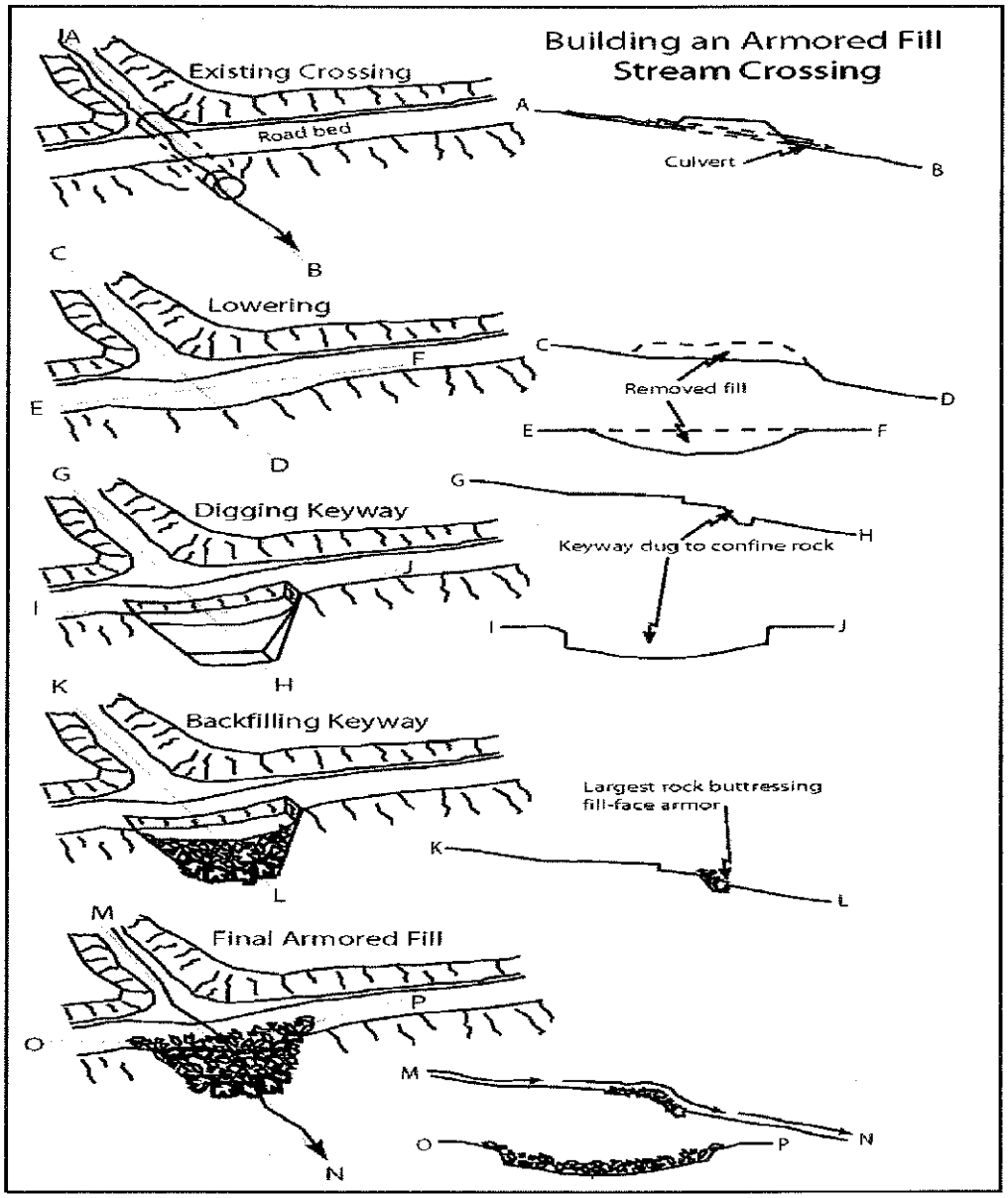


Figure 4. Design elements of a typical armored fill crossing. Note: where geotextile fabric may interfere with passage of amphibians in any Class 2 or 3 crossing, bury geotextile fabric with at least 6 inches of rock. Do not expose geotextile fabric in the bed of fish-bearing stream channels. From CDFG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

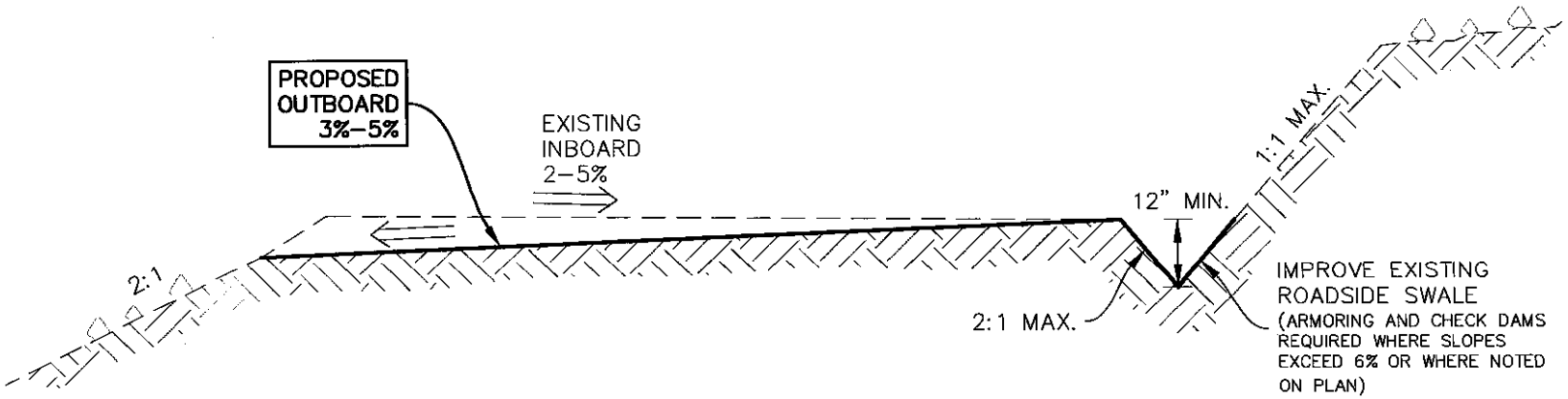
Source Material for Road BMP RD-2.7 Fords

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

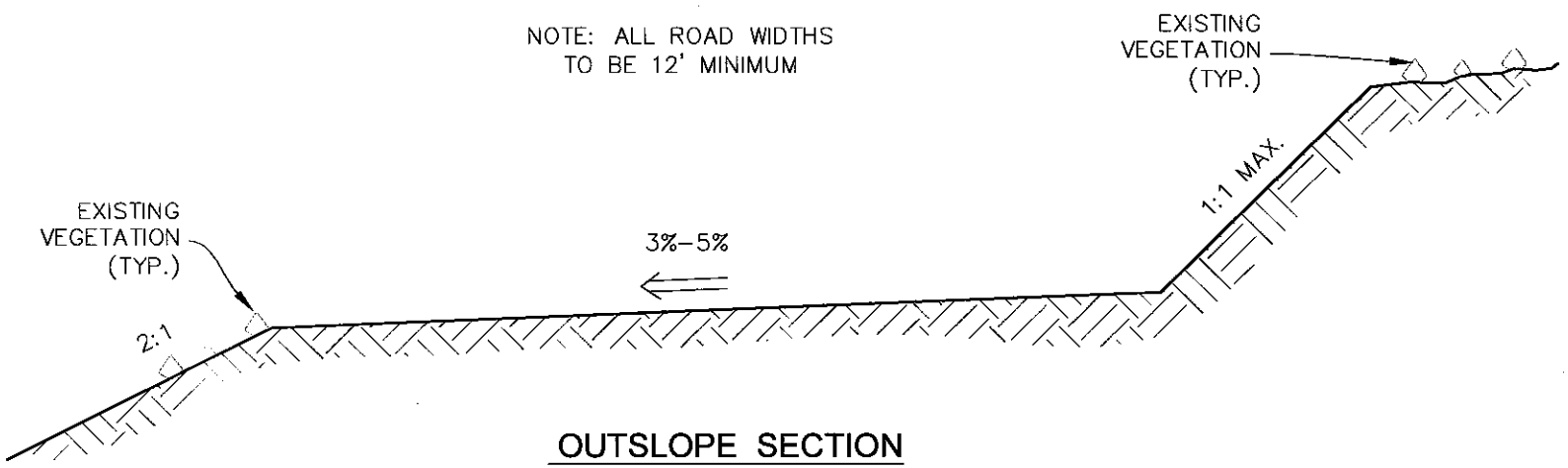
NOTE: ALL ROAD WIDTHS TO BE 12' MINIMUM AND ROCKED/REINFORCED WITH 2"MINIMUM AGG. BASE FROM ON SITE SOURCE



OUTSLOPE ROAD W/ INBOARD SWALE

RD-1.4 OUTSLOPED ROAD

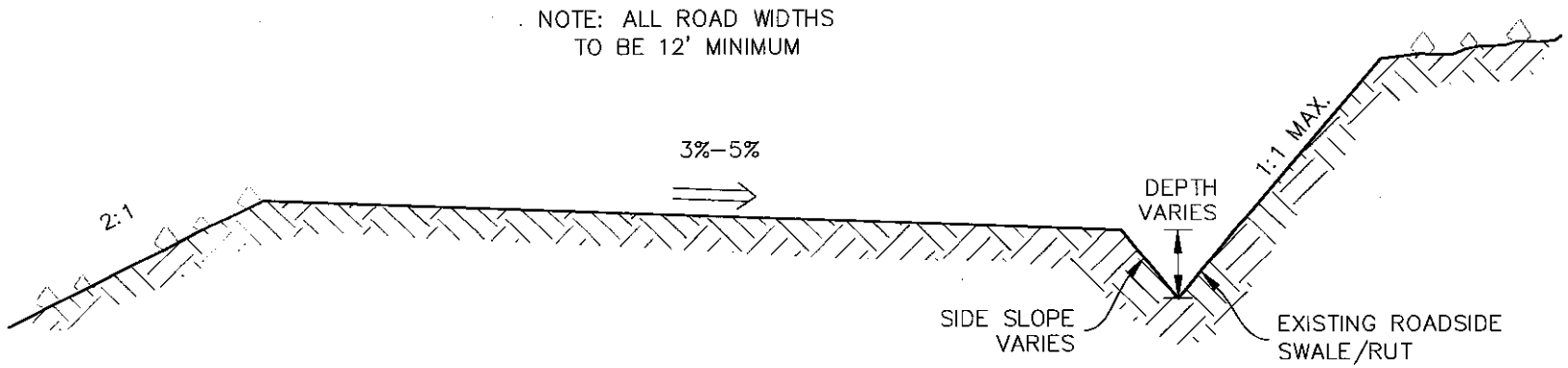
NOTE: ALL ROAD WIDTHS TO BE 12' MINIMUM AND ROCKED/REINFORCED WITH 2"MINIMUM AGG. BASE FROM ON SITE SOURCE



OUTSLOPE SECTION

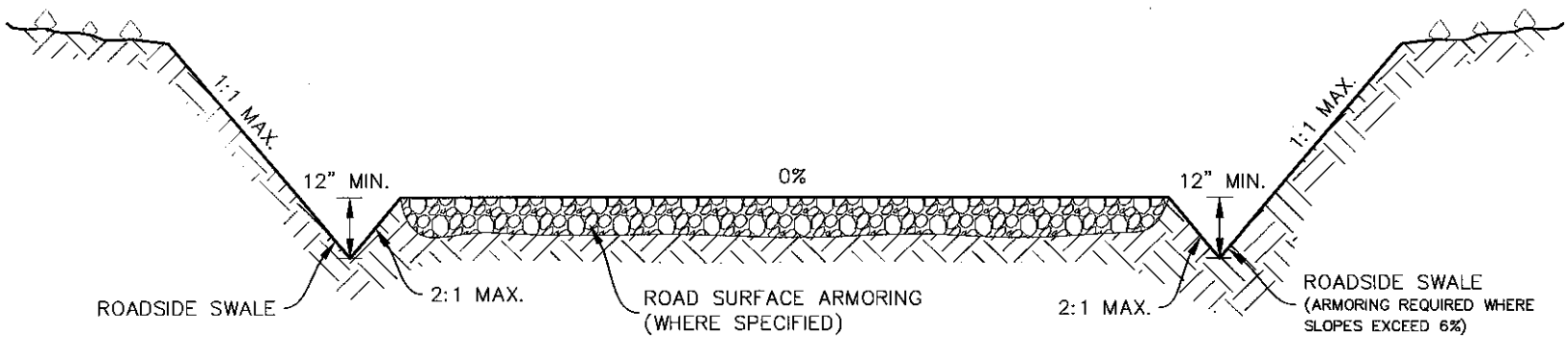
RD-1.5 INSLOPE ROAD

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).

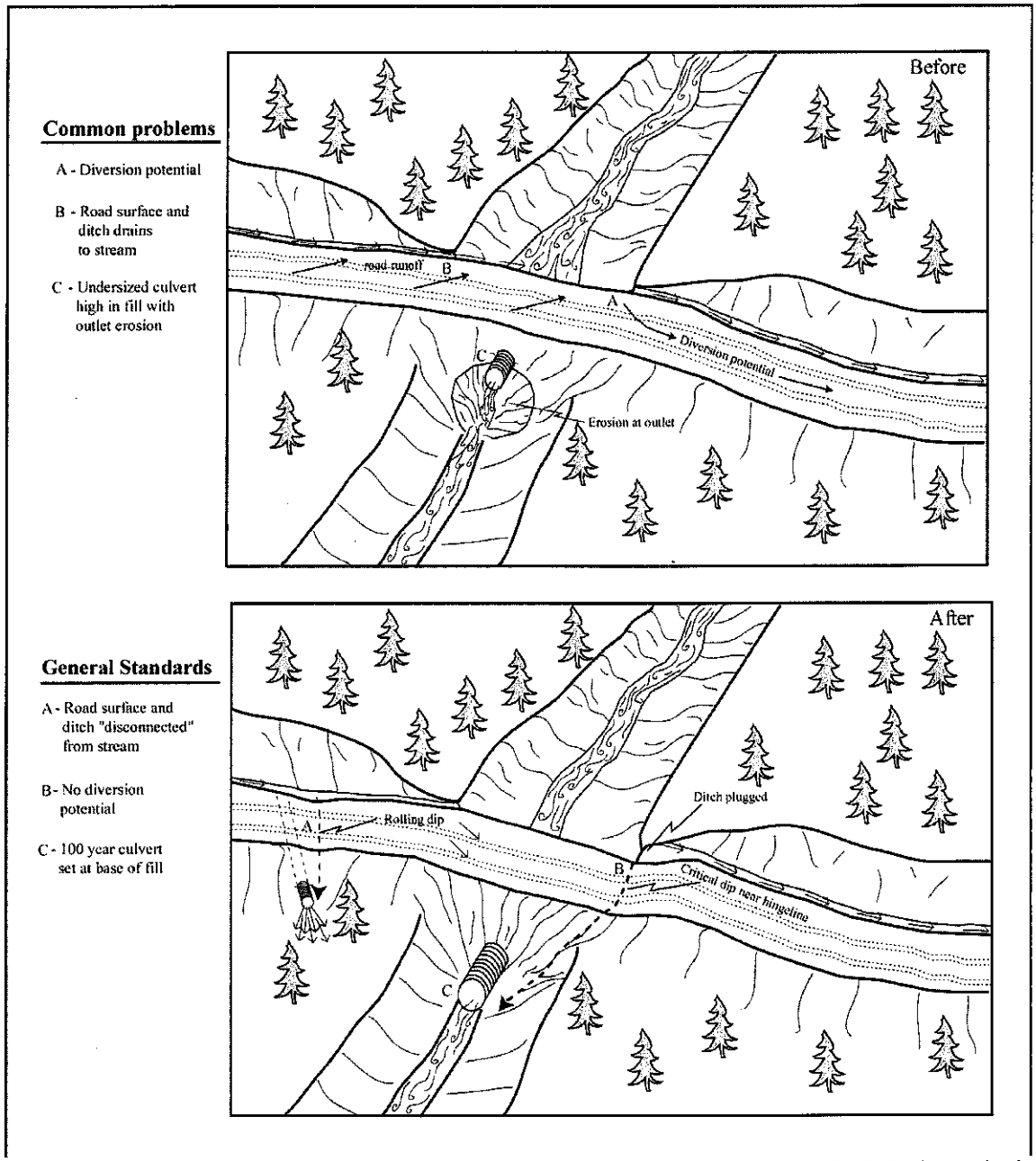


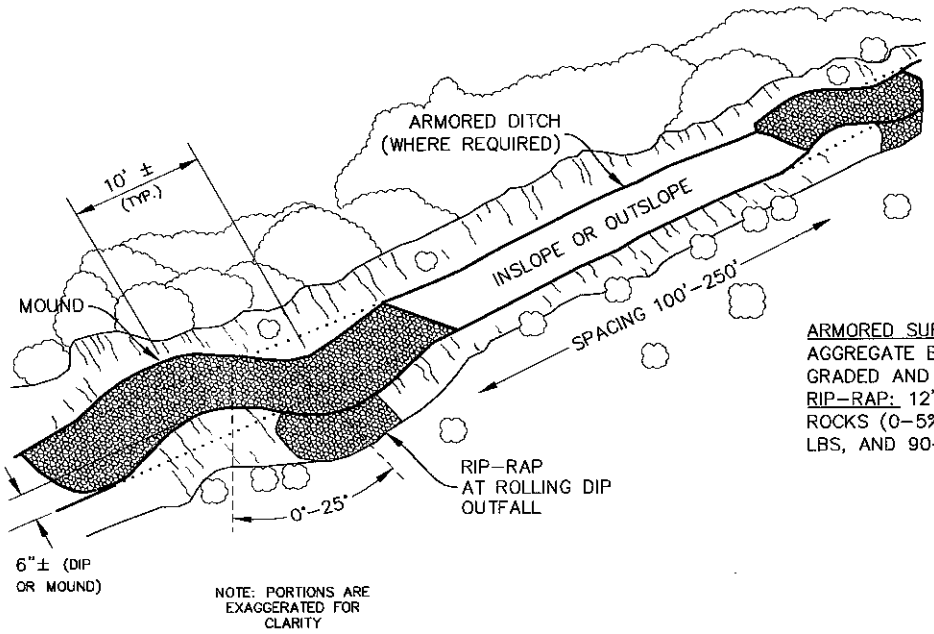
Figure 1. Install critical dips to prevent diversion prevention at stream crossings. Critical dips should be designed to handle the flow from a 100-year storm event. From CDFG (2006).

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



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.

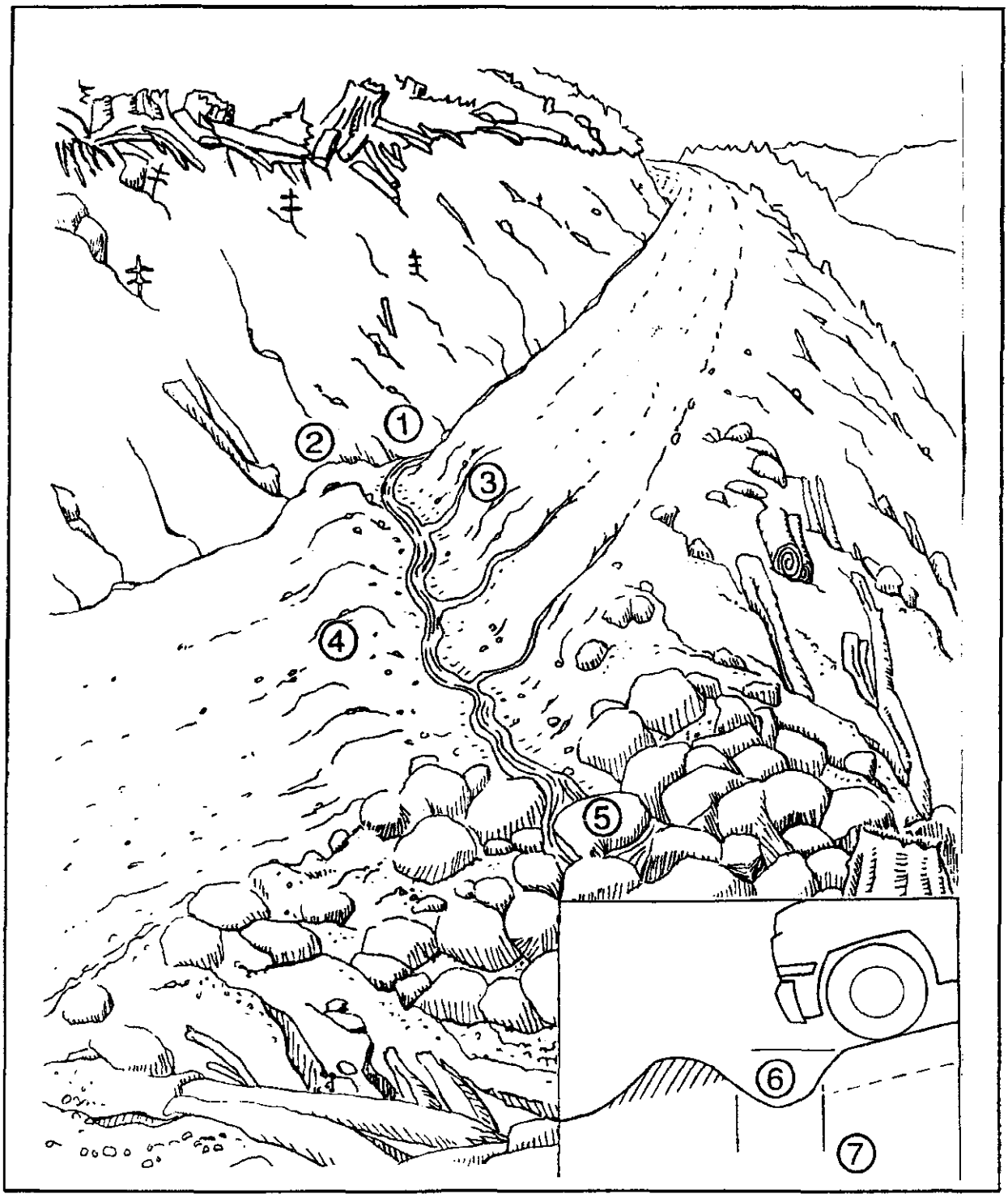


Figure 1. Waterbars are constructed on unsurfaced forest and ranch roads that will have little or no traffic during the wet winter period. The waterbar should be extended to the cutbank to intercept all ditch flow (1) and extend beyond the shoulder of the road. A berm (2) must block and prevent ditch 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).

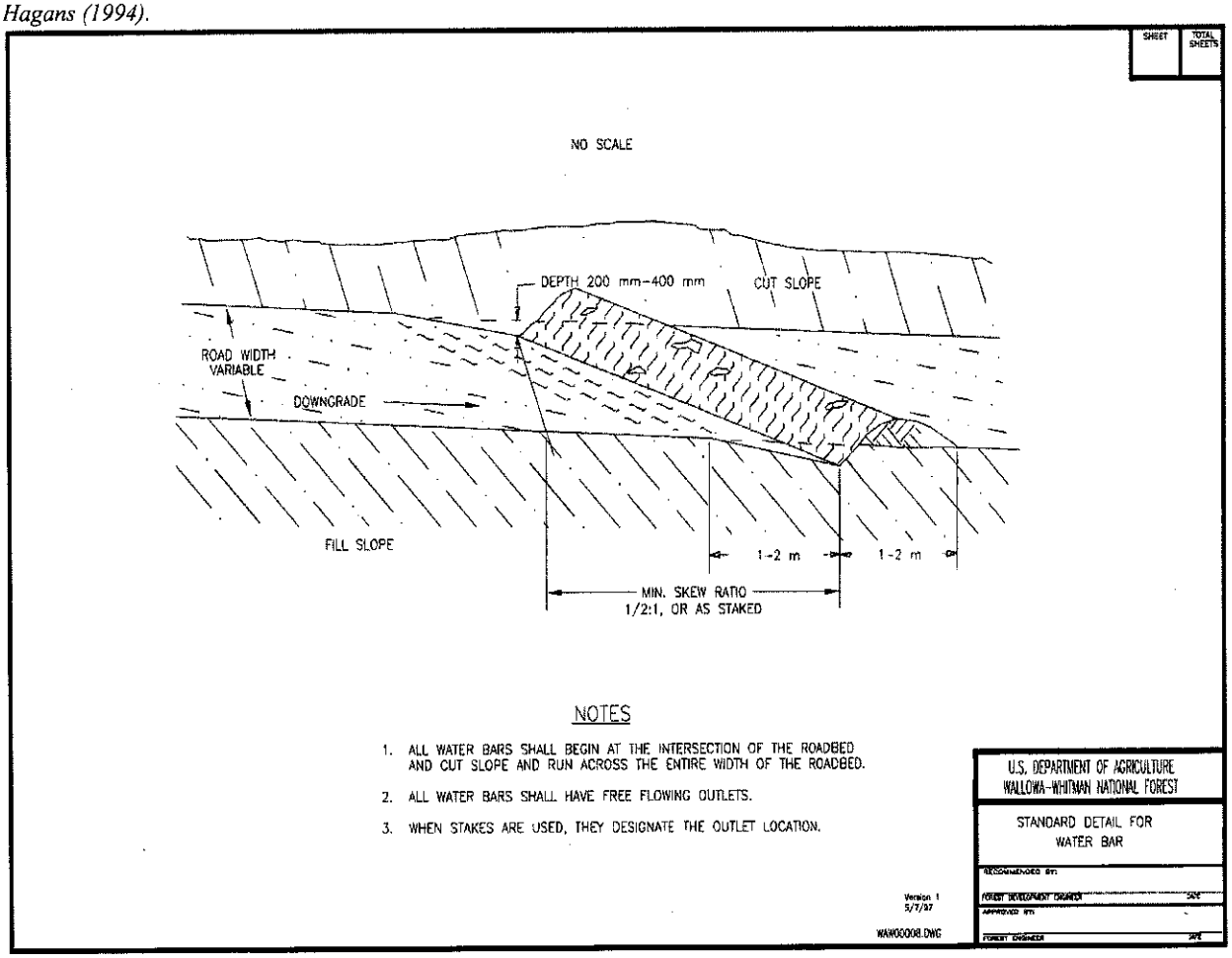


Figure 2. Typical design of a waterbar. From US Forest Service.

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.*

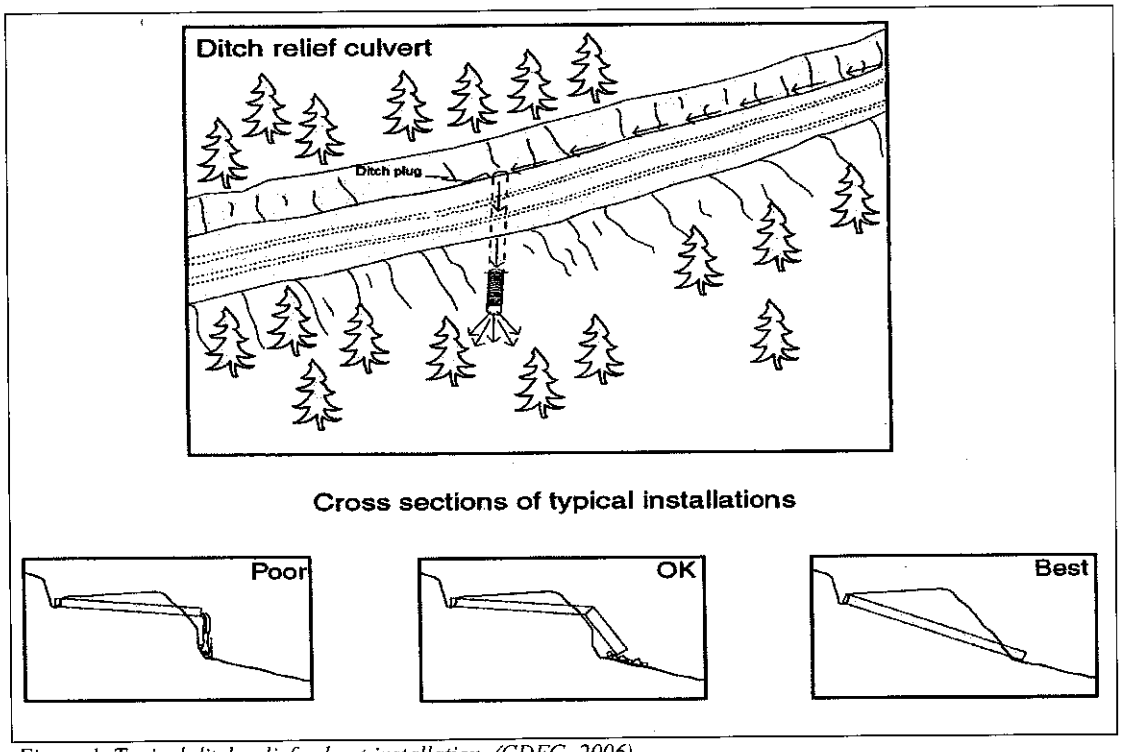


Figure 1. Typical ditch relief culvert installation. (CDFG, 2006)

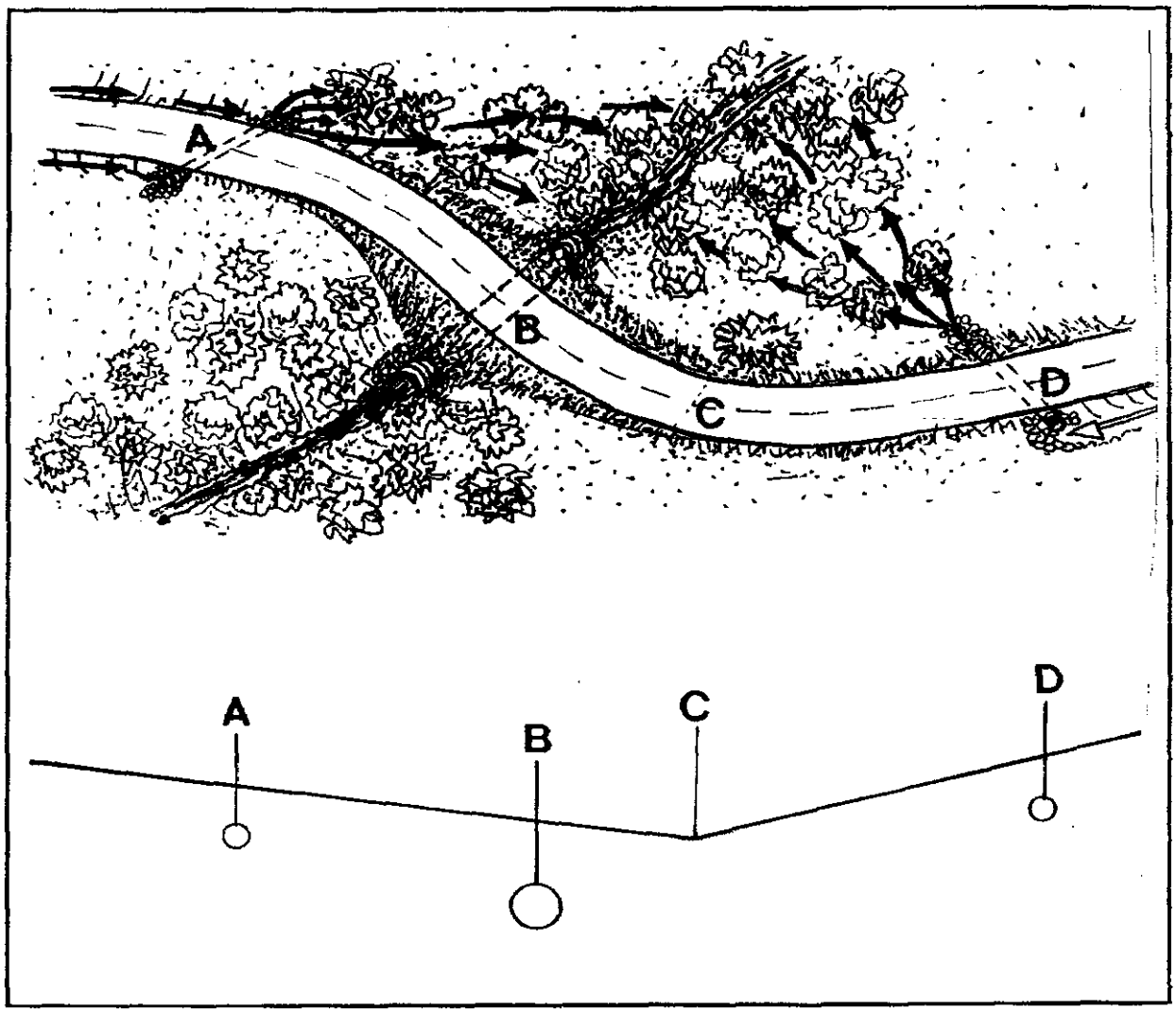


Figure 2. Where a road approaches a stream crossing (B), ditch flow should be culverted across the road (A,D) and discharged into a vegetated buffer that can filter the runoff before it reaches the watercourse. If the stream culvert plugs with debris or is topped by flood flows, flow will spillover the 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.

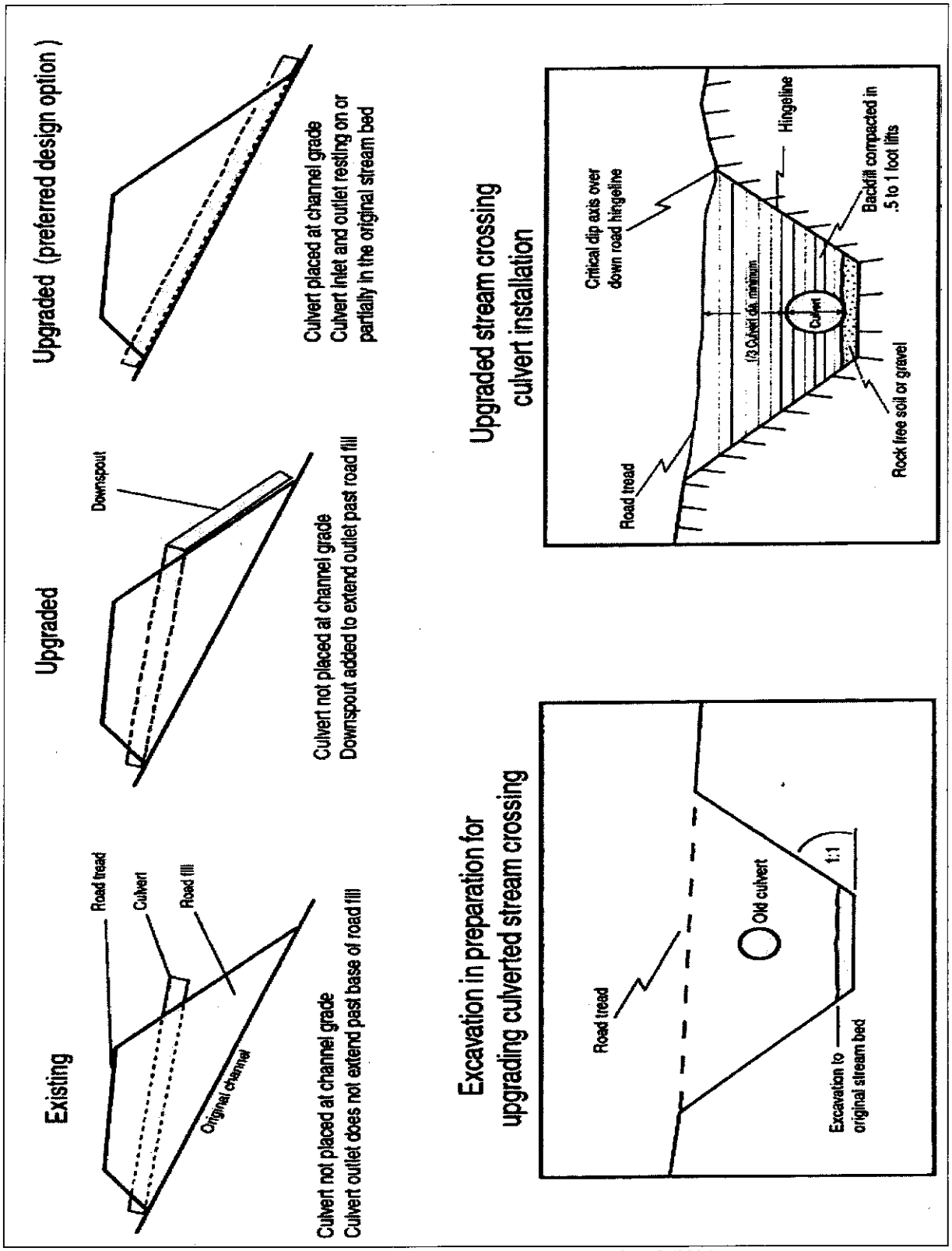


Figure 1. Typical stream crossing installation on non fish-bearing streams. From CDFG (2006).

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).

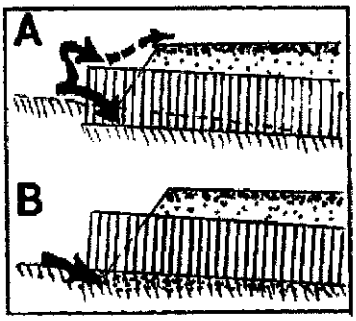
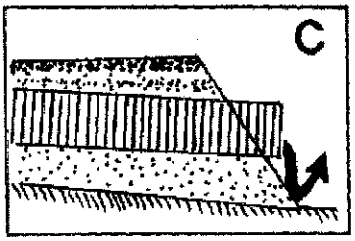


Figure 69c. If the culvert outlet is placed too high in the fill (C), flow at the outfall will erode the fill.



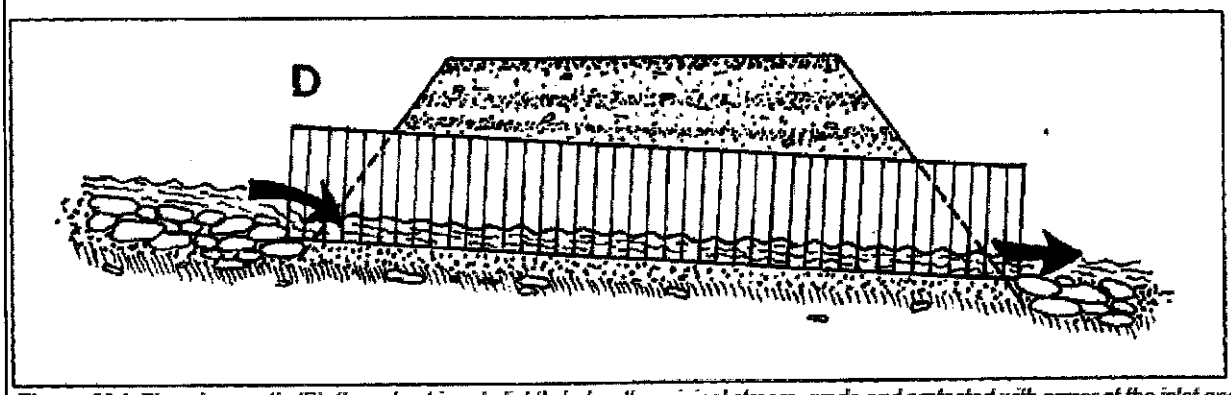


Figure 69d. Placed correctly (D), the culvert is set slightly below the original stream, grade and protected with armor at the inlet and outlet.

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).

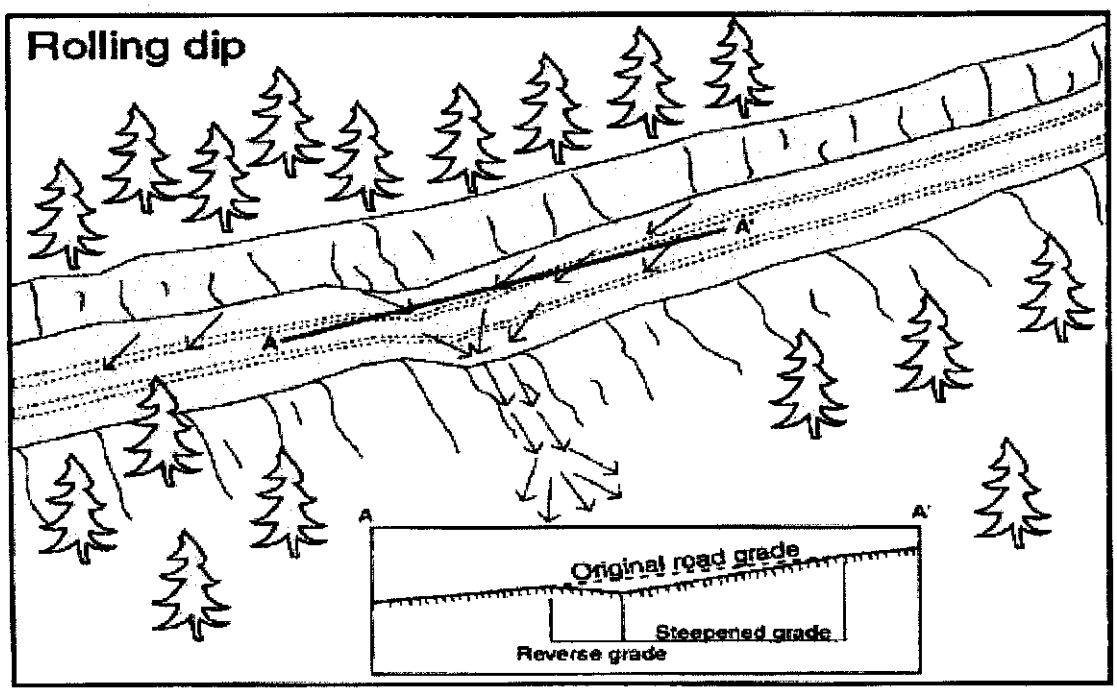


Figure 1. Use of rolling dips to reduce ditch erosion and surface runoff. Rolling dips must drain the road surface and be driveable for the expected traffic. From CDFG (2006).

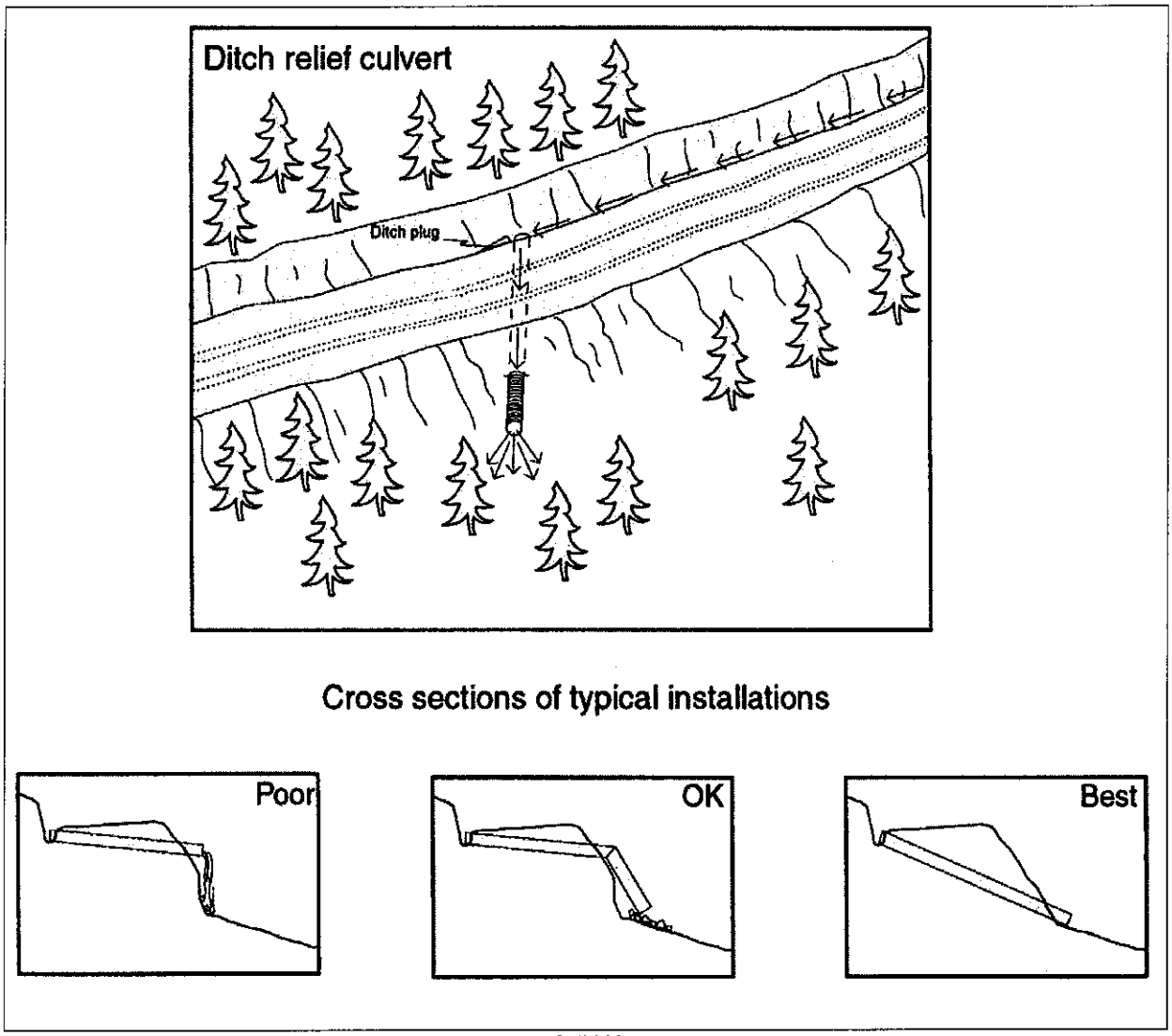


Figure 2. Typical ditch relief culvert installation. From CDFG (2002).

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 fan-	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).

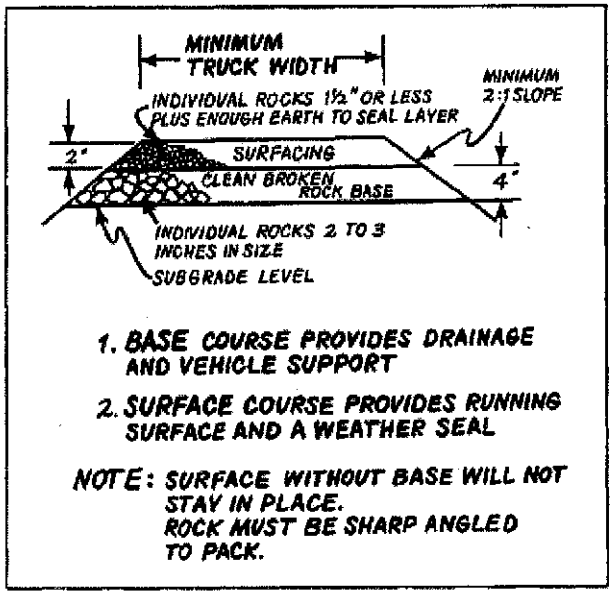


Figure 1. Cross section diagram showing typical base-course and surface-course application for forest and rand roads (USDA_SCS, 1983). From Weaver and Hagans (1994).

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 USDA-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.

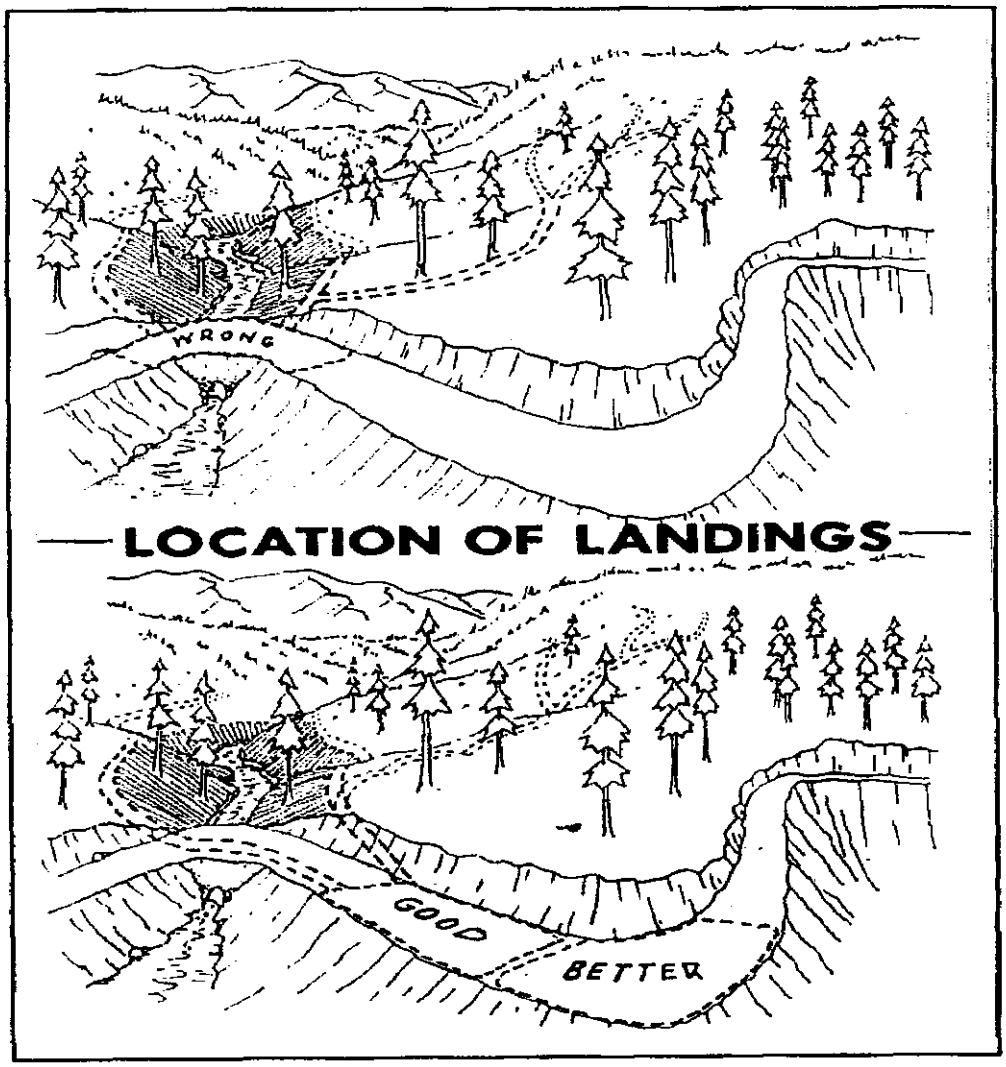


Figure 1.. Log landings on forest road systems should be kept to the absolute minimum size necessary to accommodate yarding, loading and hauling equipment and the minimum number needed to remove timber resources. Landings constructed on gentle ground and broad ridge crests far removed from stream channels 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

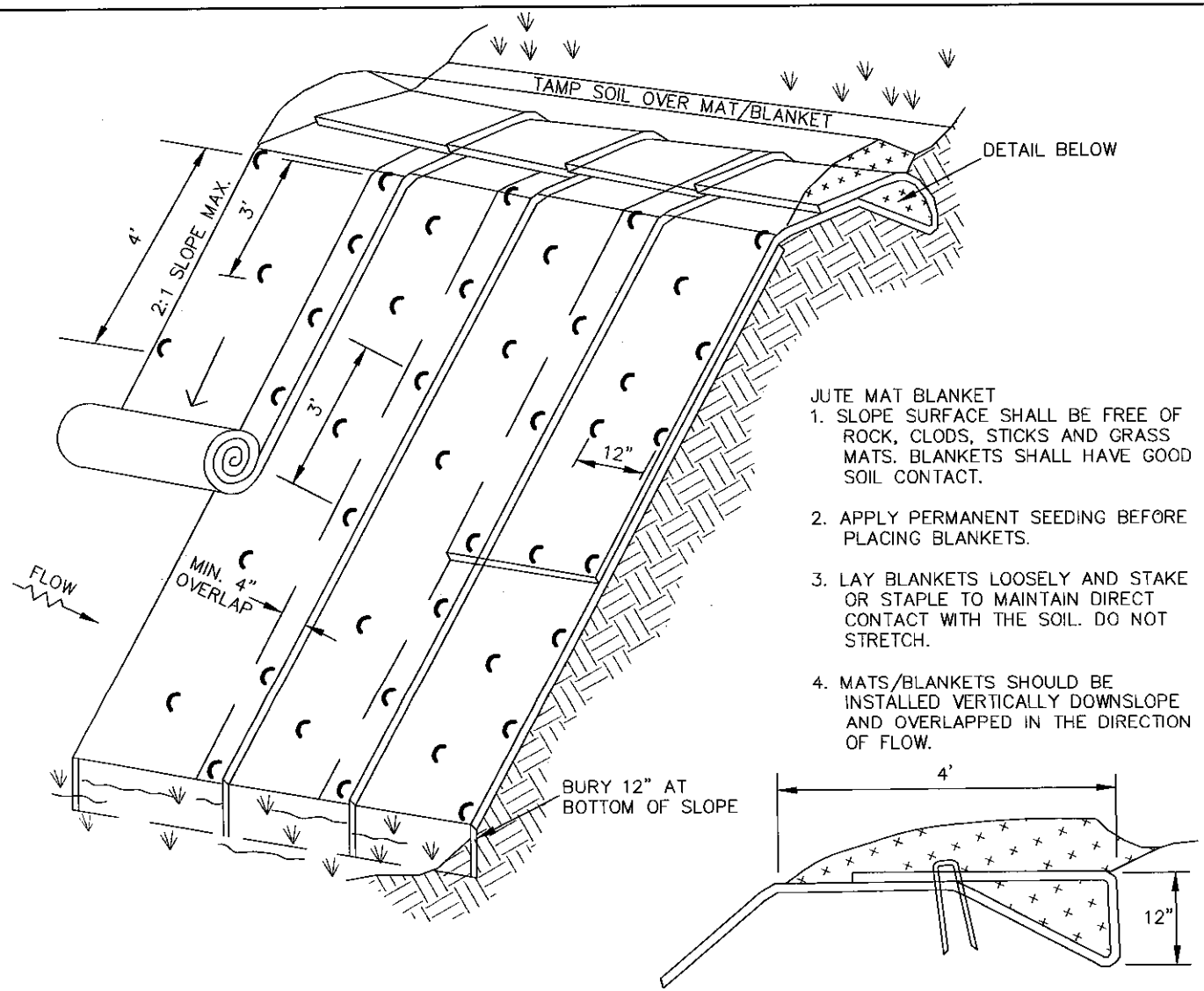
Closure Type	Description	Purpose Application
Blockage with On-Site Materials	Rock, logs, stumps, slash piles, posts, water bars, tank traps, decomposition	Discourage use, economical, dependent on-site and available material
Vegetative Planting, Seeding	Trees, shrubs, cactus, and grass seeding, recycled 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.

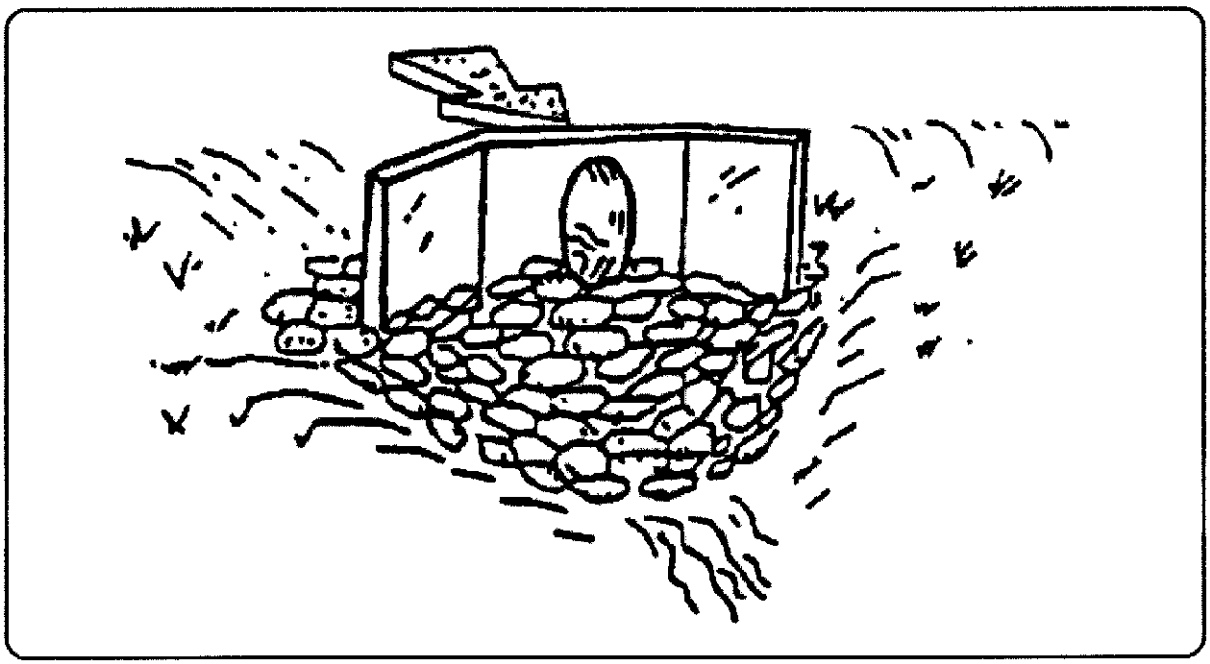


Figure 1. Flared outlet with rock energy dissipater. From Weber County, UT.

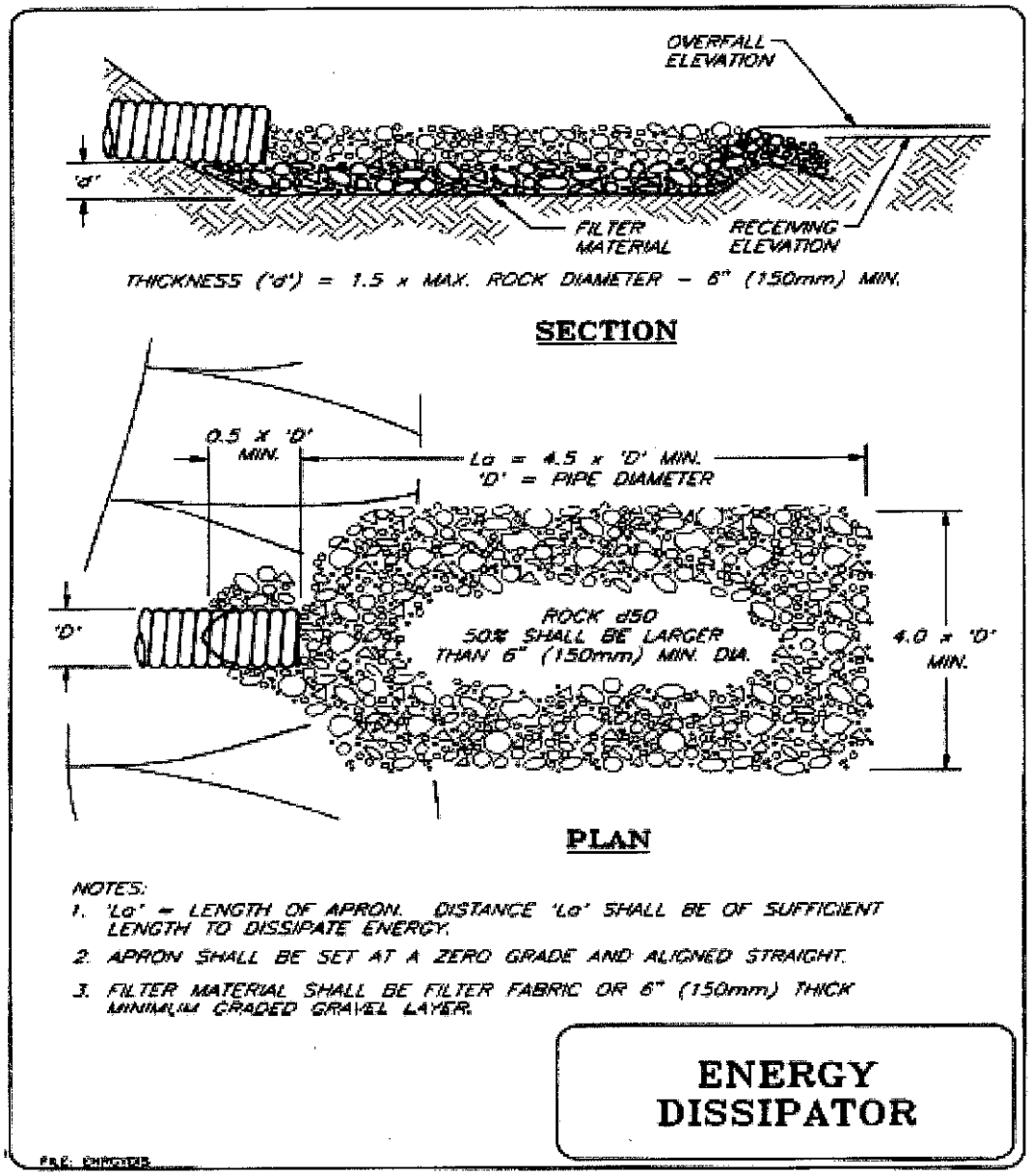


Figure 2.Rock energy dissipater. From 2004 Fishnet 4C. Adapted from 1994 McCullah.

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:

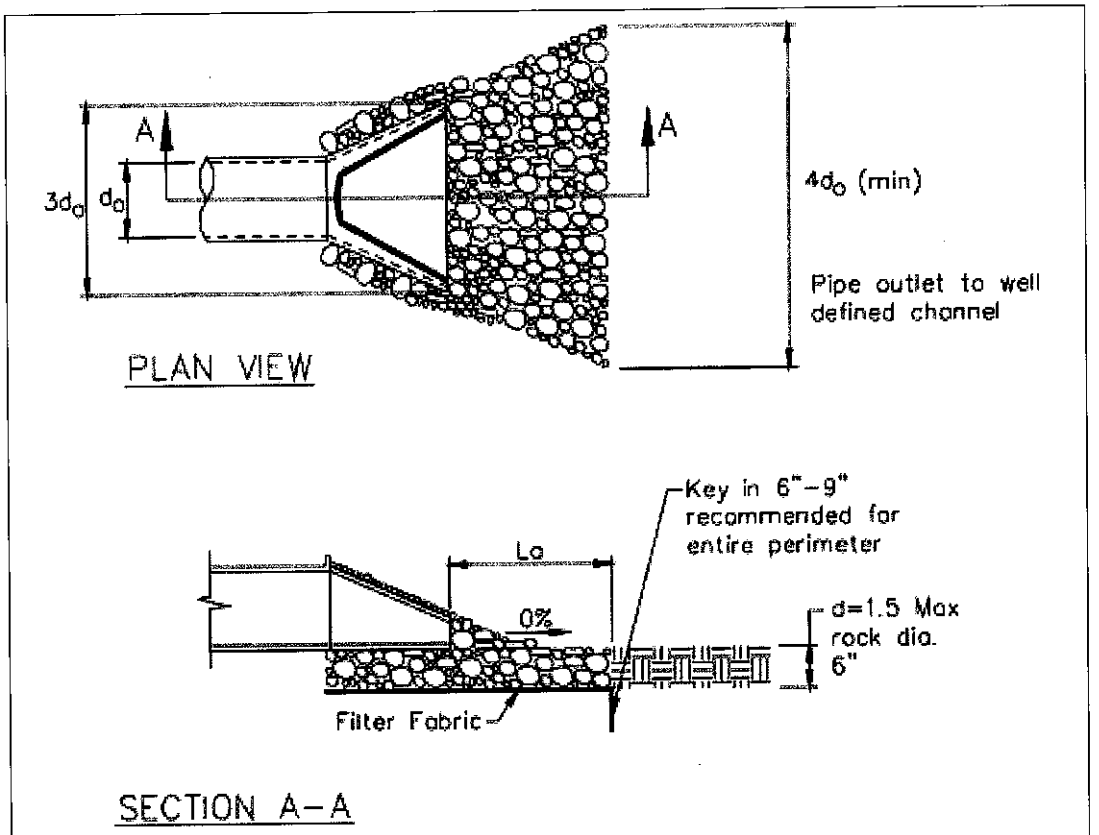
- Wherever discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach.
- Rock outlet protection is best suited for temporary use during construction because it is usually less expensive and easier to install than concrete aprons 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).

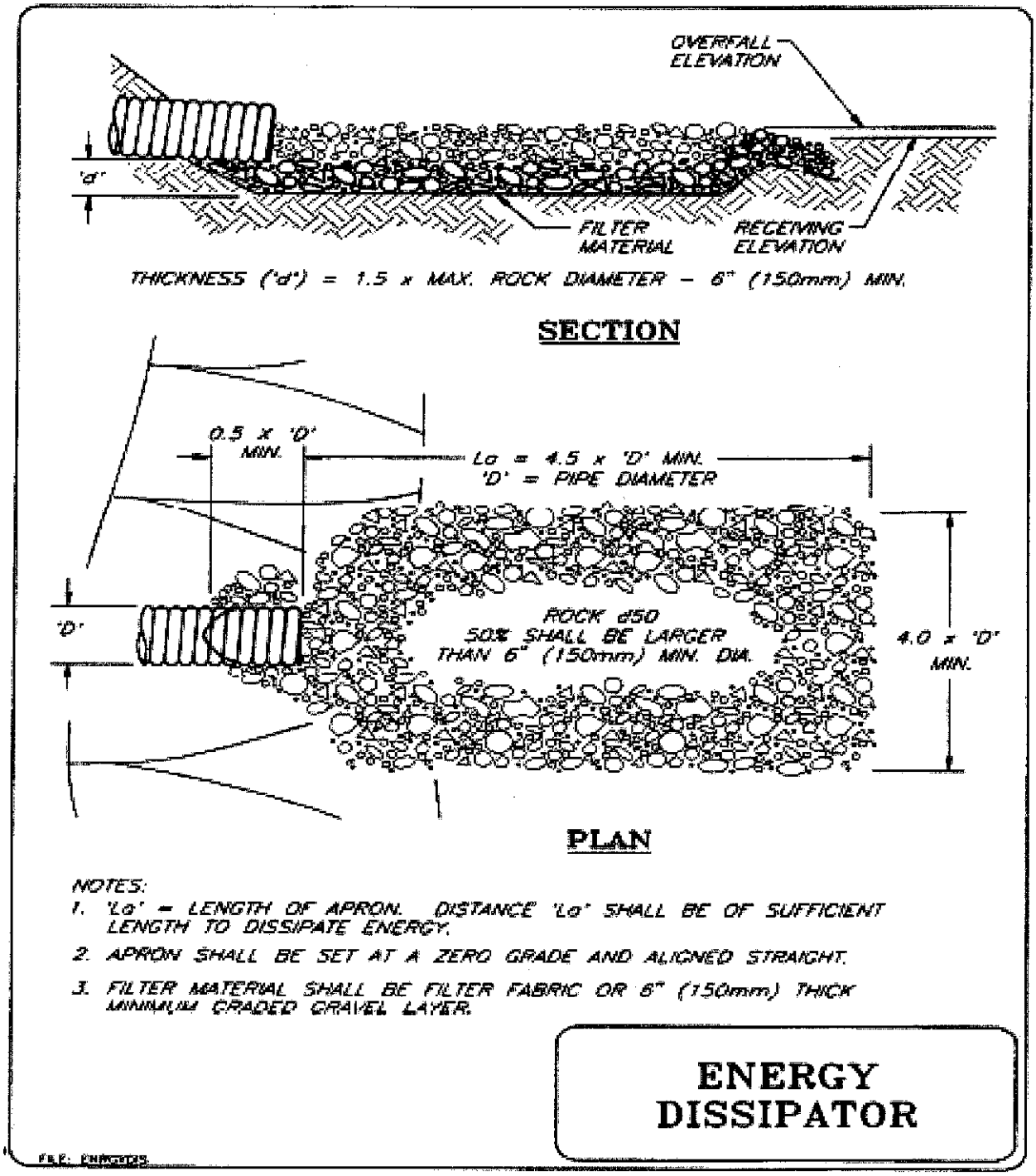


Figure 2. Rock energy dissipater. From 2004 Fishnet 4C. Adapted from 1994 McCullah.

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).

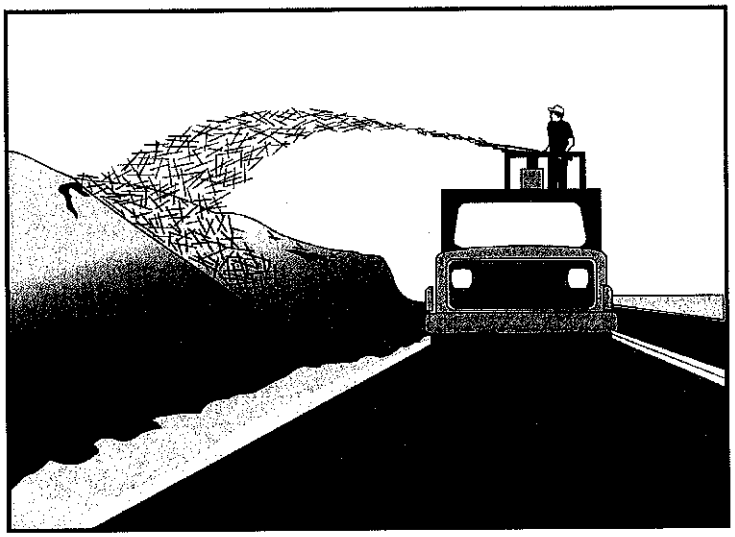
<u>Source Material for Road BMP RD-2.16 Stockpile Management</u>

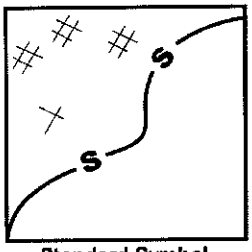
2003. California Department of Transportation (CALTRANS). Storm Water Quality Handbooks – Construction Site Best Management Practices (BMPs) Manual.

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

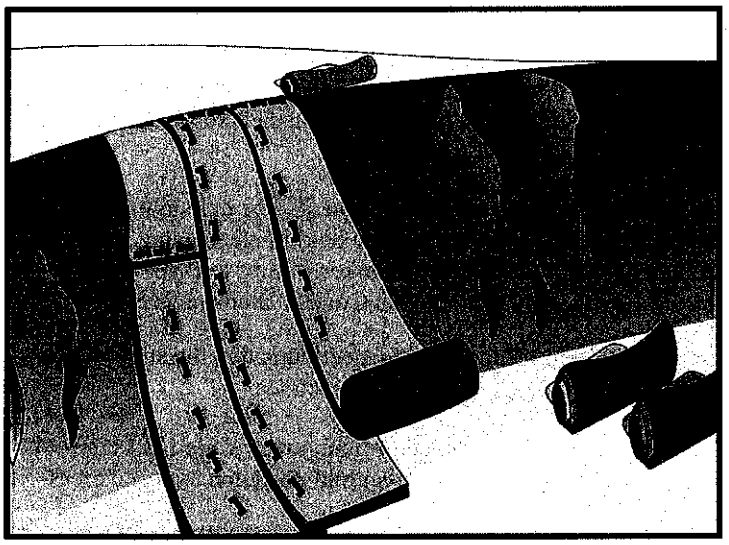
- The key consideration in Maintenance and Inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while DSAs are non-active. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw 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.

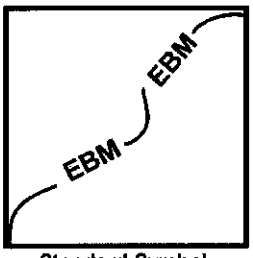
Source Material for Construction BMP SS-6

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.

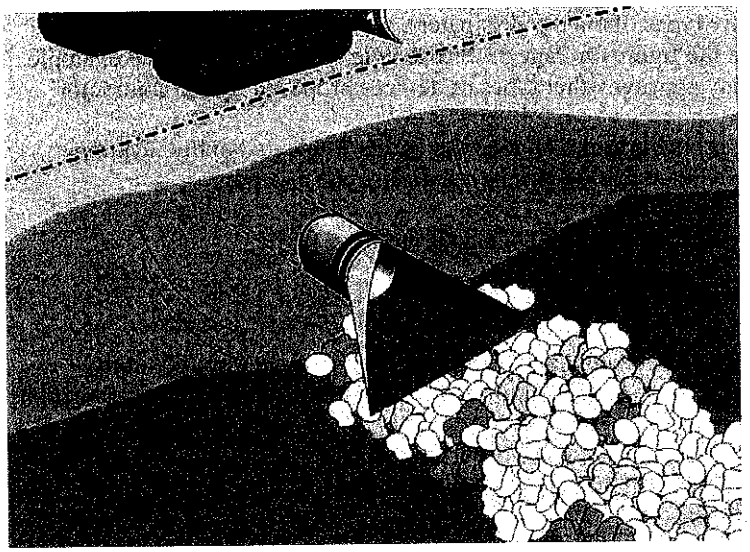
- All blankets and mats shall be inspected periodically after installation.
- Installation shall be inspected after significant rain storms to check for erosion and undermining. Any failures shall be repaired immediately.
- If washout or breakage occurs, re-install the material after repairing the damage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

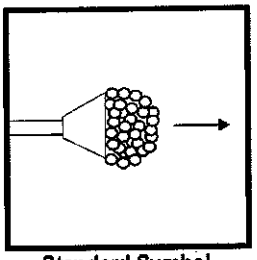
Source Material for Construction BMP SS-7 Geotextiles, Mats, Plastic Covers and Erosion Control Blankets

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

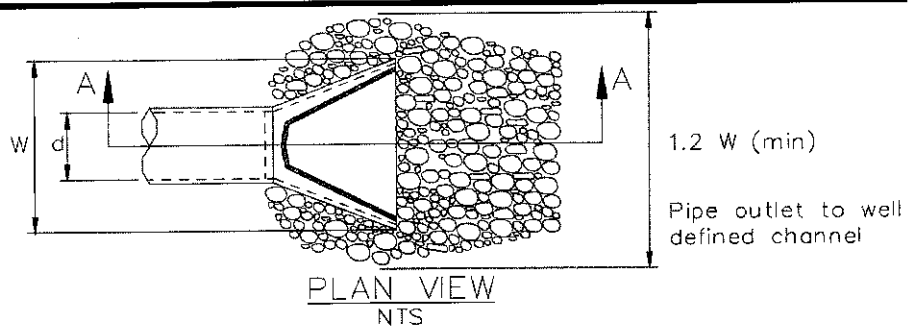
- There are many types of energy dissipaters, with rock being the one that is represented in the figure on Page 3. Please note that this is only one example and the RE may approve other types of devices proposed by the contractor.
- Install riprap, grouted riprap, or concrete apron at selected outlet. 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.

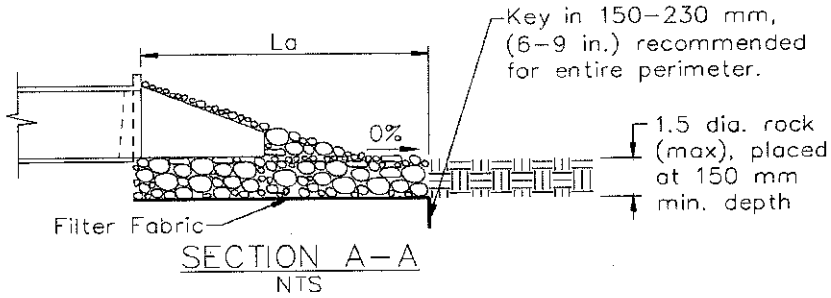
Maintenance and Inspection

- 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			

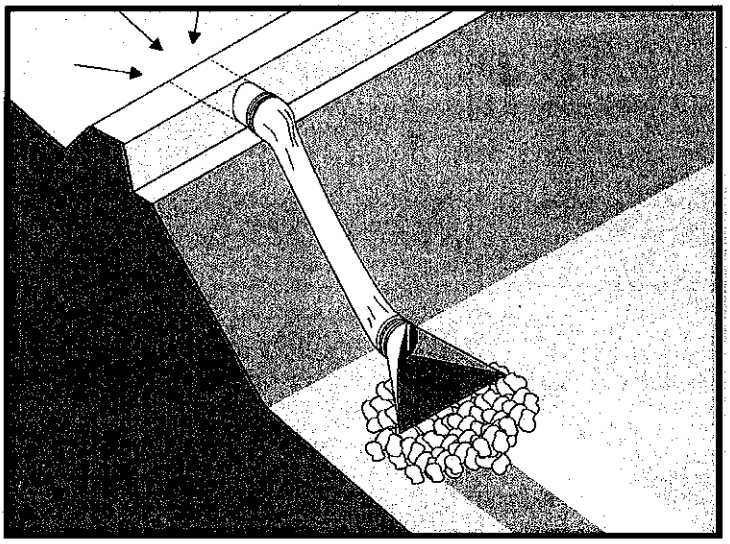
Source: USDA – SCS

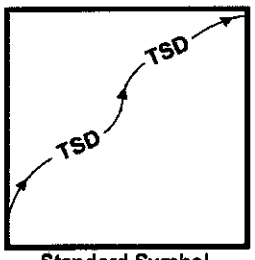
Source Material for Construction BMP SS-10 Outlet Protection

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

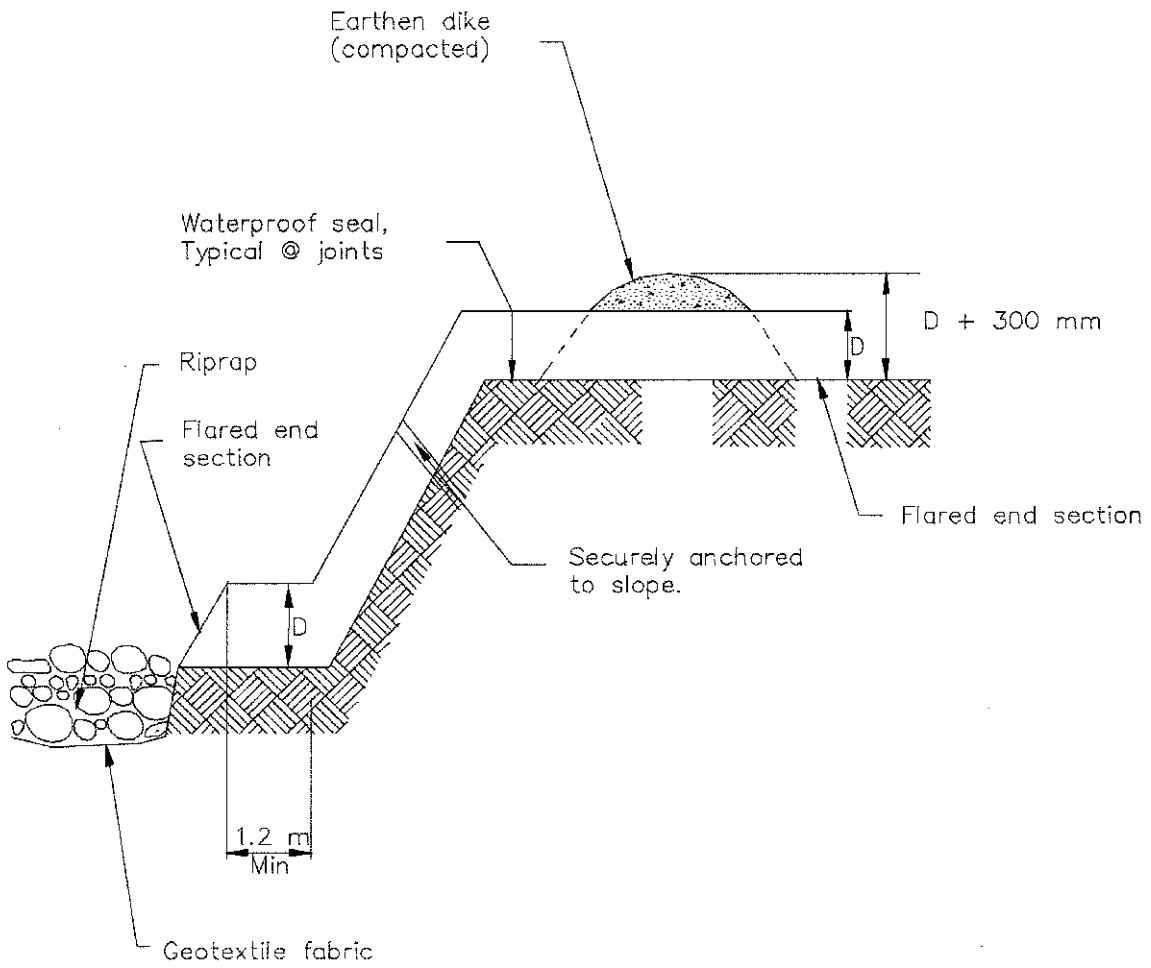
- Compact soil around and under entrance, outlet, and along length of pipe.
- Securely anchor and stabilize pipe and appurtenances into soil.
- Check to ensure that pipe connections are water tight.
- Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation 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

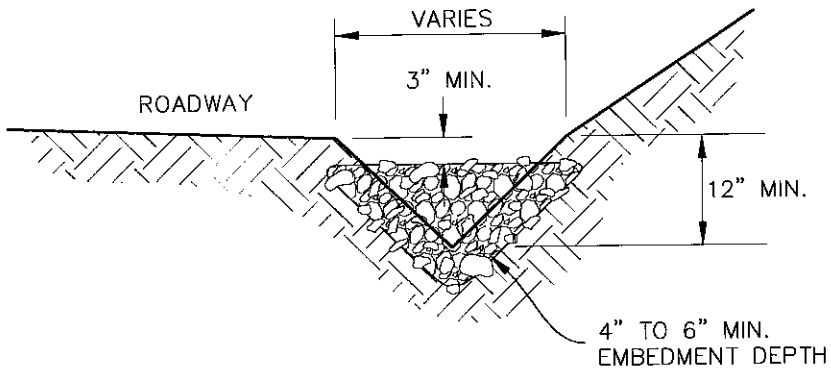


TYPICAL SLOPE DRAIN
NOT TO SCALE

Source Material for Construction BMP SS-11 Slope Drains

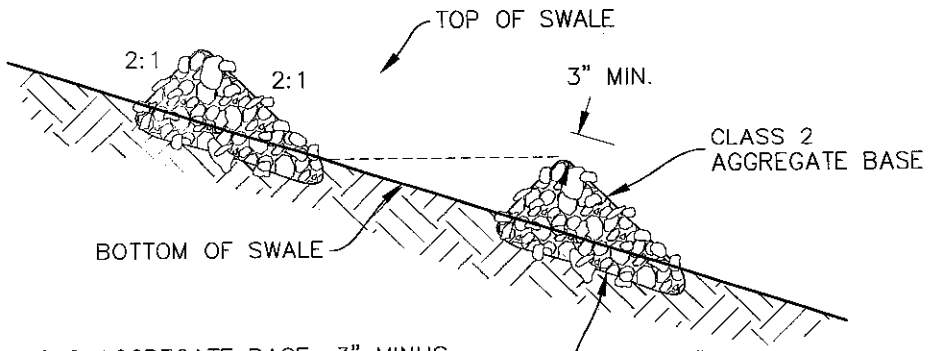
2003. State of California Department of Transportation. Caltrans Storm Water Quality Handbook Construction Site BMP Manual.

SC-1.1 CHECK DAMS



SECTION VIEW

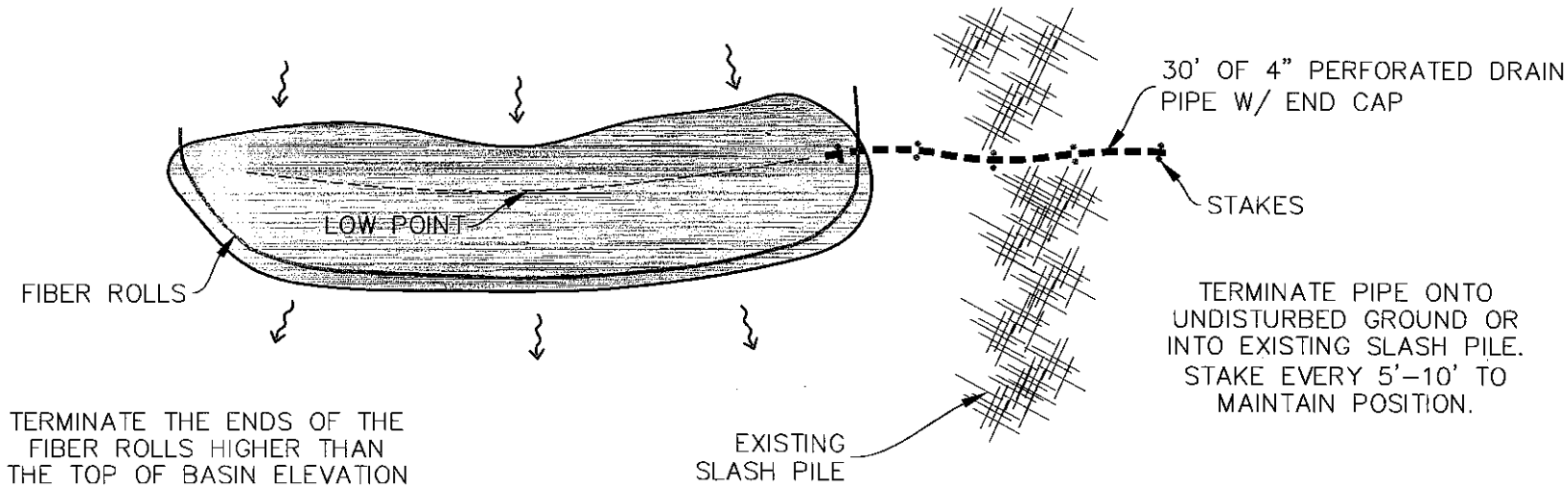
CHECK DAMS:
1. CHECK DAMS SHALL BE INSTALLED AT ALL LOCATIONS INDICATED ON THE WRPP, AND AT ANY OTHER LOCATION DEEMED NECESSARY BY THE SITE CONTRACTOR.
2. CHECK DAMS SHOULD BE SPACED SO THAT THE TOE OF CHECK DAM IS THE SAME ELEVATION AS THE TOP OF THE CHECK DAM BELOW.
3. CHECK DAMS SHOULD BE IMBEDDED 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.



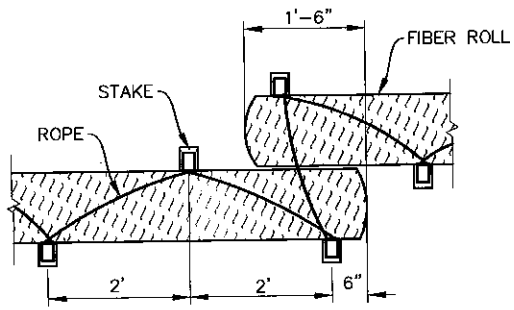
CLASS 2 AGGREGATE BASE: 3" MINUS, WELL GRADED AND LESS THAN 5% CLAYS

CHCECK DAM SPACING

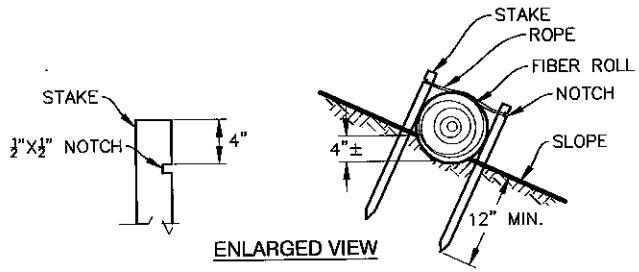
SC1.2 TEMPORARY SEDIMENT BASIN



SC-1.3 FIBER ROLLS



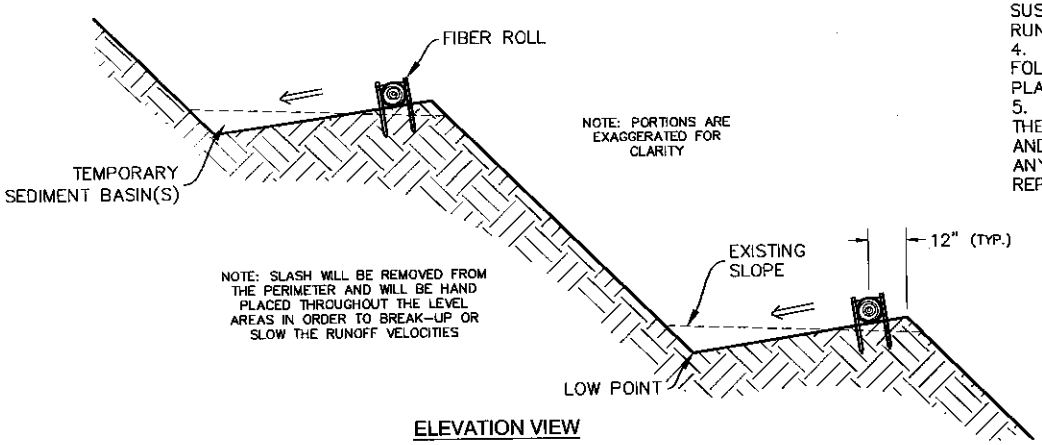
PLAN VIEW



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

APPENDIX E: REFERENCES

APPENDIX F:
WATER DIVERSION DATA SHEETS

Appendix F: Water Diversion, Storage, and Use

SWRCB Cannabis Cultivation Waste Discharge Regulatory Program Site Management Plan Water Diversion, Storage, and Use	Name: Maromo, LLC APN: 107-144-020, 107-144-021 Year:

Total surface water diversion by source and month (gallons)

Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Cannabis - Spring													
Domestic - Spring													

Water input to storage by source and month (gallons)

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

Water use by source and month (gallons)

Use-Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Cannabis-Storage													
Cannabis-Diversion													
Domestic-Diversion													
Domestic-Storage													

**Note: data is an approximation and is subject to change upon further analysis.*

APPENDIX G: FERTILIZER, PESTICIDE, HERBICIDE, & RODENTICIDE PRODUCT LIST & RECORDS

Appendix G: FERTILIZER, PESTICIDE, HERBICIDE, AND RODENTICIDE PRODUCT LIST AND RECORDS

Type	Brand	N-P-K	Total Nitrogen (lbs) Applied*	Total Phosphorous (lbs) Applied*
Growing Medium/Soil	Black Gold (every 2-3 years)	0.05-0-0	0.2	0
Fertilizer, Amendment, Additive **(Application rate: 0.25 lbs each/plant)**	Blood Meal	13-0-0	52	0
	Bone Meal	1-12-0	4	48
	Fish Meal	10-4-0	40	16
	Feather Meal	12-0-0	48	0
	Horse Manure	0.7-0.3-0.6	2.8	1.2
	Compost	-	-	-
	Granulated Kelp	1-0.15-2	4	0.6
	Bat Guano	4-6-1	16	24
	Chicken Manure	3-2-2	12	8
Pesticide/Herbicide	Safer Brand Neem Oil	N/A	N/A	N/A
	Flying Skull Plant Product's Nukem	N/A	N/A	N/A
			179	97.8

Applied during 2018

FERTILIZER, PESTICIDE, HERBICIDE, AND RODENTICIDE PRODUCT RECORDS

**Gallons or pounds applied each month*

Year: _____

Product	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec

APPENDIX H: MONTHLY BPTC MONITORING & MAINTENANCE DATA SHEETS

Appendix H: Monthly BPTC Monitoring and Maintenance Records

Monitoring Data Sheet for SWRCB Cannabis Regulatory Program
(BPTC Effectiveness Monitoring)

Inspector(s): _____ Date:_____

Owner: _____ APN:_____

Inspection Period (Circle) < Oct 15, < Dec 15, 0.5 in/day or 1 in/7 days

Other:_____

Map Point	BPTC	*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	BPTC	*Condition: G/M/R	Comment

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

APPENDIX I: STREAMBED ALTERATION AGREEMENT, WATER MANAGEMENT PLAN & DIVERSION RECORDS

RECEIVED

DEC 06 2018

CDFW - EUREKA

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
REGION 1 – NORTHERN REGION
619 Second Street
Eureka, CA 95501

STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2017-0877-R1
Unnamed Tributary to Honeydew Creek, Tributary to the Mattole River and the Pacific Ocean

Maureen Catalina
Catalina Water Diversion and Stream Crossings Project
21 Encroachments

This Lake or Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and Maureen Catalina (Permittee).

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, the Permittee initially notified CDFW on December 21, 2017, revised October 01, 2018, that the Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, the Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, the Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project to be completed is located within the Mattole River watershed, approximately 2 air miles S/SE of the town of Honeydew, County of Humboldt, State of California. The project is located in Sections 07 and 18 of T03S, R01E, Humboldt Base and Meridian; in the Honeydew U.S. Geological Survey 7.5-minute quadrangle; Assessor's Parcel Numbers 107-144-020 and 107-144-021; latitude 40.2131 N and longitude 124.1184 W at the first point of diversion (POD).

PROJECT DESCRIPTION

The project is limited to 21 encroachments (Table 1). Three encroachments are for water diversions from Honeydew Creek and unnamed tributaries to Honeydew Creek. Water is diverted for domestic use and irrigation. Work for the water diversion will

include use and maintenance of the water diversion infrastructure. The 18 other proposed encroachments are to upgrade failing and undersized culverts. Work for these encroachments will include excavation, removal of the failing culverts, replacement with new properly sized culverts, backfilling and compaction of fill, and rock armoring as necessary to minimize erosion. Crossings #10, 14, and 17 are ditch relief culverts and are not included as LSAA projects. Additionally, the Permittee has disclosed a rain water catchment pond located at 40.2142, -124.1140.

Table 1. Project Encroachments with Description

ID	Latitude/Longitude	Description
Crossing #1	40.2139 , -124.1155	Stream Restoration. Remove existing 36"x110 ft plastic culvert, decommission stream crossing; rock armor stream banks and restore stream channel. Native riparian vegetation (Red Alder and Willow) will be planted to provide shade and habitat. The restoration will be monitored for effectiveness and any invasive species will be removed. Special care will be taken to ensure adequate fish passage.
Crossing #2	40.2135 , -124.1153	Culvert Replacement. Replace existing 36" corrugated metal pipe (CMP) culvert with an arched 64" CMP set on grade with the stream channel to ensure adequate fish passage.
Crossing #3	40.8036 , -124.1659	Culvert Replacement. Replace existing 22" failing culvert with 24" CMP installed on grade with the stream channel and install 2-3 ditch relief culverts (DRC) on the road to reduce the contributing watershed area for the crossing.
Crossing #4	40.2149 , -124.1131	Culvert/crossing Replacement. Replace existing "Humboldt crossing" and failed culvert with a 36" CMP on grade with the stream channel and to armor the outlet headwall.
Crossing #5	40.2153 , -124.1124	Culvert Replacement. Replace existing 18" smooth plastic pipe with a 36" CMP on grade with the stream channel.
Crossing #6	40.2162 , -124.1113	Bank Stabilization. Remove existing concrete outfall and replace with rocked slope protection rip rap to stabilize slope and dissipate flow energy. Install 1-2 in board ditch DRCs on the road to reduce the contributing watershed area for the crossing.
Crossing #7	40.2164 , -124.1113	Culvert Replacement. Replace existing 18" metal pipe with a 27" CMP and to armor the outlet and downstream banks.
Crossing #8	40.2165 , -124.1110	Culvert Replacement. Replace existing 20" CMP with a 27" CMP installed on stream grade and rock the outlet and downstream banks with sharp angular rock.
Crossing #9	40.2162 , -124.1108	Culvert Replacement. Replace existing 24" plastic pipe with a 24" CMP set to grade. A critical dip will be constructed at the crossing to avoid erosion from potential overtopping and a DRC will be installed near the culvert to reduce the volume of runoff contributing directly to the stream channel.
Crossing #11	40.2148 , -124.1112	New culvert. The site currently lacks an engineered crossing and will receive a 24" CMP set to grade and downstream banks will be armored. A rolling dip will be install approximately 60' up road from the crossing to convey water off the road and reduce the drainage load on the crossing.
Crossing #12	40.2143 , -124.1110	Bank Stabilization. Maintain an existing 36" CMP and Replace an existing makeshift downspout with an engineered 20' long, 36"-diameter downspout. Existing concrete chunks previously placed for bank stabilization will be removed and the fill slope re-

		engineered, rip rap installed along with the fill slope engineering, and the road widened to reduce the potential for fill slope failure.
Crossing #13	40.2126 , -124.1122	Bank Stabilization. Remove old rusty culvert underneath the existing appropriately-sized 36" CMP and remove debris (tires, ice box) in the channel. The existing 36" CMP will be re-installed on grade with the stream channel and the outlet/inlet will be armored.
Crossing #15	40.2119 , -124.1122	New Culvert Construction. There currently is no engineered crossing. Install a 24" CMP on stream grade and armor the inlet/outlet.
Crossing #16	40.2115 , -124.1122	Bank Stabilization. Existing 36" CMP. In-stream debris will be removed and downstream banks will be armored to reduce sedimentation and further erosion of the channel. Install ditch relief culverts up-road of Crossing16 to reduce the volume of water flowing through the crossing.
Crossing #18	40.2097 , -124.1122	New Culvert Construction. There currently is no engineered crossing. Install a new 24"-diameter CMP on grade with the stream channel and to armor the inlet/outlet.
Crossing #19	40.2096 , -124.1120	Culvert Replacement. Replace failing, existing 26" CMP with 30" CMP set on grade with stream channel and armor the outlet with rip rap.
Crossing #20	40.2075 , -124.1114	Culvert Improvement. Existing 27" smooth plastic pipe will receive a new downspout with rip rap to dissipate energy. The contributing inboard ditch will also be armored.
Crossing #21	40.2076 , -124.1114	Culvert Replacement. Replace existing undersized 36" smooth plastic pipe with a 48" CMP on grade with the stream channel with a downspout, armored the inlet and outlet headwall.
Spring #1 POD-1	40.2131 , -124.1184	Maintenance of existing water diversion. Aboveground, 12"x 24" wooden box with a screened 1" outlet. The rate of diversion is 2.5 gallons per minute (GPM) with a minimum 80% streamflow bypass. From the box the water gravity feeds through 1" polytube to (2) 3,500-gallon water tanks, then across Honeydew Creek to the residence and cultivation area (40.2143°, -124.1144°).
Spring #2 POD-2	40.2110 , -124.1108	Maintenance. Aboveground, bottomless, 36"x 36" concrete box with a screened 1" outlet. The rate of diversion is 2.5 gallons per minute (GPM) with a minimum 80% streamflow bypasses. From the box the water gravity feeds through1" polytube to (2) 3,500-gallon water tanks, then downslope to the residence and cultivation areas on both parcels. Part of the storage is pumped up to the nearby residence and cultivation area (40.2103°,-124.1116°). The diversion is fed to numerous storage tanks, including a 5,000-gallon fire-only tank and 10,500 gallons at each of the three cultivation sites on the -021 parcel).
Stream POD-3	40.2148 , -124.1149	Maintenance. POD is in Honeydew Creek (an anadromous fish bearing stream) and is used for domestic and Irrigation / stock watering purposes. The diversion structure sits on the streambed/bank and consists of 1.5" polytube what an intake screen that has holes larger than the 3/32" recommended size. The intake screen shall be replaced to meet the CDFW standard and to protect wildlife. The water is pumped to (3) 3,500-gallon storage tanks above the residence and gravity fed down to the domestic animal and garden areas. The rate of diversion is approximately 2.6-6.9 GPM during the summer.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*O. kisutch*), winter and summer Steelhead Trout (*O. mykiss*), Western Brook Lamprey (*Lampetra richardsoni*), Pacific Lamprey (*Entosphenus tridentata*), Southern Torrent Salamander (*Rhyacotriton variegatus*), Pacific Giant Salamander *(Dicamptodon tenebrosus)*, Foothill Yellow-legged Frog *(Rana boylii),* Coastal Tailed Frog (*Ascaphus truei*), Western Pond Turtle (*Actinemys marmorata marmorata*) amphibians, reptiles, aquatic invertebrates, mammals, birds, and other aquatic and riparian species.

The adverse effects the project could have on the fish or wildlife resources identified above include:

Impacts to water quality:
increased water temperature;
reduced instream flow;
temporary increase in fine sediment transport;

Impacts to bed, channel, or bank and direct effects on fish, wildlife, and their habitat:
loss or decline of riparian habitat;
direct impacts on benthic organisms;

Impacts to natural flow and effects on habitat structure and process:
cumulative effect when other diversions on the same stream are considered;
diversion of flow from activity site;
direct and/or incidental take;
indirect impacts;
impediment of up- or down-stream migration;
water quality degradation; and
damage to aquatic habitat and function.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

The Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. The Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. The Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of the Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. The Permittee shall notify CDFW if the Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, CDFW shall contact the Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that CDFW personnel may enter the project site at any time to verify compliance with the Agreement.

1.5 Adherence to Existing Authorizations. All water diversion facilities that the Permittee owns, operates, or controls shall be operated and maintained in accordance with current law and applicable water rights.

1.6 Change of Conditions and Need to Cease Operations. If conditions arise, or change, in such a manner as to be considered deleterious by CDFW to the stream or wildlife, operations shall cease until corrective measures approved by CDFW are taken. This includes new information becoming available that indicates bypass flows, diversion rates or other measures provided in this agreement are not providing adequate protection to keep aquatic life downstream in good condition or to avoid "take" or "incidental take" of federal or State listed species.

1.7 CDFW Notification of Work Initiation and Completion. The Permittee shall contact CDFW within the 7-day period preceding the beginning of work permitted by this Agreement. Information to be disclosed shall include Agreement number, and the anticipated start date. Subsequently, the Permittee shall notify CDFW no later than seven (7) days after the project is fully completed. **Notification of completion will include photographs of the completed work, erosion control measures, waste containment and disposal, and a summary of any CNDDB submissions as required below.**

1.8 Notification to the California Natural Diversity Database. If any special status species are observed at any time during the project, a qualified Biologist shall submit California Natural Diversity Data Base (CNDDB) forms to the CNDDB within five (5) working days of the sightings. A summary of CNDDB submissions shall be included with the completion notification. Forms and instructions for submissions to the CNDDB may be found at: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, the Permittee shall implement each measure listed below.

2.1 Permitted Project Activities. Except where otherwise stipulated in this Agreement, all work shall be in accordance with Permittee Notification, together with all maps, Best Management Practices (BMPs), photographs, drawings, and other supporting documents submitted with the Notification and received on December 21, 2017, with revisions received on October 01, 2018.

2.2 Listed Species. This Agreement does not allow for the take, or incidental take of any state or federal listed threatened, endangered, or candidate species. No direct or indirect impacts shall occur to any threatened or endangered species as a result of implementing the project or the project's activities. If the project could result in the "take" of a state listed threatened or endangered species, the Permittee has the responsibility to obtain from CDFW, a California Endangered Species Act Permit (CESA section 2081).

2.3 Foothill Yellow-Legged Frog (FYLF) Avoidance. To avoid take of FYLF during its CESA candidacy period, the Permittee shall:

A. Conduct a Pre-Construction Survey. Within 3-5 days prior to entering or working at the Project Site, a qualified biologist shall examine the project site to determine the presence/absence of standing or flowing water, and the presence and/or the potential for presence of FYLF adults, juveniles, tadpoles or egg masses within the project area and 150 feet upstream and downstream. Prior to commencing work, Permittee shall provide to CDFW for review preconstruction survey notes and observations.

1. If FYLF are found during the pre-construction survey, Permittee shall:

   a) Consult CDFW immediately by either telephone or e-mail and provide a short description of observations, including a count of individuals and the life stage(s), conditions at the site, and other aquatic species observed; and

   b) Either propose site-specific mitigation measures that will be utilized to avoid take, or obtain an Incidental Take Permit (ITP) if take of FYLF cannot be avoided. Instream work shall not commence until CDFW has provided written approval of the proposed avoidance measures or an ITP has been issued.

2. If no FYLFs are found during the pre-construction survey and no surface water is present in the project area, work may commence without further surveys.

3. If no FYLFs are found but surface water is present during the pre-construction survey, *or if surface water becomes present at any time during the work period*, a qualified biologist shall survey the work site each day before commencement of work activities where equipment and/or materials may come in contact with FYLFs, streams, or riparian habitat.

4. If FYLFs are observed at any time during the construction season, work in the immediate area shall be halted, CDFW immediately consulted, and conservation measures developed and agreed to by CDFW prior to recommencing work.

B. Qualified Biologist. A qualified biologist is an individual who is experienced in construction level biological monitoring, knowledgeable in the biology, natural history, habits and behaviors of the FYLF, and who is able to recognize all age classes of FYLF relative to other amphibians in the project area. A qualified biologist shall have academic and professional experience in biological sciences or resource management activities. At least 15 days prior to commencement of Project-related surveys for FYLFs, Permittee shall provide to CDFW for review and approval the names and qualifications of individuals requesting qualified biologist status.

C. Decontamination. The Permittee is responsible for ensuring all project personnel adhere to the latest version of the Northern Region California Department of Fish and Wildlife Aquatic Invasive Species Decontamination Protocol for all field gear and equipment that will be in contact with water or FYLFs. Heavy equipment and other motorized or mechanized equipment that comes in contact with water should generally follow watercraft decontamination protocols found in the AIS Decontamination Protocol.

2.4 Nesting Birds. Actively nesting birds and their nests shall not be disturbed by project activities. If construction, grading, vegetation removal, or other project-related improvements are necessary during the nesting season of protected raptors and migratory birds (**March 1 through August 15**), the Permittee shall notify CDFW of proposed work and a focused survey for bird nests and/or nesting behavior shall be conducted by a qualified biologist within seven days prior to the beginning of project-related activities. Surveys should encompass the area up to 50 feet from disturbance to account for songbirds, and up to 250 feet from disturbance for raptors. If a nest is found or suspected to be present, Permittee shall consult with CDFW regarding appropriate action to comply with the Migratory Bird Treaty Act of 1918 and Fish and Game Code. If a lapse in project-related work of seven days or longer occurs, another focused survey, and if required, consultation with CDFW shall be required before project work can be reinitiated.

Project Timing

2.5 Work Period. All work, not including diversion of water, shall be confined to the period **June 15 through October 15** of each year. Work within the active channel of a stream shall be restricted to periods of **dry weather**. Precipitation forecasts and potential increases in stream flow shall be considered when planning construction activities. Construction activities shall cease and all necessary erosion control measures shall be implemented prior to the onset of precipitation. Limited vegetation removal may occur outside of this work period as per Measure 2.4.

2.6 Extension of the Work Period. If weather conditions permit, and the Permittee wishes to extend the work period after October 15, a written request shall be made to CDFW **at least 10-working days before the proposed work period variance**. Written approval (letter or e-mail) for the proposed time extension must be received from CDFW prior to activities continuing past October 15.

2.7 Work Completion. The proposed work shall be completed by no later than **October 15, 2020**. Extensions to this date may be granted on a case by case basis as a minor amendment requested at least 30 days prior to this date. Failure to complete work by this date shall result in suspension or revocation of this Agreement. A notice of completed work, including photographs of each site, shall be submitted to CDFW within seven (7) days of project completion.

Vegetation Management

2.8 Minimum Vegetation Removal. No native riparian vegetation shall be removed from the bank of the stream, except where authorized by CDFW. Permittee shall limit the disturbance or removal of native vegetation to the minimum necessary to achieve design guidelines and standards for the Authorized Activity. Permittee shall take precautions to avoid damage to vegetation outside the work area and adhere the Measure 2.4.

2.9 Vegetation Maintenance. Permittee shall limit vegetation management (e.g., trimming, pruning, or limbing) and removal for the purpose of stream crossing or diversion infrastructure placement/maintenance to the use of hand tools. Vegetation management shall not include treatment with herbicides. Permittee shall adhere to Measure 2.4.

General Stream Protection Measures

2.10 Fish and Aquatic Amphibians. If possible, work shall be conducted when the affected stream channel is void of surface water. If surface water is present during construction, the Permittee shall: a) have a biologist or other qualified professional survey the site and adjacent area for fish, amphibians, and turtles three days or less before commencing project activities and b) if fish, amphibians, or turtles are

detected, CDFW's Greg O'Connell will be contacted by phone or email at (707) 441-5790 or gregory.oconnell@wildlife.ca.gov and work shall not commence until authorized by Mr. O'Connell or another CDFW representative.

2.11 Stream Protection. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete washings, oil or petroleum products, or other material deleterious to fish, plant life, mammals or bird life shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into the stream.

2.12 No Dumping. Permittee shall not deposit, permit to pass into, or place where it can pass into a stream, lake, or other Waters of the State any material deleterious to fish and wildlife, or abandon, dispose of, or throw away within 150 feet of a stream, lake, or other Waters of the State any cans, bottles, garbage, motor vehicle or parts thereof, rubbish, litter, refuse, waste, debris, or the viscera or carcass of any dead mammal, or the carcass of any dead bird.

2.13 Equipment Maintenance. Refueling of machinery or heavy equipment, or adding or draining oil, lubricants, coolants or hydraulic fluids shall not take place within stream bed, channel and bank. All such fluids and containers shall be disposed of properly off-site. Heavy equipment used or stored within stream bed, channel and bank shall use drip pans or other devices (e.g., absorbent blankets, sheet barriers or other materials) as needed to prevent soil and water contamination.

2.14 Hazardous Spills. Any material, which could be hazardous or toxic to aquatic life and enters a stream (i.e. a piece of equipment tipping-over in a stream and dumping oil, fuel or hydraulic fluid), the Permittee shall immediately notify the California Emergency Management Agency State Warning Center at 1-800-852-7550, and immediately initiate clean-up activities. CDFW shall be notified by the Permittee within 24 hours at 707-445-6493 and consulted regarding clean-up procedures.

2.15 Clean-up. Structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the ordinary high water mark before such flows occur or the end of the yearly work period, whichever comes first. All project materials and debris shall be removed from the project site and properly disposed of off-site upon project completion.

2.16 Erosion Control Measures

2.16.1 Seed and Mulch. Upon completion of construction operations and/or the onset of wet weather, Permittee shall stabilize exposed soil areas within the work area by applying mulch and seed. Permittee shall restore all exposed or disturbed areas and access points within the stream and riparian zone by applying local native and weed free erosion control grass seeds. Locally native wildflower and/or shrub seeds may also be included in the seed mix. Permittee shall mulch restored areas using at least two to four inches of weed-free clean straw or similar biodegradable mulch over

the seeded area. Alternately, Permittee may cover seeding with jute netting, coconut fiber blanket, or similar non-synthetic monofilament netting erosion control blanket.

2.16.2 Erosion and Sediment Barriers. Permittee shall monitor and maintain all erosion and sediment barriers in good operating condition throughout the work period and the following rainy season, defined herein to mean October 15 through June 15. Maintenance includes, but is not limited to, removal of accumulated sediment, replacement of damaged sediment fencing, coir rolls/logs and/or straw bale dikes and ensuring drainage structures and altered streambeds and banks remain sufficiently armored and/or stable. If the sediment barrier fails to retain sediment, Permittee shall employ corrective measures, and notify the department immediately.

2.16.3 Cover Spoil Piles. Permittee shall have readily available erosion control materials such as wattles, natural fiber mats, or plastic sheeting, to cover and contain exposed spoil piles and exposed areas in order to prevent sediment from moving into a stream or lake. Permittee shall apply and secure these materials prior to rain events to prevent loose soils from entering a stream, lake, or other Waters of the State.

2.16.4 Prohibition on Use of Monofilament Netting. To minimize the risk of ensnaring and strangling wildlife, Permittee shall not use any erosion control materials that contain synthetic (e.g., plastic or nylon) monofilament netting, including photo- or biodegradable plastic netting. Geotextiles, fiber rolls, and other erosion control measures shall be made of loose-weave mesh, such as jute, hemp, coconut (coir) fiber, or other products without welded weaves.

Water Diversion (POD 1-3)

2.17 Maximum Diversion Rate. The maximum instantaneous diversion rate from the water intake shall not exceed **three (3) gallons per minute** (gpm) at any time.

2.18 Bypass Flow. The Permittee shall pass **80% of the flow at POD-1 and POD-2** and **95% of the flow at POD-3** at all times to keep all aquatic species including fish and other aquatic life in good condition below the point of diversion.

2.19 Seasonal Diversion Minimization. To accommodate domestic use, no more than **150 gallons** shall be diverted in any one day, collectively from PODs 1-3, during the low flow season from **April 1 to October 31** of each year. Water shall be diverted only if the Permittee can adhere to the maximum diversion rate and bypass flow conditions of this Agreement.

2.20 Measurement of Diverted Flow. Permittee shall install and maintain an adequate measuring device for measuring the instantaneous and cumulative rate of

diversion at the location of each POD. This measurement shall begin as soon as this Agreement is signed by the Permittee. The device shall be installed within the flow of diverted water. The Permittee shall maintain records of diversion, and provide information including, but not limited to the following:

2.20.1 A log including the date, time and quantity of water diverted from the POD.

2.20.2 The amount of water used per day for cannabis cultivation separated out from the amount of water used for other irrigation purposes and other uses of water (e.g., domestic use or fire protection).

2.20.3 Permittee shall make available for review at the request of the Department the diversion records required by the State Water Resources Control Board (Board) in Attachment A to the Board's Cannabis Cultivation Policy (October 17, 2017), No. 84, pages 40-41 (see Cal. Code Regs., tit. 23, § 2925).

2.21 Water Management Plan. The Permittee shall submit a Water Management Plan no later than **sixty days** from the time this Agreement is made final that describes how compliance will be achieved under this Agreement. The Water Management Plan shall include details on water storage, water conservation, or other relevant material to maintain water needs in coordination with forbearance and bypass flow requirements. The Water Management Plan shall include a brief narrative describing water use on the property, photographs to support the narrative, and water use calculations to ensure compliance with this Agreement.

Water Diversion Infrastructure

2.22 Intake Structure. No polluting materials (e.g., particle board, plastic sheeting, bentonite) shall be used to construct or screen, or cover the diversion intake structure.

2.23 Intake Structure Placement. Infrastructure installed in the streambed (e.g., cistern or spring box) shall not exceed 10 percent of the active channel width and shall not be located in the deepest portion of the channel. The depth of the intake shall be no greater than one foot (12 inches) below the streambed.

2.24 Intake Screening. The Permittee shall regularly inspect, clean, and maintain screens in good condition.

2.24.1 The water intake screens shall be securely attached (e.g., threaded or clamped) to the intake line and have a minimum wetted area of 0.25 square feet.

2.24.2 The intakes screen shall be designed so that approach velocity is no more than 0.1 foot per second (fps). Approach velocity is the velocity of the water

perpendicular to the screen face measured three inches in front of the screen surface.

2.24.3 A water intake screen with round openings shall not exceed 3/32-inch diameter; a screen with square openings shall not exceed 3/32-inch measured diagonally; and a screen with slotted openings shall not exceed 0.069 inches in width. Slots must be evenly distributed on the screen area.

2.24.4 The water intake screen may be constructed of any rigid material, perforated, woven, or slotted and should have a minimum of 27% open area. Stainless steel or other corrosion-resistant material is recommended to reduce clogging due to corrosion. Care should be taken not to use materials deemed deleterious to aquatic species.

2.24.5 The screen shall be designed to distribute the flow uniformly over the entire screen area.

2.24.6 The water intake screen shall be placed in fast moving water with the long axis of the screen parallel to the streamflow. The water intake shall not be placed in pool habitat.

2.25 Intake Shall Not Impede Aquatic Species Passage. The water diversion structures shall be designed, constructed, and maintained such that they do not constitute a barrier to upstream or downstream movement of aquatic life.

2.26 Intake Maintenance. Intakes shall be kept in good repair. Intakes shall be inspected periodically and kept clean and free of accumulated algae, leaves or other debris, which could block portions of the screen surface and increase approach velocities at any point on the screen. No part of screen surfaces shall be obstructed

2.27 Exclusionary Devices. Permittee shall keep the diversion structures (e.g. cistern) covered at all times to prevent the entrance and entrapment of amphibians and other wildlife.

2.28 Diversion Intake Removal. Permittee shall plug, cap, block (e.g., with a shut-off valve), or remove all intakes at the end of each diversion season.

2.29 Heavy Equipment Use. No heavy equipment shall be used in the excavation or replacement of the existing water diversion structure. The Permittee shall use hand tools or other low impact methods of removal/replacement. All project materials and debris shall be removed from the project site and properly disposed of off-site upon project completion.

Diversion to Storage

2.30 Water Storage. All water storage facilities (WSFs) (e.g., reservoirs, storage tanks, mix tanks, and bladders tanks) must be located outside the active 100-year floodplain and outside the top of bank of a stream. Covers/lids shall be securely affixed to water tanks at all times to prevent potential entry by wildlife. Permittee shall cease all water diversion at the point of diversion when WSFs are filled to capacity.

2.31 Water Storage Maintenance. WSFs shall have a float valve to shut off the diversion when tanks are full to prevent overflow. Water shall not leak, overflow, or overtop WSFs at any time. Permittee shall regularly inspect all WSFs and infrastructure used to divert water to storage and use and repair any leaks.

2.32 Water Conservation. The Permittee shall make best efforts to minimize water use, and to follow best practices for water conservation and management.

2.33 Limitations on Impoundment and Use of Diverted Water. The Permittee shall impound and use water in accordance with a valid water right, including any limitations on when water may be impounded and used, the purpose for which it may be impounded and used, and the location(s) where water may be impounded and used.

2.34 State Water Code. This Agreement does not constitute a valid water right. The Permittee shall comply with State Water Code sections 5100 and 1200 et seq. as appropriate for the water diversion and water storage. The application for this registration is found at: http://www.swrcb.ca.gov/waterrights/publications_forms/forms/docs/sdu_registration.pdf.

Reservoirs

2.35 Reservoirs. Shall be appropriately designed, sized, and managed to contain any diverted water in addition to precipitation and storm water runoff, without overtopping. The Permittee shall install an overflow spillway that will withstand a 100-year flood event, designed with a dispersal mechanism, or low-impact design, that discourages channelization and promotes dispersal and infiltration of flows to prevent surface overflow from reaching waters of the State. The spillway shall be designed and placed to allow for a minimum of two-feet of freeboard.

2.36 Diversion. Water shall be diverted to reservoirs only if the Permittee can adhere to the diversion rate, bypass flow, season of diversion and all other relevant conditions of this Agreement.

2.37 No Stocking. Stocking of fish, wildlife, or plant of any kind, in any Waters of the State, including reservoirs, shall be prohibited without written permission from the department pursuant to Section 6400 of the Fish and Game Code.

2.38 Invasive Species Management for Reservoirs. Permittee shall implement an invasive species management plan prepared by a Biologist for any existing or proposed reservoir. The plan shall include, at a minimum, an annual survey for invasive aquatic species, including the American bullfrog (*Lithobates catesbeianus = Rana catesbeiana).* The Biologist, if appropriate, shall implement eradication measures if invasive aquatic species are identified as part of the survey.

2.38.1 Bullfrog Management Plan. If bullfrogs are observed, they shall be appropriately managed. Management of bullfrogs, including annual draining and drying of ponds, shall follow the guidelines in Exhibit A. A copy of the annual monitoring report, shall be submitted to CDFW in accordance with the reporting measures described in Exhibit A and in the Reporting Measures section of this Agreement.

Stream Crossings

2.39 Road Approaches. The Permittee shall treat road approaches to new or re-constructed permanent crossings *on Class I and II watercourses* to minimize erosion and sediment delivery to the watercourse. Permittee shall ensure road approaches are hydrologically disconnected to the maximum extent feasible to prevent sediment from entering the crossing site, including when a Stream Crossing is being constructed or reconstructed. Road approaches shall be armored from the crossing for a minimum of *50 feet in both directions,* or to the nearest effective water bar or point where road drainage does not drain to the crossing, with durable, clean, screened, angular rock.

2.40 Excavated Fill. Excavated fill material shall be placed in upland locations where it cannot deliver to a watercourse. To minimize the potential for material to enter the watercourse during the winter period, all excavated and relocated fill material shall be tractor contoured (to drain water) and tractor compacted to effectively incorporate and stabilize loose material into existing road and/or landing features.

2.41 Runoff from Steep Areas. The Permittee shall make preparations so that runoff from steep, erodible surfaces will be diverted into stable areas with little erosion potential or contained behind erosion control structures. Erosion control structures such as straw bales and/or siltation control fencing shall be placed and maintained until the threat of erosion ceases. Frequent water checks shall be placed on dirt roads, cat tracks, or other work trails to control erosion.

2.42 Crossing Maintenace. The Permittee shall provide site maintenance for the life of the structures, including, but not limited to, re-applying erosion control to minimize

surface erosion and ensuring drainage structures, streambeds and banks remain sufficiently armored and/or stable.

2.42.1 The placement of armoring shall be confined to the work period when the stream is dry or at its lowest flow

2.42.2 No heavy equipment shall enter the wetted stream channel.

2.42.3 No fill material, other than clean rock, shall be placed in the stream channel.

2.42.4 Rock shall be sized to withstand washout from high stream flows, and extend above the ordinary high water level.

2.42.5 Rock armoring shall not constrict the natural stream channel width and shall be keyed into a footing trench with a depth sufficient to prevent instability.

2.43 Isolation of Work Site. Only when work in a flowing stream is unavoidable (e.g., perennial streams), Permittee shall divert the stream flow around or through the work area during construction operations. Permittee shall adhere to the following conditions:

2.43.1 Stream Diversion. Stream flow shall be diverted using gravity flow through temporary culverts/pipes or pumped around the work site with the use of hoses.

2.43.2 Coffer Dams. Prior to the start of construction, Permittee shall isolate the work area. Cofferdams shall be installed to divert stream flow; isolate and dewater the work site; catch and retain sediment-laden water; and minimize sediment transport downstream. Water tight coffer dams shall be constructed upstream and downstream of the work area and water diverted, through a suitably sized pipe, from upstream of the upstream coffer dam and discharge downstream of the downstream coffer dam. Coffer dams and the stream diversion system shall remain in place and functional throughout the construction period. Coffer dams or stream diversions that fail for any reason shall be repaired immediately. Permittee shall use only clean, non-erodible materials such as sand bags, on-site rock, and/or plastic sheeting. Mineral soil shall not be used in the construction of cofferdams.

2.43.3 Stranded Aquatic Life. Once coffer dams are installed, a qualified biologist or other qualified professional trained to identify listed species shall check daily for stranded aquatic life as the water level in the dewatering area drops. All reasonable efforts shall be made to capture and move all stranded aquatic life observed in the dewatered areas. Capture methods may include fish landing nets, dip nets, buckets and by hand. Captured aquatic life shall be released immediately in the closest suitable aquatic habitat adjacent to the work site. This condition does not allow for the take

or disturbance of any State or federally listed species, or State listed species of special concern. The Department staff who prepared this agreement shall be contacted immediately if any of these species are detected.

2.43.4 Dewatering. Permittee shall catch and retain sediment-laden water and minimize sediment transport downstream. Flowing water shall be cleanly bypassed and/or prevented from entering the work area through pumping or gravity flow, and cleanly returned to the stream below the work area. Permittee shall divert stream flow around the work site in a manner that minimizes turbidity, siltation, and pollution, and does not result in erosion or scour downstream of the diversion.

2.43.5 Remove any Materials upon Completion. Permittee shall remove any turbid water and sediment present in the work area prior to restoring water flow through the project site, and place them in a location where they cannot enter the Waters of the State. Permittee shall remove all materials used for the temporary stream flow bypass after the Authorized Activity is completed.

2.43.6 Restore Normal Flows. Permittee shall restore normal flows to the effected stream immediately upon completion of work at that location.

2.44 Culvert Installation.

2.44.1 Permanent culverts shall be sized to accommodate the estimated 100-year flood flow [i.e. ≥1.0 times the width of the bankfull channel width or the 100-year flood size, whichever is greater], including debris, culvert embedding, and sediment loads.

2.44.2 If the project is located in a high to very high Fire Hazard Severity Zone as designated by CAL FIRE, CDFW recommends culvert materials consist of corrugated metal pipe (CMP). Use of High Density Polyethylene (HDPE) pipe is discouraged.
http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_maps

2.44.3 Existing fill material in the crossing shall be excavated down vertically to the approximate original channel and outwards horizontally to the approximate crossing hinge points (transition between naturally occurring soil and remnant temporary crossing fill material) to remove any potential unstable debris and voids in the older fill prism.

2.44.4 Culvert shall be installed to grade (not perched or suspended), aligned with the natural stream channel, and extend lengthwise completely beyond the toe of fill. If culvert cannot be set to grade, it shall be oriented in the lower third of the fill face, and a downspout or energy dissipator (such as boulders, rip-rap, or rocks) shall be installed above or below the outfall as

needed to effectively control stream bed, channel, or bank erosion (scouring, headcutting, or downcutting). The Permittee shall ensure basins are not constructed and channels are not be widened at culvert inlets.

2.44.5 Culvert bed shall be composed of either compacted rock-free soil or crushed gravel. Bedding beneath the culvert shall provide for even distribution of the load over the length of the pipe, and allow for natural settling and compaction to help the pipe settle into a straight profile. The crossing backfill materials shall be free of rocks, limbs, or other debris that could allow water to seep around the pipe, and shall be compacted.

2.44.6 Culvert inlet, outlet (including the outfall area), and fill faces shall be armored where stream flow, road runoff, or rainfall energy is likely to erode fill material and the outfall area.

2.44.7 Project Inspection. The Project shall be inspected by NorthPoint Consulting Group or a licensed engineer to ensure that the stream crossings were installed as designed. A copy of the inspection report, including photographs of each site, shall be submitted to CDFW within 90 days of completion of this project.

Stream Restoration

2.45 Stream Restoration Plan. The Permittee shall submit a Stream Restoration Plan to CDFW prior to conducting remediation activities. The Stream Restoration Plan (SRP) shall detail the dimensions and slopes of the stream channel to be remediated. The SRP shall describe any material utilized to restore the channel to a natural condition. The SRP shall include a revegetation plan for remediation of the impacted channel reach.

2.46 The Project shall be inspected by NorthPoint Consulting Group or a licensed engineer to ensure that the stream restoration was implemented as designed. A copy of the inspection report, including photographs of each site, shall be submitted to CDFW within 90 days of completion of this project.

2.47 Revegetation Plan. The Permittee shall submit a revegetation plan with the Stream Restoration Plan to CDFW for review and approval prior to implementation of riparian habitat restoration activities. The Revegetation Plan shall, at a minimum, include the following:

2.47.1 The identification of the area and vegetation types that will be restored.

2.47.2 A planting design and palette appropriate to the vegetation type, cover, stratum, and level of biodiversity (i.e., species richness and composition). Use of a reference site is recommended.

2.47.3 Use regionally appropriate native plants for a riparian vegetation type. The derivation of plant material such as containers, plugs, cuttings, divisions, or seeds from coastal areas of Humboldt, Del Norte and Mendocino Counties within 30 miles of the coast. All native seed material shall be from the North Coast ecoregion (Humboldt, Mendocino, Sonoma or Del Norte Counties), if practical. If quantities are not able to be satisfied from these collection sites, propagules may be obtained from other counties in Northern California with pending approval from a restoration ecologist or botanist.

2.47.4 Cuttings of willows, cottonwoods conducted when dormant. Collection of cuttings within an area dispersed to maintain genetic and sexual diversity, and to avoid adversely impact existing riparian vegetation. Cuttings hydrated between harvesting and planting (e.g., soak cuttings in water several days to a week to stimulate rooting prior to planting). Cuttings planted to depth of 75 percent of their length with buds pointing up and bottom of cutting in moist soil or water.

2.47.5 Planting conducted after the first seasonal rains have saturated soils beyond the first several inches (November/December) and before April.

2.47.6 No application of fertilizer on plants or chemical controls on weeds.

2.47.7 Measurable success criteria based on plant survival, density, or cover.

2.47.8 Monitoring conducted for a minimum of five years to determine whether the revegetation goals and objectives have been met. Remedial measures if revegetation goals and objectives are not met.

2.47.9 Annual status reports on the revegetation efforts shall be submitted to CDFW in the by **October 31 of each year** following initial planting for the length of the monitoring period.

3. Reporting Measures

Permittee shall meet each reporting requirement described below.

3.1 CDFW Notification of Work Initiation. The Permittee shall contact CDFW within the seven-day period **preceding the beginning of work** permitted by this Agreement. Information to be disclosed shall include Agreement number, and the anticipated start date.

3.1.1 Prior to commencing work, Permittee shall provide to CDFW for review preconstruction FYLF survey notes and observations.

3.2 Work Completion. The proposed work shall be completed by no later than **October 15, 2020**. Extensions to this date may be granted on a case by case basis as a minor amendment requested at least 30 days prior to this date. Failure to complete work by this date may result in suspension or revocation of this Agreement. **Notification of completion will include photographs of the completed work, erosion control measures, waste containment and disposal, and a summary of any CNDDB submissions** and shall be submitted to CDFW, LSA program at 619 Second Street, Eureka, CA 95501 **within seven (7) days** of project completion.

3.3 Project Inspection. The Project shall be inspected by NorthPoint Consulting Group or a licensed engineer to ensure that the stream crossings were installed as designed and the stream restoration was implemented as designed. A copy of the inspection report, including photographs of each site, shall be submitted to CDFW within 90 days of completion of this project. The Permittee shall submit the **Project Inspection Report** to CDFW, LSA Program at 619 Second Street, Eureka, CA 95501

3.4 Measurement of Diverted Flow. Copies of the **Water Diversion Records** shall be submitted to CDFW, LSA Program at 619 Second Street, Eureka, CA 95501 no later than **December 31** of each year beginning in **2018**.

3.5 Water Management Plan. The Permittee shall submit a **Water Management Plan** within **60 days** from the effective date of this agreement. The Water Management Plan shall be submitted to CDFW, LSA Program at 619 Second Street, Eureka, CA 95501.

3.6 Invasive Species Management for Reservoirs. The Permittee shall submit all required documents described in the Invasive Species Management for Reservoirs, **Bullfrog Management Plan** (Exhibit A) no later than **December 31** of each year. The Bullfrog Management Plan shall be submitted to CDFW at 619 Second Street, Eureka, CA 95501.

3.7 Stream Restoration Plan. The Permittee shall submit a **Stream Restoration Plan** by **May 15, 2019**. The Stream Restoration Plan shall be submitted to CDFW at 619 Second Street, Eureka, CA 95501.

3.8 Revegetation Plan. The permittee submit a **Revegetation Plan** to CDFW by **May 15, 2019**, for review and approval prior to implementation of riparian habitat restoration activities (condition 2.25). The Revegetation Plan shall be submitted to CDFW at 619 Second Street, Eureka, CA 95501.

3.8.1 Annual status reports on the revegetation efforts shall be submitted to CDFW by **October 31 of each year** following initial planting for the length

of the monitoring period.

CONTACT INFORMATION

Any communication that Permittee or CDFW submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or CDFW specifies by written notice to the other.

To Permittee:

Maureen Catalina
P.O. BOX 93
Honeydew, CA, 95545
707-499-4855
catalinaranch@aol.com

To CDFW:

Department of Fish and Wildlife
Northern Region
619 Second Street
Eureka, California 95501
Attn: Lake and Streambed Alteration Program –Greg O'Connell
Notification #1600-2017-0877-R1

LIABILITY

Permittee shall be solely liable for any violation of the Agreement, whether committed by the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW's endorsement of, or require the Permittee to proceed with the project. The decision to proceed with the project is the Permittee's alone.

SUSPENSION AND REVOCATION

CDFW may suspend or revoke in its entirety this Agreement if it determines that the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide the Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide the Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to the Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against the Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with, or obtaining any other permits or authorizations that might be required under, other federal, state, or local laws or regulations before beginning the project or an activity related to it. For example, if the project causes take of a species listed as threatened or endangered under the Endangered Species Act (ESA), such take will be unlawful under the ESA absent a permit or other form of authorization from the U.S. Fish and Wildlife Service or National Marine Fisheries Service.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the Fish and Game Code including, but not limited to, Fish and Game Code sections 2050 *et seq.* (threatened and endangered species), section 3503 (bird nests and eggs), section 3503.5 (birds of prey), section 5650 (water pollution), section 5652 (refuse disposal into water), section 5901 (fish passage), section 5937 (sufficient water for fish), and section 5948 (obstruction of stream).

Nothing in the Agreement authorizes the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

The Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and the Permittee. To request an amendment, the Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by the Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, the Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with Fish and Game Code section 1605, subdivision (b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with Fish and Game Code section 1605, subdivisions (b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code § 1605, subd. (f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after the Permittee signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the

applicable FGC section 711.4 filing fee listed at http://www.wildlife.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall **expire five years** from date of execution, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. The Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as Fish and Game Code section 1605, subdivision (a)(2) requires.

EXHIBITS

The documents listed below are included as exhibits to the Agreement and incorporated herein by reference.

A. Exhibit A. Bullfrog Management Plan

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with Fish and Game Code section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

FOR Maureen Catalina

Maureen Catalina — Date: 12·6·18

FOR DEPARTMENT OF FISH AND WILDLIFE

Cheri Sanville — Date: 12/12/18

Senior Environmental Scientist Supervisor

Prepared by: Greg O'Connell, Environmental Scientist, November 26, 2018

EXHIBIT A.

BULLFROG MONITORING AND MANAGEMENT PLAN FOR 1600-2017-0877-R1

GENERAL BULLFROG INFORMATION

The American bullfrog (*Lithobates catesbeianus* = *Rana catesbeiana*); hereafter bullfrog, is an invasive non-native species in California and poses a significant threat to California's native fish and wildlife resources. Bullfrogs were introduced in California over 100 years ago from eastern parts of the United States as a food supply, but have since caused substantial ecological consequences. Bullfrogs are considered highly invasive and are well documented to be prey upon a variety of fish and wildlife species, including some that are rare, threatened, and endangered. Human modifications to the environment provide favorable condition to bullfrogs such as artificially created agricultural ponds, canals and ditches where warm still water occurs. As a result bullfrogs have spread throughout California.

Efforts to control bullfrogs have been met with varying degrees of success because: 1) bullfrogs can be difficult to detect and go dormant from fall through winter, 2) bullfrogs often take cover in difficult areas to manage (e.g. dense vegetation), 3) they can travel long distances to colonize and re-colonize areas, 4) they have high reproductive output, 5) they are weary and readily flee perceived threats, and 6) they can survive physical trauma remarkably well. CDFW scientific staff recognizes there is an urgent and immediate need to develop improved bullfrog management strategies to protect California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. Public support and implementation of bullfrog control in California is an important conservation strategy that will help protect natural resources for future generations.

MONITORING

The Project reservoir(s) shall be monitored for bullfrog presence on an annual basis with a minimum of five total surveys, no less than two weeks apart, throughout the months of May-July

- All pond survey effort must be made by a person knowledgeable in bullfrog identification (see Appendix A for reference photos);
- Survey efforts shall include listening for bullfrog calls and slowly walking the complete perimeter of the pond at night* (dusk or later) while shining a flashlight to detect movement and eye-shine

If bullfrogs are not detected upon completion of five total surveys, or at any other time of the year incidentally, removal efforts are not required that year.

*Day time monitoring can also be conducted to aid detection but is not required under this plan.

SUCCESS CRITERIA

The level of effort needed to successfully manage bullfrog populations varies with infestation levels. This plan shall be considered successfully implemented if sufficient effort is provided to prevent adult bullfrogs from reproducing in the reservoir(s) each year, and no bullfrog life-stages can be detected. Bullfrogs are capable of traveling long distances over-land, and on-going

efforts will be required to ensure dispersing bullfrogs do not colonize the reservoir(s) at a future time.

OPTIONS FOR MANAGEMENT

Two management methods may by employed for controlling bullfrogs under this plan and include:

- Manual direct removal
- Reservoir de-watering (Hydro-modification)

Implementing both reservoir de-watering and manual direct removal is currently believed to be the most effective method of managing bullfrog infestations. For reservoirs that are heavily infested with juvenile bullfrogs and/or tadpoles, reservoir dewatering may be necessary to break the bullfrog's life cycle and prevent on-going reproduction. Prior to conducting reservoir dewatering activities, please coordinate with CDFW Scientist Greg O'Connell at gregory.oconnell@wildlife.ca.gov

Direct Removal

All direct removal efforts must be made by a person knowledgeable in bullfrog identification.

- Removal efforts must occur during, but are not be limited to the active/breeding season, occurring May – July;
- A minimum of ***five*** efforts throughout the season are considered necessary;
- Direct removal efforts are typically most effective when conducted at night with use of lights but can also be conducted during the day;
- Direct removal must include working the entire perimeter of the reservoir;
- A rubber raft or small boat may be necessary to successfully remove some individuals;
- A team of two individuals or more is often helpful, one person for shining lights and/or operating a boat and the other person to perform removal efforts;
- Bullfrog tadpoles must be removed and dispatched and must not be relocated or kept as pets.

Management Authorization

Take of bullfrogs is specifically allowed in the California Code of Regulations (CCR), Title 14 (T-14) section 5.05(a)(28), under the authority of a sport fishing license. There is no daily bag limit, possession limit or hour restriction, but bullfrogs can only be taken by hand, hand-held dip net, hook and line, lights, spears, gigs, grabs, paddles, bow and arrow or fish tackle.

Alternatively, FGC Section 5501 allows CDFW, as limited by the commission, to issue a permit to destroy fish that are harmful to other wildlife. The regulations have addressed this under Section CCR T-14 226.5 Issuance of Permits to Destroy Harmful Species of Fish in Private Waters for Management Purposes. This allows the CDFW to issue free permits to destroy harmful aquatic species by seining and draining.

Pond Dewatering

Pond dewatering may be appropriate if the reservoir can be successfully dewatered without adversely affecting stream resources. Careful planning and coordination with CDFW, is necessary to ensure potential impacts to stream resources can be addressed, prior to commencing with pond draining. Discharge of polluted water to waters of the state may require permitting from other agencies with permitting authority, such as the Regional Water Quality Control Board.

In general, bullfrog tadpoles require two years to develop into frogs, whereas native amphibians only require one year. Therefore, draining a reservoir every year is intended to interrupt bullfrog tadpole development, dramatically decrease bullfrog populations and allow for reduced efforts as a measure of adaptive management. Typically in Northern California, reservoir draining should occur in September through October to avoid impacts to sensitive native amphibian and fishery resources. While draining occurs, direct removal efforts should be employed as described above if possible.

REPORTING

A written log shall be kept of monitoring and management efforts and shall be provided to CDFW **each year** by December 31. The written log shall include: 1) date and time of each monitoring and management effort, 2) approximate number of each bullfrog life stage detected and/or removed per effort, and 3) amount of time spent for each monitoring and management effort.

APPENDIX A. BULLFROG REFERENCE PHOTOS

This is a photo of a Bullfrog tadpole. (Photo taken by Mike van Hattem).

The photos shown in this Appendix demonstrate a medium sized adult bullfrog that was removed from Ten Mile Creek, Mendocino County. Note the bullfrog has a large tympanum, (circular ear drum shown with an arrow) and **does not** have distinct ridges along its back (dorsolateral folds). Photo taken by Wes Stokes.

The bullfrog has somewhat distinct mottling and **the underside of the bullfrogs hind legs are not shaded pink or red.**

NORTHPOINT
CONSULTING GROUP, INC.
P.O. Box 44 ◆ Eureka, CA 95501
(707) 798-6438

Technical Memorandum

February 18, 2019

California Department of Fish and Wildlife
c/o Cheri Sanville
Northern Region
619 Second Street
Eureka, CA 95501

Subject: Maureen Catalina – Catalina Water Diversion and Stream Crossings Project
Water Management Plan and Diversion Records
Humboldt County APN: 107-144-020 & 107-144-021; Honeydew, CA

This memo summarizes how compliance will be achieved under the final Streambed Alteration Agreement (**Notification No. 1600-2017-0877-R1**), executed on December 12, 2018. The conditions of the Agreement include requirements on minimum bypass flows, measurement of diverted flow, and the season of withdrawal.

APN: 107-144-020

POD-1

Water Rights

During 2018, water for domestic use and cannabis cultivation on the "lower" parcel (APN 107-144-020) was sourced from a spring on the west-side of the parcel. An Initial Statement of Diversion and Use (ISDU) was filed with the State Water Resources Control Board (SWRCB) for the Point of Diversion (POD) (40.2144°, -124.1197°) and has been assigned # S027233. A Small Domestic Use Registration (SDUR) will be applied for if necessary.

2018 Diversion Infrastructure and Use

The spring box was originally installed by a prior landowner and is an aboveground, 12"x 24" wooden box with a screened 1" outlet (Figures 1-2). The springbox is bottomless and allows for at least 80% of the streamflow to bypass the structure. From the box the water gravity feeds through 1" polytube to (4) 3,500-gallon water tanks, then to the residence and cultivation area (40.2143°, -124.1144°). Approximately 100,000 gallons was used during the growing season for cannabis cultivation. Various water conservation practices are utilized in the household and in the garden to minimize the amount of water diverted. Domestic use is estimated to be 64 gallons/day for a total annual withdrawal of 22,970 gallons.

Proposed Irrigation Infrastructure

For 2019, the spring will only be used for domestic purposes in order to comply with the requirements in the Agreement and with SWRCB regulations. Water for irrigation will be supplied by a proposed rooftop rain-catchment system: (2) 500-gallon water tanks attached to the roof gutters will collect rain, then water

will be pumped uphill to (2) 3,500-gallon water tanks before gravity-feeding to a 110,000-gallon engineered, steel water tank outside riparian buffers. The water will then gravity-feed to the 10,000 sq. ft. cultivation area. The type and number of water tanks may change, but the total storage will be sufficient to last through the forbearance period.

Stream Alteration Agreement Requirements

1. *Bypass Flow Requirement:* The intake pipe is 1" polytube connected to the bottom of the springbox in an ~2 ft-wide channel. Since the intake pipe take less than 5% of the channel width and the springbox has an open bottom, the diversion structure allows for the minimum 80% bypass flow. A float valve has been installed to prevent overflow.

2. *Maximum Diversion Rate Requirement:* The diversion structure is not estimated to divert more than 3 gallons per minute; however, a flow rate control valve will be installed to ensure compliance with the Agreement. Starting in 2019, the combined domestic diversion rate of the 3 PODs on the property will not exceed 150 gallons/day during the low flow season.

3. *Seasonal Diversion Requirement:* In 2018, the combined domestic and irrigation diversions from April 1 – October 15 ranged from an estimated 274-570 gallons per day. Per the measurement requirement, a measuring device will be installed at the POD prior to diverting for 2019. Installation of a rain-catchment system in early 2019 will dramatically reduce the demand on the spring. Water diversion records (Table 1) will be submitted annually prior to December 31st.

4. *Measurement of Diverted Flow (Records):*

Table 1. POD-1 Total Surface Water Diversion and Use for 2018.

Total surface water diversion by source and month (gallons) for 2018													
Source	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
POD-1 (Domestic)	3,281	3,281	3,281	531	1,053	1,164	1,547	1,547	1,264	1,207	1,531	3,281	22,970
POD-1 (Cannabis)	1,750	1,750	1,750	11,429	12,857	14,286	17,143	17,143	10,786	9,357	0	1,750	100,000
Total													**122,970**

Water input to storage by source and month (gallons) for 2018													
Storage - Source	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
Watertanks (POD-1)	3,500	3,500	3,500	0	0	0	0	0	0	0	0	3,500	14,000
Total													**14,000**

Water use by source and month (gallons) for 2018													
Use-Source	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
POD-1 (Domestic)	1,531	1,531	1,531	531	1,053	1,164	1,547	1,547	1,264	1,207	1,531	1,531	15,970
POD-1 (Cannabis)	0	0	0	11,429	12,857	14,286	17,143	17,143	10,786	9,357	0	0	93,000
Watertanks (Domestic)	0	0	0	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0	0	7,000
Watertanks (Cannabis)	0	0	0	0	0	0	0	0	3,500	3,500	0	0	7,000
Total													**122,970**

Fig. 1. POD-1 Springbox (40.2144°, -124.1197)

Fig. 2. POD-1, Looking downstream

POD-3 (Honeydew Creek)

Water rights

The Stream POD-3 (40.2148º, -124.1149º) is in Honeydew Creek and is used for irrigation/stockwatering purposes. The permittee has appropriative rights (application # A021479) to withdraw 5.5 ac-ft/year for irrigation and other beneficial uses. The License for Diversion and Use of Water (# 008878) was issued by the SWRCB in 1969 and a copy was submitted to CDFW along with the LSA Notification. The direct diversion season under this water right is May 15 – October 1. There are no senior water rights holders upriver from the POD and there is one other registered POD downriver and adjacent Honeydew Creek (e-WRIMS).

Honeydew Creek Streamflow

Most of the Honeydew Creek watershed is managed by BLM and is within the King Range National Conservation Area. The previously submitted Stream Inventory Report on Honeydew Creek (CDFW, 1995) indicates the base flow can reach approximately 6 cfs at the mouth. The subject POD is approximately 2.1 miles from the mouth. The peakflow statistics from StreamStats (USGS) (see attached) indicate that during a 100-year peak flood the velocity of the creek would reach 5,600 cfs at the POD.

Diversion Infrastructure and Use

The diversion structure sits on the streambed/bank and consists of 1.5” polytube what an intake screen that has holes larger than the 3/32” recommended size (Fig. 3-4). The intake screen shall be replaced to meet the CDFW standard and to protect wildlife. The water is pumped to (3) 3,500-gallon storage tanks above the residence and gravity fed down to the residence, orchard, pasture, and other domestic garden areas. Numerous water conservation practices are utilized on the property and more water storage may be

added to help minimize the diversion during the low flow season. The rate of diversion during the diversion season of 2018 was approximately 2.6-6.9 gpm. The annual amount used is 4.28 acre-feet (Table 3). Water diversion and use records are based on the best available data. A water meter will be installed prior to diverting in 2019.

Stream Alteration Agreement Requirements

1. *Bypass Flow Requirement:* The intake pipe is 1.5" polytube with a screened intake resting on the bank of the creek. The active stream channel at the POD is approximately 30 feet wide and the volume of water flowing past the POD most of the summer far exceeds the rate of withdrawal. However, to ensure the required 95% bypass flow, the maximum diversion rate will be reduced to 3gpm during low flow season. A float valve on the watertanks has been installed to prevent overflow.

2. *Maximum Diversion Rate Requirement:* The diversion structure is estimated to divert up to 6.9 gpm late in the diversion season to meet the stockwatering and irrigation demands. A water meter will be installed to measure the instantaneous and cumulative diversion rate prior to diverting in 2019. To meet the irrigation demands of the project site and maximum diversion rate of 3gpm, additional water storage will be utilized late in the low flow season.

3. *Seasonal Diversion Requirement:* In 2018, the irrigation diversion from April 1 – October 15 ranged from an estimated 276-9,992 gallons per day. The POD is used only for irrigation/stockwatering purposes and thus meets the requirement of 150 gal/day for domestic use. Per the measurement requirement, a measuring device will be installed at the POD prior to diverting for 2019. Water will only be diverted if the requirements in the Agreement can be adhered to. Water diversion records (Table 2) will be submitted annually prior to December 31st.

4. *Measurement of Diverted Flow (Records):*

Table 2. POD-3 Total Surface Water Diversion and Use for 2018.

Total surface water diversion by source and month (gallons) for 2018

Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
POD-3 (Irrigation)	0	0	0	0	197,243	197,243	197,243	205,212	298,852	298,852	0	0	1,394,644
Total													**1,394,644**

Water input to storage by source and month (gallons) for 2018

Storage - Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Watertanks *	0	0	0	0	1,750	1,750	1,750	1,750	1,750	1,750	0	0	10,500
Total													**10,500**

Water use by source and month (gallons) for 2018

Use-Source	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
POD-3	0	0	0	0	195,493	195,493	195,493	203,462	297,102	297,102	0	0	1,384,144
Watertanks	0	0	0	0	1,750	1,750	1,750	1,750	1,750	1,750	0	0	10,500
Total													**1,394,644**

*water is directly diverted and is temporarily stored in watertanks for less than 30 days

Fig. 3. POD-3 at the wetted edge of Honeydew Creek (40.2148º, -124.1149º)

Fig. 4. POD-3 Intake

APN: 107-144-021

POD-2

Water Rights

Spring POD-2 (40.2110º, -124.1108º) is on the "upper" parcel and is used for irrigation and domestic purposes. An ISDU was filed with the SWRCB and assigned # S027231. The POD was also registered under the Small Irrigation Use Registration program and issued a water right certificate (#H100330) to appropriate water for the purpose of cannabis irrigation. For domestic use, a Small Domestic Use Registration (SDUR) will be applied for if necessary.

2018 Diversion Infrastructure and Use

The spring box was originally installed by a prior landowner and is an aboveground, bottomless, 36"x 36" concrete box with a screened 1" outlet connected to 1" polytube (Fig. 5-7). At least 80% of the streamflow bypasses the structure by flowing out of the bottom and to the side. From the box the water gravity feeds through 1" polytube to (3) 3,500-gallon water tanks, then it is partially pumped upslope to the nearby residence and cultivation area (40.2103°, -124.1116°) and also gravity-fed to numerous storage tanks, including (1) 2,500-gallon fire-only tank and (1) 2,500-gal domestic storage tank, near the other residence and cultivation area (40.2082°, -124.1140°). The total water storage capacity is 29,000 gallons. Approximately 100,000 gallons was used during the growing season to irrigate 10,000 sq. ft. of cannabis cultivation. Diversion for irrigation ranges from 224-826 gpd. Domestic use is estimated to be 108 gpd for a total annual withdrawal of 39,040 gallons.

Proposed Irrigation Infrastructure

To meet the forbearance period, approximately 80,000 gallons in water storage tanks will be added to the project site. Rooftop rain-catchment systems may be added to reduce the demand on the spring as well. The type and number of water tanks may change, but the total storage will be sufficient to last through the forbearance period.

Stream Alteration Agreement Requirements

1. *Bypass Flow Requirement:* The intake pipe is 1" polytube connected to the bottom of the springbox in an ~2 ft-wide channel. Since the intake pipe take less than 5% of the channel width and the springbox has an open bottom, the diversion structure allows for the minimum 80% bypass flow. A float valve has been installed to prevent overflow.

2. *Maximum Diversion Rate Requirement:* The diversion structure is not estimated to divert more than 3 gallons per minute; however, a flow rate control valve will be installed to ensure compliance with the Agreement. Additional water storage will help meet this requirement.

3. *Seasonal Diversion Requirement:* In 2018, the combined domestic and irrigation diversions from April 1 – October 15 ranged from an estimated 342-570 gallons per day. The domestic use during this low flow season is estimated to be less than the 150 gpd. Starting in 2019, the combined domestic diversion rate of the 3 PODs on the property will not exceed 150 gallons/day during the low flow season. Per the measurement requirement, a measuring device will be installed at the POD prior to diverting for 2019. Water diversion records (Table 3) will be submitted annually prior to December 31st.

4. *Measurement of Diverted Flow (Records):*

Table 3. POD-2 Total Surface Water Diversion and Use for 2018.

Total surface water diversion by source and month (gallons) for 2018													
Source	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
POD-2 (Domestic)	3,803	3,803	3,803	2,953	3,253	3,553	3,853	2,187	2,186	1,889	3,253	4,501	39,040
POD-2 (Cannabis)	6,000	6,000	6,000	8,000	9,429	10,857	13,714	13,714	10,857	9,429	0	6,000	100,000
Total													**139,040**

Water input to storage by source and month (gallons) for 2018													
Storage - Source	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
Watertanks (POD-2)	7,250	7,250	7,250	0	0	0	0	0	0	0	0	7,250	29,000
Total													**29,000**

Water use by source and month (gallons) for 2018													
Use-Source	**Jan**	**Feb**	**March**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Total**
POD-2 (Domestic)	2,553	2,553	2,553	2,953	3,253	3,553	3,853	2,187	2,186	1,889	3,253	3,251	34,040
POD-2 (Cannabis)	0	0	0	8,000	9,429	10,857	13,714	13,714	10,857	9,429	0	0	76,000
Watertanks (Cannabis)	0	0	0	3,429	3,429	3,429	3,429	3,429	3,429	3,429	0	0	24,000
Watertanks (Domestic)	0	0	0	0	0	0	0	1,667	1,667	1,666	0	0	5,000
Total													**139,040**

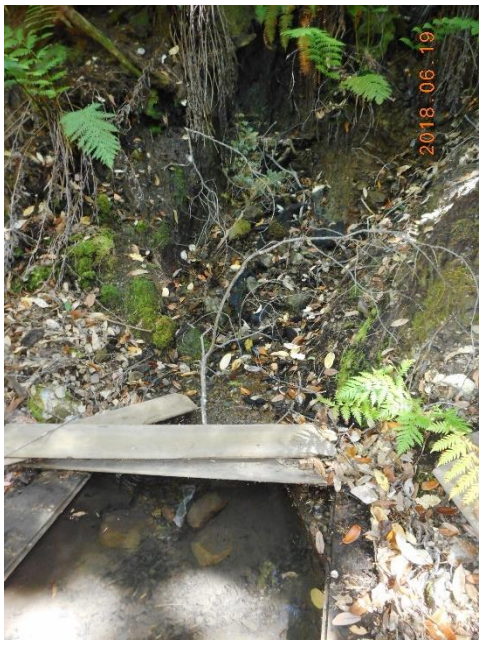


Fig. 5. POD-2, looking upstream (40.2110º, -124.1108º)

Fig. 6. POD-2, looking downstream

Fig. 7. POD-2, sideview of diversion structure

APPENDIX J:
SIUR CERTIFICATE

STATE OF CALIFORNIA
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD

DIVISION OF WATER RIGHTS

RIGHT TO DIVERT AND USE WATER

REGISTRATION *H503797* CERTIFICATE *H100330*

Right Holder: *Maureen Catalina*
P.O. Box 93
Honeydew, CA 95545

The State Water Resources Control Board (State Water Board) authorizes the diversion and use of water by the right holder in accordance with the limitations and conditions herein SUBJECT TO PRIOR RIGHTS. The priority of this right dates from *11/02/2018*. This right is issued in accordance with the State Water Board delegation of authority to the Deputy Director for Water Rights (Resolution 2012-0029) and the Deputy Director for Water Rights redelegation of authority dated October 19, 2017.

The Deputy Director for Water Rights finds that this registration meets the requirements for registration of small irrigation use appropriation. (Wat. Code, § 1228 et seq.)

Right holder is hereby granted a right to divert and use water as follows:

1. Location of point*(s)* of diversion **(Coordinates in WGS 84)**

Name of Diversion	Source	Tributary To:	Thence	Latitude	Longitude	County	Assessor's Parcel Numbers (APN)
Maromo-Honeydew-POD-2	Unnamed Spring	Honeydew Creek	Mattole River	40.211072	-124.111209	Humboldt	107-144-021

2. Purpose of Use and 3. Place of Use

2. Purpose of Use	3. Place of Use		
	County	Assessor's Parcel Numbers (APN)	Acres
Irrigation, Fire Protection	Humboldt	107-144-021	0.23
Irrigation	Humboldt	107-144-020	0.23

Note: Assessor's Parcel Numbers provided are based on the user's entries in this portal on *11/19/2018*.
The place of use is shown on the map filed on *11/19/2018* with the State Water Board.

4. Quantity and Season:

The water appropriated shall be limited to the quantity which can be beneficially used and shall not exceed 0.38 **acre-feet per year** to be collected from 01/01 to 12/31 and as permitted in the diversion season specified in the current version of the State Water Board's Cannabis Policy, whichever is more restrictive. The total storage capacity shall not exceed 0.39 acre-feet. The rate of diversion to storage shall not exceed **42,000 gallons per day (gpd) or the diversion rate specified in the current version of the State Water Board's Cannabis Policy, whichever is more restrictive.**

5. No water shall be diverted or used under this right unless the water right holder is in compliance with all applicable conditions, including the numeric and narrative instream flow requirements, of the current version of the State Water Board's

Cannabis Policy, except as follows:

Right holders enrolled under Regional Water Quality Control Board Order R1-2015-0023 or Order R5-2015-0113 shall comply at all times with requirements related to flow, diversion, storage, and similar requirements of Attachment A of the Cannabis Policy identified by the Division of Water Rights below in this condition. This condition remains in effect until July 1, 2019, or when the right holder enrolls under the statewide Cannabis General Order, whichever comes first, at which time right holders shall comply with all applicable conditions and requirements of Attachment A of the Cannabis Policy.

- Section 1 – Term Numbers 4, 15, 17, 24, 26, and 36.
- Section 2 – Term Numbers 23, 63, 64, 66, 69 – 78, 82 – 94, 96, and 98 – 103.
- Section 3 – All Instream Flow Requirements for Surface Water Diversions (Requirements 1 – 7) and the Gage Installation, Maintenance, and Operation Requirements.
- Section 4 – All requirements and conditions.

The current version of the State Water Board's *Cannabis Policy* is available online at: https://www.waterboards.ca.gov/water_issues/programs/cannabis/docs/policy.pdf.

6. No water shall be diverted or used under this right, and no construction related to such diversion shall commence, unless right holder has obtained and is in compliance with all necessary permits or other approvals required by other agencies.

7. Diversion works shall be constructed and water applied to beneficial use with due diligence.

8. No water shall be diverted under this right unless right holder complies with all lawful conditions required by the California Department of Fish and Wildlife. (Wat. Code, § 1228.6, subd. (a)(2).)

9. No water shall be diverted under this right unless it is diverted in accordance with the information set forth in the completed registration form as to source, location of point of diversion, purpose of use, place of use, quantity, and season of diversion. This information is reproduced as conditions 1 through 4 of this certificate.

10. No water shall be diverted under this right unless right holder complies with all applicable state, city, county, and local laws, regulations, ordinances, permits, and license requirements including, but not limited to those for cannabis cultivation, grading, construction, and building.

11. Pursuant to Water Code sections 100 and 275 and the common law public trust doctrine, all rights and privileges under this right, including method of diversion, method of use, and quantity of water diverted, are subject to the continuing authority of the State Water Board in accordance with law and in the interest of the public welfare to protect public trust uses and to prevent waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of said water.

12. The State Water Board reserves jurisdiction over this registration to change the season of diversion and rate of diversion based on later findings of the State Water Board concerning availability of water and the protection of beneficial uses. Any action to change the authorized season of diversion and rate of diversion will be taken only after notice to interested parties and opportunity for hearing.

13. Right holder shall grant, or secure authorization through right holder's right of access to property owned by another party, the staff of the State Water Board, and any other authorized representatives of the State Water Board the following:

    a. Entry upon property where water is being diverted, stored, or used under a right issued by the State Water Board or where monitoring, samples and/or records must be collected under the conditions of this right;

    b. Access to copy any records at reasonable times that are kept under the terms and conditions of a right or other order issued by the State Water Board;

    c. Access to inspect at reasonable times any project covered by a right issued by the State Water Board, equipment (including monitoring and control equipment), practices, or operations regulated by or required under this right; and,

    d. Access to photograph, sample, measure, and monitor at reasonable times for the purpose of ensuring compliance with a right or other order issued by the State Water Board, or as otherwise authorized by the Water Code.

14. Diversion of water under this right is subject to prior rights. Right holder may be required to curtail diversion or release water stored during the most recent collection season should diversion under this right result in injury to holders of legal downstream senior rights. If a reservoir is involved, right holder may be required to bypass or release water through, over, or around the dam. If release of stored water would not effectively satisfy downstream prior storage rights, right holder may be required to otherwise compensate the holders of such rights for injury caused.

15. This right shall not be construed as conferring right of access to any lands or facilities not owned by right holder.

16. All rights are issued subject to available flows. Inasmuch as the source contains treated wastewater, imported water from another stream system, or return flow from other projects, there is no guarantee that such supply will continue.

17. If storage or diversion of water under this right is by means of a dam, right holder shall allow sufficient water at all times to pass through a fishway or, in the absence of a fishway, allow sufficient water to pass over, around, or through the dam to keep in good condition any fish that may be planted or exist below the dam; provided that, during a period of low flow in the stream, upon approval of the California Department of Fish and Wildlife, this requirement will be satisfied if sufficient water is passed through a culvert, waste gate, or over or around the dam to keep in good condition any fish that may be planted or exist below the dam if it is impracticable or detrimental to pass the water through a fishway. In the case of a reservoir, this provision shall not require the passage or release of water at a greater rate than the unimpaired natural inflow into the reservoir. (Fish & G. Code, § 5937.)

18. The facilities for diversion under this right shall include satisfactory means of measuring and bypassing sufficient water to satisfy downstream prior rights and any requirements of the California Department of Fish and Wildlife and the State Water Board's Cannabis Policy.

19. This right does not authorize any act which results in the taking of a threatened, endangered, or candidate species or any act which is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code section 2050 et seq.) or the federal Endangered Species Act (16 U.S.C.A. section 1531 et seq.). If a "take" will result from any act authorized under this water right, the right holder shall obtain authorization for an incidental take prior to construction or operation of the project. Right holder shall be responsible for meeting all requirements of the state and Federal Endangered Species Acts for the project authorized under this right.

20. This right is subject to the submittal of an annual report of water use and satisfactory renewal, on forms to be furnished by the State Water Board, including payment of the then-current annual renewal fees. (Wat. Code, § 1228.5.)

21. This right shall be totally or partially forfeited for nonuse if the diversion is abandoned or if all or any part of the diversion is not beneficially used for a continuous period of five years.

22. This right is subject to enforcement, including but not limited to revocation, by the State Water Board if 1) the State Water Board finds that the right holder knowingly made any false statement, or knowingly concealed any material fact, in the right; 2) the right is not renewed as required by the conditions of this certificate; or 3) the State Water Board finds that the right holder is in violation of the conditions of this right. (Wat. Code, § 1228.4 et seq.)

23. The State Water Board intends to develop and implement a basin-wide program for real-time electronic monitoring and reporting of diversions, withdrawals, releases, and streamflow in a standardized format if and when resources become available. Such real-time reporting will be required upon a showing by the State Water Board that the program and the infrastructure are in place to accept real-time electronic reports. Implementation of the reporting requirements shall not necessitate amendment to this right.

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER RIGHTS

This certificate was issued automatically as a result of the registrant self-certifying submittal of a water right registration filing in substantial compliance with Water Code §1228.3.

Dated: 11/19/2018 07:10:07

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