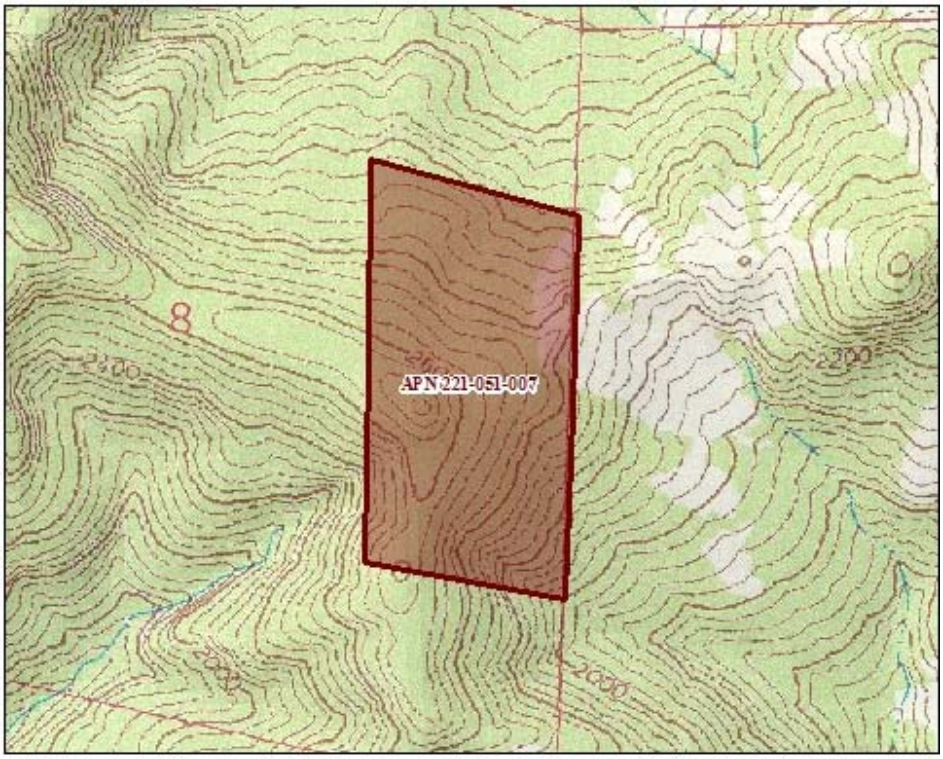
Water Resource Protection Plan (WRPP)

for

APN: 221-051-007

Located at
3790 Thomas Road
Miranda, California

June, 2018



Prepared for:
WD ID# 1B171289CHUM
PWA ID #180101060404/180101070203-5427
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Miranda, California

1.0 PROJECT SUMMARY

This report documents Pacific Watershed Associate's (PWA)[1] Water Resource Protection Plan (WRPP) for APN: 221-051-007 located off 3790 Thomas Road, Miranda, CA, as shown on Figure 1. This property is located approximately 6.3 miles southwest of Myers Flat, Humboldt County, CA, and hereinafter is referred to as the "Project Site." Based on either site conditions and/or total cultivation area, this Project Site falls within **Tier 2** of the North Coast Regional Water Quality Control Board's (NCRWQCB) Order No. 2015-0023, Waiver of Waste Discharge and General Water Quality Certification for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or Operations with Similar Environmental Effects ("Order"). Properties that fall into Tier 2 of the Order are required to develop a WRPP. Therefore, as required, this WRPP has been developed for you based on site inspections made by PWA on your property. PWA's recommendations for any remediation or corrective actions are a result of water quality requirements under the Order, including Best Management Practices (BMPs) designed to meet those requirements (Appendix A). This WRPP documents the findings of a site visit conducted on June 7, 2017 by PWA staff scientist Greg Davis and PWA staff biologist Margo Moorhouse.

2.0 CERTIFICATIONS, LIMITATIONS AND CONDITIONS

This WRPP has been prepared by, and under the responsible charge of a California licensed geologist or certified licensed professional in erosion and sediment control at PWA and all information herein, including treatment recommendations, are based on observations, data and information collected by PWA staff.

This WRPP has been prepared to: 1) describe the general conditions of the property at the time of our inspection; 2) summarize the site conditions and how they relate to the NCRWQCB twelve (12) Standard Conditions of the Order; 3) provide recommendations for remediation and/or correction of existing or potential water quality threats or impacts; and 4) recommend work to be conducted on this property to meet the 12 Standard Conditions of the Order. The analysis and recommendations submitted in this WRPP are based on PWA's evaluation of the Project Site and your activities which fall under the Order.

In this WRPP we have described the current conditions of the property and any water resource and water quality risk factors we observed at the time of our site inspection. PWA is not responsible for problems or issues we did not observe on our site inspection, or for changes that have naturally occurred or been made to the property after our site review. The interpretations and conclusions presented in this WRPP are based on a reconnaissance level site investigation of inherently limited scope. Observations are qualitative, or semi-quantitative, and confined to surface expressions of limited extent and artificial exposures of subsurface materials. Interpretations of problematic

[1] PWA is an approved Third Party Program for the North Coast Regional Water Quality Control Board's (NCRWQCB) Order No. 2015-0023, Waiver of Waste Discharge and General Water Quality Certification for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or Operations with Similar Environmental Effects.

geologic, geomorphic or hydrologic features such as unstable hillslopes, erosional processes and water quality threats are based on the information available at the time of our inspection and on the nature and distribution of existing features we observed on the property.

We have also included recommendations for remediation and/or correction that are based on these observations. The recommendations included in this WRPP are professional opinions derived in accordance with current standards of professional practice, and are valid as of the date of field inspection. No other warranty, expressed or implied, is made. Furthermore, to ensure proper applicability to existing conditions, the information and recommendations contained in this report shall be regularly reevaluated and it is the responsibility of the landowner and/or lessee operating under the Order to ensure that no recommendations are inappropriately applied to conditions on the property that have changed since the recommendations were developed.

If site conditions have changed for any reason, the site should be reevaluated and the WRPP revised and updated as required. These conditions include any changes in land management activities or property conditions that have occurred since our site visit (regardless of what they are, how they occurred or who performed them). Similarly, if the landowner/lessee uses portions of this property not identified or covered under the current WRPP, this Water Resource Protection Plan will need to be updated with the new information, including possible additions or changes to the recommended remedial or corrective actions and BMPs (Appendix A).

If the property owner has enrolled their property under the Order, they are responsible for complying with all the requirements thereunder, regardless of who is operating or cultivating on that property. If the property is being formally or informally leased to an operator, and the lessee has enrolled under the Order, then the lessee is responsible for complying with the Order's requirements, including the WRPP and related recommendations and requirements. If the lease expires or the lessee is not otherwise available or does not respond to information requests by the NCRWQCB or PWA, then the landowner automatically assumes responsibility under the Order for the requirements therein and for all related penalties or actions brought by the NCRWQCB.

If at any time in the future the property is to transfer ownership, it is the responsibility of the current owner, or their representatives, to ensure that the information and recommendations contained herein are called to the attention of any future owner or agent for the property. Unless this WRPP is modified by the NCRWQCB, or another approved Third Party Program representative, the findings and recommendations contained in this WRPP shall be utilized as a tool while implementing the recommendations made within this WRPP. Necessary steps shall be taken to see that contractor(s) and subcontractor(s) carry out such recommendations in the field in accordance with the most current WRPP and BMP standards.

As a Third Party Program, PWA will be responsible for the data, interpretations and recommendations developed by PWA, but will not be responsible for the interpretation by others of that information, for implementation of corrective actions by others, or for additional or modified work arising out of those plans, interpretations and recommendations. PWA assumes no liability for the performance of other workers or suppliers while following PWA's recommendations in the WRPP, unless PWA is under contract to perform or oversee those activities. Additionally, PWA is not responsible for changes in applicable or appropriate standards beyond our control, such as those arising from changes in legislation or regulations, or the

broadening of knowledge which may invalidate or alter any of our findings or recommended actions.

Any WRPP plan review or construction management services that may be needed or identified in the recommendations sections of this report are separate tasks from the preparation of this WRPP, and are not a part of the contract under which this WRPP was prepared. If requested, additional PWA field inspections, surveys, WRPP revisions/updates, project layout, design, permitting, construction oversight/management, or other related services arising from tasks described and recommended in the WRPP may be performed under separate agreements requiring advance notice and contracting.

PWA's services consist of professional opinions and recommendations made in accordance with generally accepted principles and practices. No warranty, expressed or implied, or merchantability or fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings. If the client desires assurances against project failures, they shall obtain appropriate insurance through their own insurance broker or guarantor.

This WRPP is considered a living document and shall be updated at least annually, or sooner if conditions have changed or land management actions have been undertaken after our site inspection. As an official part of the Waiver Program, this WRPP (including all its text, appendices, maps and photos) shall remain onsite and available for NCRWQCB staff to inspect and review upon request.

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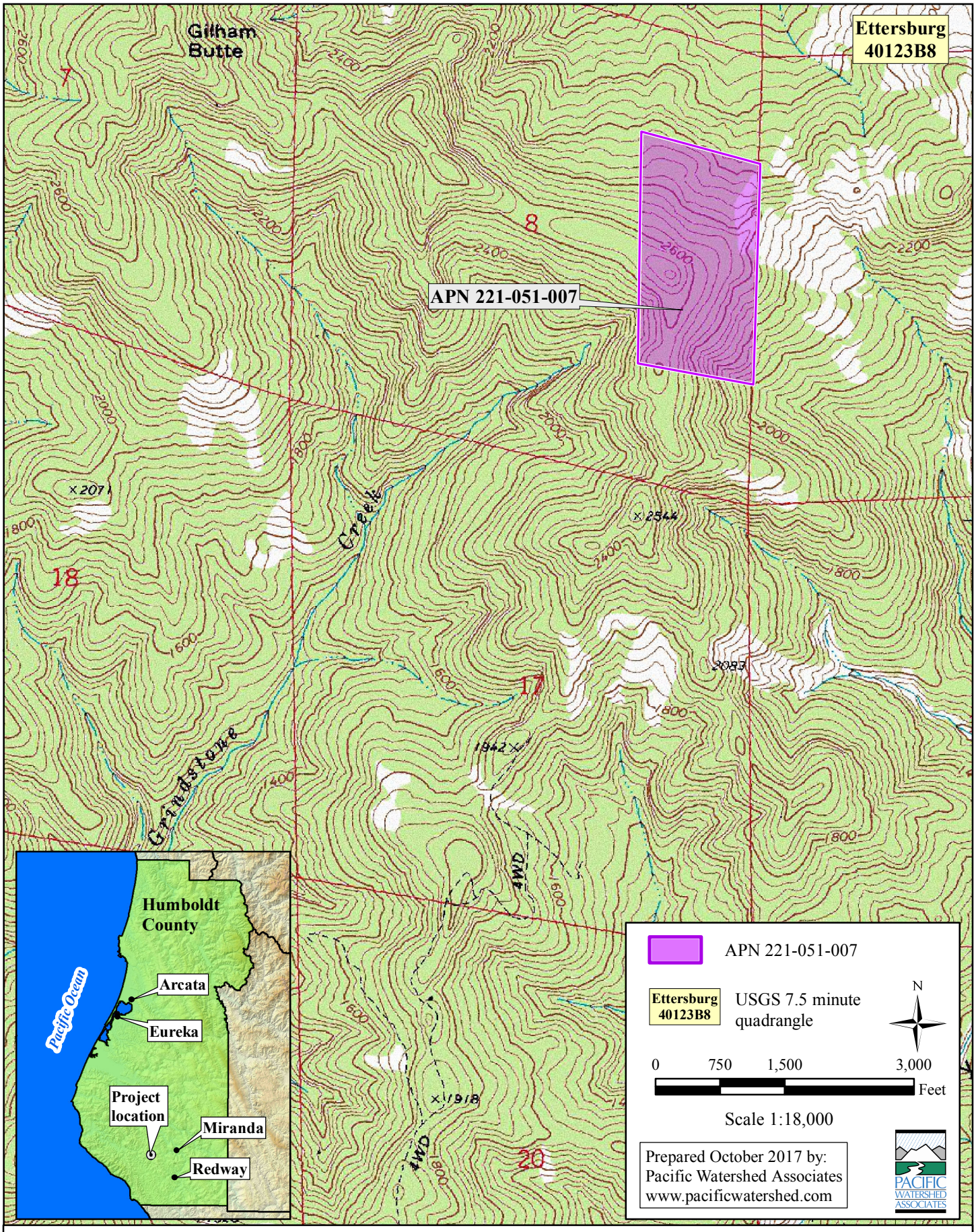

Figure 1. Location map for WDID #1B171289CHUM, APN 221-051-007, located at 3790 Thomas Road, Miranda, Humboldt County, California.

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3.0 INTRODUCTION

This Water Resources Protection Plan (WRPP) summarizes the results of Pacific Watershed Associate's (PWA) site visit and subsequent analysis and documentation of site conditions on APN: 221-051-007 located off 3790 Thomas Road, Miranda, California, as shown on Figure 1, hereinafter is referred to as the "Project Site." The WRPP describes and addresses the required elements and compliance with the 12 Standard Conditions established by the North Coast Regional Water Quality Control Board's (NCRWQCB) Order No. 2015-0023 to protect water quality from cannabis cultivation and related activities (Order). PWA has identified certain areas where the Project Site does not fully meet all 12 of the Standard Conditions of the Order. Section 4, below, identifies and discusses each of the 12 Standard Conditions as related to your property with regard to compliance with the NCRWQCB's Order.

The WRPP contains the following required sections:

1. Legible map (Figure 2) depicting the required site elements and features associated with the 12 Standard Conditions of the Order;
2. Description of current site conditions, compliance with the 12 Standard Conditions, and prioritized remediation or corrective actions needed to bring the site into compliance with the requirements of the Order;
3. A monitoring and inspection plan to ensure BMPs used to protect and prevent impacts to water quality are being implemented as recommended by PWA (implementation monitoring), and that they are effective (effectiveness monitoring);
4. A water use plan, including water sources, water use and storage rights documentation, monthly water use documentation (quantity), and water conservation measures that are employed to prevent adverse impacts to water quality and water quantity in the watershed;
5. List of fertilizers and chemicals stored and used onsite, including a log of the frequency and quantity of these materials used.

4.0 STANDARD CONDITIONS CHECKLIST FOR APN: 221-051-007 as of 6/7/2017

The NCRWQCB has developed a set of 12 Standard Conditions that shall be followed and implemented to protect and improve water quality as required under the NCRWQCB's Order. For a property to become compliant with the Order, all 12 Standard Conditions must be fully satisfied.

The following section details the specific requirements listed and described in the Order for each of the 12 Standard Conditions. Each Standard Condition has from 1 to 6 sub-requirements (*listed in italic type*), each of which must be satisfied to protect water quality and comply with the Order. The checklist developed by PWA for your property indicates: 1) whether the Standard Condition or Standard Condition sub-requirement was adequately met as of the date of PWA's field inspection, 2) PWA's observations and comments related to the Standard Condition or Standard Condition sub-requirement, 3) whether a relevant photo has been taken and included in the WRPP, and 4) recommended corrective or remedial actions that need additional work to meet the requirements of the Order.

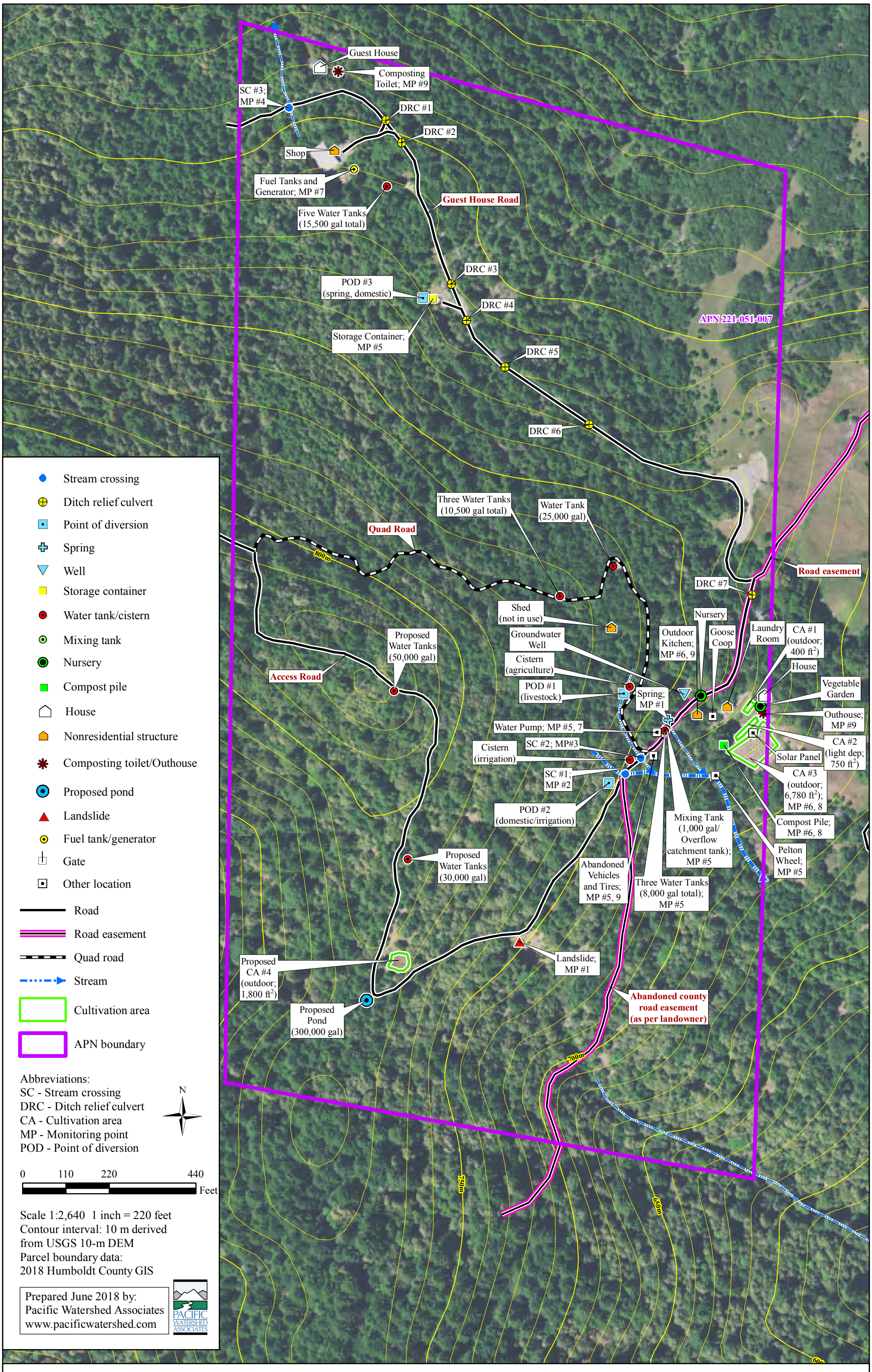

Figure 2. WRPP site map for WDID#1B171289CHUM, APN 221-051-007, located at 3790 Thomas Road, Miranda, Humboldt County, California.

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In Section 5 of this WRPP, PWA has provided a summary prioritized list (Table 1) of the recommended treatments and actions to be implemented by you to meet the requirements of the Order. PWA will consult with you to review the WRPP document and findings, and to set a preliminary schedule for implementation of the recommended measures for achieving compliance with the Order. Please note that some of the PWA recommended actions are based on regulatory requirements and deadlines, while others can be scheduled to fit the needs of both you and your property.

4.1 Standard Condition #1. Site Maintenance, Erosion Control and Drainage Features

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

Meets condition? No

Observations/Comments: Approximately 1.32 miles of road were inspected on the Project Site during the field review. The Guest House road will need some additional road surface drainage features and general road shaping. The Quad road and the Access road (see Site Map) are old, overgrown legacy forest roads that both lack sufficient drainage structures to effectively disperse flow and prevent future hydrologic connectivity. Stream crossings will have to be reconstructed, and the road has failed in several locations. Finally, there is also a small spring saturating the road between the nursery and Stream Crossing (SC) #2. Even though the spring does not appear to be lowering the road surface and no slumping was evident, direct delivery from the road surface to the Class III below was evident.

Much of the Project Site parcel is covered with second growth forests that likely conceal abandoned (legacy) forest roads used in past logging and the Abandoned County Road easement; these may or may not contain eroding or potential sediment sources that pose a threat to water quality.

Photos: Photos 1 and 2; MP #1

Corrective or remedial actions needed: Road drainage improvements are needed in a number of locations to meet the Standard Conditions of the Order:

1) Install permanent road drainage structures which shape the road surface (such as rolling dips, ditch relief drains/culverts, etc.) on the immediate approaches to stream crossings to hydrologically disconnect road segments from surface waters and to disperse concentrated road surface runoff.
2) Install a small rocked dip in the road surface where the spring crosses the road, near SC#2, the groundwater well and nursery (Figure 2).
3) Outslope sections of the Quad road and the Access road, to reduce road runoff, erosion, and routine maintenance.
4) A California licensed geologist or certified licensed professional in erosion and sediment control needs to be consulted to evaluate the slide along the Access road, and to make prescriptions to either decommission or repair this road.

Since the Abandoned County Road easement running through the property was reportedly an old county maintained road (as per landowner communications after the site inspection), it would be important to contact the County to see if the easement was formal, and if is still active or if it is abandoned. It is (remotely) possible that the

maintenance will be the responsibility of Humboldt County Department of Public Works. This will help define your options and responsibilities for access and treatments of the easement ridge road.

Under the Order, all legacy roads and the Abandoned County Road easement, on the Project Site are required to be inventoried and assessed for erosion sources and threats to water quality. There are significant second growth forest areas on the Project Site parcel. You will need to identify and map all legacy roads in these forested areas (if there are any) and conduct a rapid erosion assessment to identify existing or potential sediment sources or pollution threats, if any, along these routes. The most important sites to examine include road or skid trail crossings of stream channels and potentially unstable fillslopes where roads were built across steep hillslopes.

If existing or potential legacy sediment sources that could impact surface waters are identified in the field, they will need to be treated using erosion prevention and erosion control treatments (see Appendix A).

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

Meets condition? Yes

Observations: Even though there was no delivery to surface waters present, the DRCs along the Guest House road have either plugged or are partially plugged and require cleaning. Also, see 4.1 above.

Photos: None

Corrective or remedial actions needed: Maintain all DRCs so that the inlets, interiors, and outlets are clear of debris and the pipes are free flowing. Also, see 4.1a above.

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

Meets condition? No

Observations/Comments: There is a landslide feature (MP #1) on the unmaintained Access Road that reportedly failed and delivered sediment to a Class III watercourse. The failure apparently occurred years ago and is the upper end of a head-cut from a slide originating in the Abandoned County road easement downslope (as per landowner communications after the site inspection). The head-cut fillslope instability has a small volume of perched fill remaining at the headscarp but appears to be stabilized by several uneven aged conifers. If there was to be future failure there would be little to no delivery to surface waters.

Photos: Photo 1; MP #1

Corrective or remedial actions needed: A California licensed geologist or certified licensed professional specializing in erosion and sediment control, needs to be consulted to evaluate the slide along the Abandoned County Road, and to make prescriptions to either decommission or repair the road.

d) Roads, clearings, fill prisms, and terraced areas (cleared/developed areas with the potential for sediment erosion and transport) shall be maintained so that they are hydrologically disconnected, as feasible, from surface waters, including wetlands, ephemeral, intermittent and perennial streams.

Meets condition? No
Observations: See 4.1a-c, above.
Photos: Photos 1 and 2; MP #1
Corrective or remedial actions needed: See 4.1a-c, above.

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

Meets condition? No
Observations/Comments: See 4.1a and b, above.
Photos: None
Corrective or remedial actions needed: See 4.1a and b, above.

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

Meets condition? Yes
Observations/Comments: No construction materials were observed on the Project Site during the initial inspection.
Photos: None
Corrective or remedial actions needed: None

4.2 Standard Condition #2. Stream Crossing Maintenance

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

Meets condition? No
Observations/Comments: Three (3) stream crossings (SCs), were identified on the Project Site during our field inspection. They include: 1) a partially washed out fill crossing on a Class II watercourse (SC #1); 2) an unculverted fill crossing on a Class III watercourse (SC #2); and 3) a 24-inch diameter, plastic culvert on a Class III watercourse that is properly sized for peak flows (SC #3). Implementation of treatments for SC #1 and #2 may depend on whether or not the road maintenance is the County's responsibility and if the road easement is still active. Another concern is whether the road will be able to stay open, depending on the treatment prescribed for the landslide feature by a professional geologist or engineer.
Photos: Photos 3-11; MP #2-4
Corrective or remedial actions needed: If the easement road is not under the County's jurisdiction, one treatment option for SC #1 and #2 is to upgrade each crossing by installing 24-inch diameter CMP's to allow for the passage of vehicle traffic. The alternative option is to decommission the crossings, which will deny vehicle access to the ridge. The culvert at SC #3 is sized appropriately for peak flows, is in line with the natural channel, and does not have diversion potential. SC #3 will not

require upgrading and should be maintained as is, to include periodic inspections prior to and during the wet season.

Table 4.2. Culvert Sizing

Stream crossing number	Existing culvert diameter (in) or condition	Watershed area (acres)	Mean annual rainfall (in)	Q100 discharge estimate for 100-yr storm (cfs)	Recommended culvert diameter (in) or treatment
SC #1	Unculverted Fill	1	108	2	24" culvert or decommission
SC #2	Unculverted Fill	2	108	3	24" culvert or decommission
SC #3	24"	6	108	8	24 CMP (correctly sized)

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

Meets condition? No
Observations/Comments: See 4.2.a above.
Photos: Photos 3-7; MP #2 and 3
Corrective or remedial actions needed: See 4.2.a above.

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

Meets condition? No
Observations/Comments: See 4.2a, above.
Photos: None
Corrective or remedial actions needed: All upgraded culverts and crossings will be designed and upgraded to allow for aquatic organism passage. Culverts will be set in line and at the grade of the natural streambed. If decommissioned, the crossing(s) will be excavated according to current standards.

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

Meets condition? No
Observations/Comments: See 4.2.a, above.
Photos: Photos 3-7; MP #2 and 3
Corrective or remedial actions needed: See 4.2a, above.

e) *Culverts shall align with the stream grade and natural stream channel at the inlet and outlet where feasible.*

Meets condition? Yes
Observations/Comments: See 4.2.a above for the single culverted crossing on the Project Site.
Photos: Photos 8-11; MP# 4

Corrective or remedial actions needed: When rebuilding stream crossings, ensure they are installed in-line and at an aligned grade with the natural channel.

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

Meets condition? No
Observations/Comments: Stream Crossings #1 and #2 have diversion potential.
Photos: Photos 3-7; MP #2 and 3
Corrective or remedial actions needed: See 4.2a above and utilize critical dips, where necessary, to prevent diversion if the culvert plugs and overtops.

Standard Condition #2. - General comments and recommendations: Obtain all necessary agreements and permits prior to commencing work in any watercourse or at any stream crossing. These may include, but not be limited to: California Department of Fish and Wildlife (CDFW) Lake and Streambed Alteration Agreement (LSAA) 1602, State Water Resources Control Board (SWRCB) 401 Certification, and Army Corps of Engineers (ACOE) 404 Permit.

4.3 Standard Condition #3. Riparian and Wetland Protection and Management

a) For Tier 1 Dischargers, cultivation areas or associated facilities shall not be located within 200 feet of surface waters. While 200 foot buffers are preferred for Tier 2 sites, at a minimum, cultivation areas and associated facilities shall not be located or occur within 100 feet of any Class 1 or 2 watercourse or within 50 feet of any Class 3 water course or wetlands.

Meets condition? No
Observations/Comments: There are multiple water tanks, a 1,000 gallon mixing/overflow tank, a Pelton Wheel balanced on T-Posts, and a water pump within the 50 foot of a spring and Class II watercourse, and legacy vehicles and tires in the bed and bank of the stream, located near SC#1 and #2. There is a storage container next to POD #3, within the 50 foot buffer of the spring water source (POD #3). Finally, Cultivation Area (CA) #3, the outdoor kitchen, and the compost pile are within the 100 foot riparian buffer of a Class II watercourse.
Photos: Photos 12-18; MP #5 and 6
Corrective or remedial actions needed: Relocate the mixing/overflow tank, the water tanks, storage container, compost pile, water pump, and that portion of CA #3 that are within the riparian buffers to a stable location outside the buffer where there is no risk of delivery to surface waters. The vehicles and tires will require permitting for removal and are to be included in the permit applications necessary for and as recommended in Section 4.2 above. The outdoor kitchen needs to either receive a variance to include draining away from the Class II watercourse below, or be relocated. Either way, the effluent from the sink will need an approved disposal method that meets Health and Safety Standards with no risk of delivery to surface waters. Alternative options for the Pelton Wheel location need to be explored where, a more stable and permanent base

can be developed and the extent of de-watering the watercourse is minimized. Also, see the general comments below that address cultivation areas within riparian buffers.

b) *Buffers shall be maintained at natural slope with native vegetation.*
Meets condition? No
Observations/Comments: The natural 30% slope, and native vegetation have been altered at CA #3.
Photos: Photos 14; MP #6
Corrective or remedial actions needed: Once the facilities have been moved out of the riparian buffer areas, native slopes need to be restored, all bare soils and disturbed areas should be seeded with native grasses and mulched, and stream buffer planted with riparian vegetation. See general comments below.

c) *Buffers shall be of sufficient width to filter wastes from runoff discharging from production lands and associated facilities to all wetlands, streams, drainage ditches, or other conveyances.*
Meets condition? No
Observations/Comments: See 3.1a-b, above.
Photos: Photos 12-18; MP #5 and 6
Corrective or remedial actions needed: See general comments below

d) *Riparian and wetland areas shall be protected in a manner that maintains their essential functions, including temperature and microclimate control, filtration of sediment and other pollutants, nutrient cycling, woody debris recruitment, groundwater recharge, streambank stabilization, and flood peak attenuation and flood water storage.*
Meets condition? No
Observations/Comments: There are no riparian protections in place where the buffers have been disturbed.
Photos: Photos 12-18; MP #5 and 6
Corrective or remedial actions needed: See general comments below.

Standard Condition #3. - General comments and recommendations: Certain cultivation areas and/or other related facilities on this Project Site do not meet the setback or buffer area requirements to be achieved and maintained under the North Coast Water Quality Control Board's (NCRWQCB) Waiver of Waste Discharge (Order) (see 4.3a, above). However, if you are participating in the County Land Use planning and permitting process, the Humboldt County Planning Department (County) also requires that no infrastructure be moved until you have received your land use permit, so as to maintain consistency in the process of evaluating and approving a pending land use applications on file for properties in Humboldt County. Before you move facilities named in this WRPP, contact and seek approval from the County.

The Schedule of Corrective Actions listed in Table 1 of this WRPP specifies the date by which cultivation areas and related facilities now located within stream buffers should be removed from those riparian buffer areas. That WRPP Table 1 schedule and date of

removal should be followed by everyone who is not a part of the County land use planning permit process.

If you are applying under County's land use permitting process and have been specifically directed not to remove or move infrastructure, the following interim measures shall be applied until its removal has been approved:

(1) Obtain a written note from the County stating that you are directed not to remove the infrastructure within stream buffer areas on the Project Site; keep that note with your WRPP.
(2) All cultivation waste and spent soils should be removed and stored outside the buffer areas during the winter period as per recommendations included elsewhere in this WRPP.
(3) All petroleum products, fertilizers, and other chemicals that are stored within the buffer area(s) must be moved to proper storage facilities outside stream buffers elsewhere on the Project Site, and as recommended elsewhere in the WRPP.
(4) Use timed or volume limited drip irrigation for all watering of cultivation areas that fall within stream buffer areas.
(5) Minimize soil disturbances and bare earth areas within these cultivation areas; seed and mulch all bare earth prior to October 31 each year.
(6) Maintain native grassy buffers and/or dense riparian vegetation between these cultivation areas and the potential receiving waterbody.
(7) Prior to October 31, planting beds and planting pots containing spent soils or amendments should be either 1) fully tarped or 2) planted with heavy cover crops during the wet season to minimize surface runoff and leaching of nutrients. If cover crops cannot be maintained due to cold weather, the beds/pots should be fully tarped.
(8) Regularly monitor the subject garden area and related facilities to assure the interim measures are effective and adaptively manage the area to minimize or eliminate surface runoff and potential impacts to water quality.

4.4 Standard Condition #4. Spoils Management

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

Meets condition? Yes
Observations/Comments: Spoils generated in 2007 from the engineered graded pad for the 25,000 gallon water tank are located in a stable area away from any watercourse and are not a threat to water quality.
Photos: Photo 19
Corrective or remedial actions needed: Make a copy of the engineering report and all grading permits for the 25,000 gallon water tank, and keep on site along with this WRPP.

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

Meets condition? Yes
Observations/Comments: See 4.4a, above.
Photos: None
Corrective or remedial actions needed: None

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

Meets condition? Yes
Observations/Comments: See 4.4a, above.
Photos: None
Corrective or remedial actions needed: None

4.5 Standard Condition #5. Water Storage and Use

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

Meets condition? Unknown
Observations/Comments: The Project Site has a total of 59,000 gallons of water storage in rigid tanks. Another 80,000 gallons of tank storage and 300,000 gallons in a ridgetop, rainwater-fed pond is planned for the future (see Figure 2). There are multiple water sources at the Project Site that are used for irrigation, domestic purposes, and for livestock. A permitted groundwater well was installed in February 2017 to minimize or eliminate dry season surface water diversions for the Project Site. According to the Order, one way to prevent downstream impacts to water quality is to forbear, not divert surface waters, during the dry season from May 15 through October 31 each year.

Approximately 7,930 ft^2 of cultivation area exists on the project Site. With an estimated irrigation use of 10 gallons/ft^2/year, our preliminary water budget calculations suggest that approximately 79,300 gallons of irrigation water would need to be stored so that landowner could successfully forbear over the summer (assuming the well was not used during that period). The landowner estimates that approximately 100,000 gallons of water was used in 2016 to supply the irrigation of all cultivation areas. Based on these preliminary calculations (see Section 7.0, below) and water use estimates, the current water storage of 59,000 gallons is insufficient for summer forbearance. With the proposed addition of another 80,000 gallons of rigid tank water storage, preliminary calculations suggest the landowner could easily forbear during the dry summer season.
Photos: None
Corrective or remedial actions needed: A Water Budget should be developed and refined by water monitoring to determine how much additional water storage is needed for annual forbearance from May 15th through October 31st. A Water Monitoring Plan will also need to be implemented (see comments below). Under the Order, you are required to measure, document and report the water you divert, store and use throughout the year. PWA has created a simple log sheet to help you monitor this water data for your Project Site (Appendix D). This water data (diversion, pumping, storage and use) will help you refine the water budget and document the exact timing and volume of your water diversion, pumping, storage, and use throughout the year. The

water data will be reported annually to the North Coast Regional Water Quality Control Board (NCRWQCB) no later than March 31 for the preceding calendar year. Keep a copy of the well permit and the drilling log with this WRPP for possible inspection.

Additionally, PWA strongly recommends and regulatory agencies (CDFW, SWCB Division of Water Rights) may require installing in-line water meters to measure water volumes: diverted from each water source, stored (tanks, ponds, or bladders), and used for irrigation and domestic purposes, Each area of use should have separate meters, separating irrigation and domestic uses at a minimum.

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

Meets condition? Yes
Observations/Comments: Several water conserving strategies are currently being implemented. These include: 1) controlled hand watering; 2) the use of compost and mulch fertilizer to improve soil structure and water-holding capacity; and 3) the use of rice hulls that retain moisture and therefore limit the frequency of irrigation.
Photos: None
Corrective or remedial actions needed: Existing and additional water conservation measures should be continued or investigated and employed to minimize water diversion and use, including but not limited to: 1) irrigation scheduling (watering during the early morning and early evening); 2) planting in-ground and not in above-ground pots; 3) top mulching beds with straw to limit evaporation and 4) timed and/or volume limited drip emitters. PWA further recommends developing rainwater harvesting activities and adding rainwater-fed storage facilities sufficient to meet dry season irrigation needs, as well as using your groundwater well opposed to surface water diversions.

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

Meets condition? Unknown
Observations/Comments: PWA staff identified 12 rigid water tanks on the Project Site, yielding approximately 59,000 gallons of water storage used for irrigation. Most water storage is from the 25,000 gallon water tank. The landowner is now utilizing a permitted groundwater well recently drilled on the Project Site and has also proposed adding 80,000 gallons in additional water tank storage and construction a 300,000 gallon rainwater catchment pond on the ridgetop (see Figure 2). This total volume would likely far exceed the irrigation requirements of the current cultivation footprint.
Photos: Photo 19
Corrective or remedial actions needed: Based on preliminary calculations (see Section 7.0, below), existing water storage is inadequate for the size and scope of the current operation. However, to confirm this, a Water Budget should be developed and refined through water monitoring to determine exact timing and volumes of water use from the new well and water diversions, as well as water storage and use through time

and especially for the low flow period from May 15 through October 15. If the 25,000 gallon water tank has not been permitted by the county, you should check with the county to determine if you need to obtain a retroactive grading permit for its installation. This permit will likely require a retroactive engineering analysis and design, and filing for the county permit. Once obtained, keep a copy of the permit with this WRPP for possible inspection.

d) *Water is applied using no more than agronomic rates.*

Meets condition? Yes

Observations/Comments: According to the cultivator, water is applied sparingly, though application was not observed due to the early inspection date.

Photos: None

Corrective or remedial actions needed: To verify compliance with this Standard Condition, start measuring and recording your water usage using flow meters on a per plant basis, based on type and size of plant pot, full term versus short season (light deprivation) plant, and type of irrigation. Observe and monitor soil moisture so watering, fertilizer and chemical applications are made only when necessary and overwatering and excess infiltration is avoided. This data will help you refine a Water Budget for your operation and determine agronomic rates of watering.

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

Meets condition? No

Observations/Comments: It is PWA's understanding that Client captures and uses water from two streams and a spring. Currently, applications for a riparian water right have been submitted and recorded for the diversion and use of the spring. There is also a Pelton wheel that is used for energy generation on the Project Site (on a Class II watercourse southwest of CA #3).

Photos: None

Corrective or remedial actions needed: Water diversion and water storage requires valid water rights documentation. As opposed to employing one or more surface water diversions and securing various water rights, consider obtaining irrigation water for your agricultural needs from your recently installed groundwater well or by developing rainwater capture systems to fill rigid water tanks and/or one or more off-stream, rainwater-fed ponds.

Domestic water rights: If you plan to continue flow diversions for your domestic water needs and are storing water for over 30 days, you will need to file, obtain, and maintain water rights for your parcel. File for a Small Domestic Use (SDU) Appropriation for the spring diversion to cover your domestic use requirements such as drinking, bathing, cooking and fire control. This type of water right cannot be used for commercial crop irrigation. File for water rights with the State Water Resources Control Board (SWRCB):

- Small Domestic Use (SDU) Appropriation Registration

http://www.waterboards.ca.gov/waterrights/publications_forms/forms/docs/sdu_registration.pdf

Submit annual water diversion and use volumes to the NCRWQCB by each March 31 for the preceding calendar year, and to the State Water Resources Control Board, Department of Water Rights (SWRCB, DWR) for supplemental reporting required for the Annual Statement of Diversion and Use (ISDU) by June 30 of each year.

Agricultural water rights: If you plan to continue flow diversions for your agricultural water needs, you need to file and obtain water rights for your parcel. The SWRCB has recently developed a Small Irrigation Use Registration (SIUR) water right for this region. PWA recommends that you apply for this small irrigation water right as soon as possible:

https://www.waterboards.ca.gov/water_issues/programs/cannabis/cannabis_water_rights.shtml

The link to the online SIU water right application for cannabis cultivators is:

• Registration Small Irrigation Use Registration (SIUR)
https://public2.waterboards.ca.gov/cgo

Fish and Wildlife impacts: While not a true water right, if you are directly diverting water from a jurisdictional spring or stream, pumping water from a well, or capturing surface water in a pond, you will need to obtain a consultation with California Department of Fish and Wildlife (CDFW) staff to determine if you are required to file a CDFW Lake and Streambed Alteration Agreement (LSAA). The agreement will be needed to cover your diversions, Pelton wheel and the three (3) stream crossings on the Project Site.

• Lake and Streambed Alteration Agreement (LSAA).
https://www.wildlife.ca.gov/Conservation/LSA

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

Meets condition? Yes
Observations/Comments: Most water tanks are located on stable slopes on or near ridge tops far from any streams making it unlikely that water storage structure failures will result in delivery to the stream network. However, three water tanks (8,000 gallons total) are located within the 50 foot riparian buffer of a Class III watercourse and adjacent to a spring (see MP#5 and Figure 2). All these tanks are required to be moved out of and away from any riparian buffer.
Photos: Photo 16; MP #5 (as relates to Condition #3)
Corrective or remedial actions needed: Move the three water tanks out of the riparian buffer zones of the spring and watercourse (see corrective action 4.3a, above) to a location where they will not threaten water quality if they failed.

Standard Condition #5 - General comments and recommendations: PWA highly recommends, and state agencies may require, that you install flow meters on your surface water diversions, water tanks, cisterns, and/or on your distribution lines, to accurately document the timing and volume of your water diversion and use. You will need to document the amount of water that is diverted from the spring and streams, and water stored and used for irrigation and other purposes. PWA has created a simple log sheet to help you monitor your water usage (see Appendix D).

4.6 Standard Condition #6. Irrigation Runoff

a) *Implementing water conservation measures, irrigating at agronomic rates, applying fertilizers at agronomic rates and applying chemicals according to the label specifications, and maintaining stable soil and growth media should serve to minimize the amount of runoff and the concentration of chemicals in that water. In the event that irrigation runoff occurs, measures shall be in place to treat/control/contain the runoff to minimize the pollutant loads in the discharge. Irrigation runoff shall be managed so that any entrained constituents, such as fertilizers, fine sediment and suspended organic particles, and other oxygen consuming materials are not discharged to nearby watercourses. Management practices include, but are not limited to, modifications to irrigation systems that reuse tailwater by constructing off-stream retention basins, and active (pumping) and or passive (gravity) tailwater recapture/redistribution systems. Care shall be taken to ensure that irrigation tailwater is not discharged towards or impounded over unstable features or landslides.*

Meets condition? Yes
Observations/Comments: No evidence of irrigation runoff was observed on the Project Site.
Photos: None
Corrective or remedial actions needed: None

Standard Condition #6 - General comments and recommendations: According to the Order, irrigation and fertilization shall occur at agronomic rates and chemicals shall be applied according to the label instructions and specifications. Agronomic rates are those rates of application of water, fertilizers and other amendments that are sufficient for utilization by the crop being grown, but not at a rate that would result in surface runoff or infiltration below the root zone of the crop being grown.

In the event that irrigation runoff occurs or could occur, you shall ensure that contaminated runoff does not enter nearby watercourses. This can be accomplished by constructing or designing containment measures, including sediment basins, berms, infiltration ditches and/or other Best Management Practices (BMPs), as needed, to contain and control surface runoff (see Appendix A).

4.7 Standard Condition #7. Fertilizers and Soil Amendments

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

Meets condition? No

Observations/Comments: The compost pile is uncovered and within the riparian buffer of a Class II watercourse (see Section 4.3). All other fertilizers and amendments are stored under cover when not in use.

Photos: Photo 13; MP #6

Corrective or remedial actions needed: If the landowner wishes to keep fertilizers and soil amendments on the Project Site, they should continue to be stored fully under cover, off the ground, and in a stable location not exposed to the elements. If stored outdoors, they should be fully tarped, off the ground, and in a stable location with no chance of nutrient leaching or delivery to surface waters. Fertilizers, potting soils, compost, and other soils and soil amendments should not be stored with petroleum products as they may be incompatible and could potentially react (see General Comments in Section 4.9 for more information).

b) Fertilizers and soil amendments shall be applied and used per packaging instructions and/or at proper agronomic rates.

Meets condition? Unknown

Observations/Comments: Based on verbal communication with the cultivator, the recommended application rates are being followed.

Photos: None

Corrective or remedial actions needed: To confirm compliance with this Standard Condition, you are required to keep detailed records of the type, timing and volume of fertilizers and/or other soil amendments you use in your operations. They can be recorded on log sheets such as those provided in Appendix E. Observe and monitor soil moisture so watering, fertilizer and chemical applications are made only when necessary and overwatering and excess infiltration is avoided.

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

Meets condition? Yes

Observations/Comments: Planting beds and pots are cover cropped with vetch, kale, and arugula over the winter to prevent nutrient leaching.

Photos: None

Corrective or remedial actions needed: To prevent nutrient leaching from cultivation areas, continue to plant dense cover crops in spent pots, holes and beds to enrich soil and lock up nutrients or; 1) fully tarp any exposed soils and growing mediums in beds, pots, holes or piles; or 2) move spent soils and amendments inside or under cover to temporarily store them during the wet season (November 1 – May 15). If dense cover crops cannot be kept alive, all planted areas should be tarped to protect them from rainfall, snowmelt and subsequent infiltration and leaching of nutrients. Winterize all cultivation areas and all disturbed areas on the Project Site by placing straw wattles

with biodegradable wrapping on the downslope perimeter and/or by mulching/seeding any bare soil areas on cultivation sites.

Standard Condition #7 - General comments and recommendations: Based on verbal communication with the cultivator, all fertilizers and amendments were reportedly applied according to packaging instructions, and they are stored in areas with cover.

Under the Order, you are required to keep track of the type, timing and volume of fertilizers and other soil amendments that are applied. This can be done using the simple log form we have provided in Appendix E.

4.8 Standard Condition #8. Pesticides/Herbicides

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

Meets condition? Unknown

Observations/Comments: The primary pest management tool implemented by the landowner is the application of predatory mites and beneficial nematodes. Additional organic pesticides and fungicides include neem oil and potassium bicarbonate, respectively.

Photos: None

Corrective or remedial actions needed: To be compliant with the Order, all pesticides, herbicides and related materials (e.g., fungicides) must be used and applied consistent with product labeling. Pesticide and herbicide storage and use on the Project Site must be closely monitored and recorded. To be compliant with the Order you are required to keep records (logs) of the type, timing and volume of pesticides and herbicides used in your operations. This can be done using a simple log form, such as the one included in Appendix F.

Standard Condition #8 - General comments and recommendations: When present, pesticides and herbicides should be stored within enclosed buildings in such a way they cannot enter or be released into surface or ground waters. They should not be stored with petroleum products as they may be incompatible and could potentially react (see General Comments in Section 4.9 for more information).

For the health of the environment and your workers, you are encouraged to utilize organic or biologic controls, rather than highly toxic petro-chemicals, to prevent pest and mildew problems. Several safe alternatives are available.

Additionally, for any pesticide use you must comply with any Pesticide Registration Requirements. See Appendix E2 included in the NCRWQCB Order, or on their web site at:
http://www.waterboards.ca.gov/northcoast/board_decisions/adopted_orders/pdf/2015/150728_Appendix_E2_DPR_MJ%20Pesticide%20Handout.pdf

4.9 Standard Condition #9. Petroleum Products and other Chemicals

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

Meets condition? No
Observations/Comments: There are multiple sites of stored petroleum on the Project Site including: 1) a water pump with cover that is lacking secondary containment and is within a riparian buffer; 2) a 1,000 gallon fuel tank with secondary containment but lacking cover; and 3) a 15,000 watt generator lacking cover and secondary containment
Photos: Photos 15 and 20; MP #7
Corrective or remedial actions needed: Place all small fuel cans, generators, fuel tanks, gasoline powered garden equipment and any other items containing petroleum products in adequate secondary containment basins and store in a safe, covered, secure location (e.g. away from slopes and outside of riparian buffers). Additional information on handling and storing hazardous materials is provided in the *General Comments and Recommendations*, below.

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

Meets condition? No
Observations/Comments: See 4.9a comment above.
Photos: Photos 15 and 20; MP #7
Corrective or remedial actions needed: See 4.9a comment above.

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

Meets condition? N/A
Observations/Comments: None
Photos: None
Corrective or remedial actions needed: None

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

Meets condition? No

Observations/Comments: No spill prevention cleanup kit is kept onsite to help clean up small spills.

Photos: None

Corrective or remedial actions needed: Obtain one or more spill prevention cleanup kits and keep readily available to clean up small spills. Spill kits should be located where fuel is stored and refueling occurs.

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

Meets condition? N/A

Observations/Comments: No underground storage tanks were observed on the Project Site.

Photos: None

Corrective or remedial actions needed: None

Standard Condition #9 - General comments and recommendations: Note that when petroleum products are onsite they will need to be stored under cover, off the ground and in a secondary containment basin (tote, tub, impermeable floor/basin, etc.).

Based on the size of fuel storage tank near the generator, you are required to file a Hazardous Materials Business Plan (HMBP). The State of California requires an owner or operator of a facility to complete and submit a HMBP if the facility handles a hazardous material or mixture containing a hazardous material that has a quantity at any one time during the reporting year equal to or greater than:

- 55 gallons (liquids),
- 500 pounds (solids), or
- 200 cubic feet for compressed gas (propane)

…that are used for the cultivation operations. If at any time during the year your operations exceed any one of these quantities, you need to prepare and file a HMBP for your operation. Information regarding HMBPs can be found at http://ca-humboldtcounty.civicplus.com/DocumentCenter/Home/View/3224.

Additionally, while it is not explicitly stated in the Order, please note that the Humboldt County Division of Environmental Health (HCDEH) also requires that anyone that has over 55 gallons or more of any petroleum liquid at any time of the year, including fuels and waste oil, develop a HMBP.

Proper storage of hazardous materials: Proper storage of hazardous materials (e.g., flammable liquids or gasses, many agricultural chemicals, oxidizers, acids, caustic substances) is essential for maintaining safe operations and for protection of the environment. Commercial operations that store hazardous materials are required to prepare a hazardous materials business plan (HMBP) and maintain Material Safety Data Sheets

(MSDS) for each hazardous chemical that they store or use. County health agencies may require HMBPs to be submitted for their review. The HMBP information must be communicated to employees annually and be kept in a location that is readily accessible by employees. MSDSs explain how to medically treat a person that has been exposed to a hazardous substance and how to safely cleanup a spill.

Hazardous liquids and chemical storage - Generally, incompatible hazardous materials must be stored in separate locations, with distinct secondary containment vessels for each type of material. Secondary containment is required for hazardous liquids and must be sized to contain a spill volume equivalent to the largest hazardous material container or 10% of the total volume, whichever is greater. Flammable and combustible hazardous materials must be separated from oxidizers by a distance of no less than 20 feet. The following guidelines should be followed when handling and storing hazardous materials.

Always label containers with the substance inside for both hazardous and non-hazardous materials. For flammable hazardous materials, make certain that an appropriate fire extinguisher is available nearby the storage area. Dry powder fire extinguishers are the most versatile. Water filled fire extinguishers should not be used on certain types of hazardous material fires (e.g. water-reactive metals, strong acids, petroleum).

- Acids (e.g. hydrochloric acid, pool cleaner, citric acid) must be segregated from:
  - ✓ Reactive metals such as sodium, potassium, magnesium, etc.
  - ✓ Flammable and combustible materials.
  - ✓ Chemicals which could generate toxic or flammable fumes when mixed.
  - ✓ Bases.

- Bases (e.g., Portland cement, lime, lye, or drain cleaner) must be segregated from:
  - ✓ Acids, metals, organic peroxides and flammable liquids, and other easily ignitable materials.
  - ✓ Solvents
  - ✓ Oxidizing acids and oxidizers.

- Oxidizers (e.g. Ammonium nitrate, ammonium phosphate, oxygen gas cylinders) must be segregated from:
  - ✓ Combustible and flammable liquids and gasses (e.g. petroleum, acetylene cylinders, solvents) with at least 20 feet of separation.
  - ✓ Reducing agents such as zinc, alkali metals, and formic acid.

- Flammable materials (e.g., gasoline, fuses, gunpowder, acetylene cylinders) must be segregated from:
  - ✓ Oxidizers, caustic materials, acids, and bases.

It is good housekeeping practice to store compatible hazardous materials exclusively away from agricultural chemicals. Although uncommon, even some organic agricultural amendments may be reactive, caustic, ignitable, or corrosive. Segregation of hazardous materials from non-hazardous materials eliminates the potential for cross-contamination of agricultural amendments and exposure of workers to hazardous fumes or residues.

Finally, the Order requires that Petroleum Storage Spill Prevention, Control and Countermeasures (SPCC) be implemented for the site (see the CA-EPA fact sheet: http://www.rivcoeh.org/Portals/0/documents/guidance/hazmat/FactSheetSPCC.pdf).

4.10 Standard Condition #10. Cultivation-Related Wastes

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

Meets condition? No

Observations/Comments: PWA observed the cultivation areas and the surrounding property appeared to be relatively clean, but there is an uncovered compost pile within the riparian buffer of a Class II watercourse and many uncovered pots containing spent soils that are exposed to nutrient leaching over the winter season.

Photos: Photos 13 and 14; MP #8

Corrective or remedial actions needed: The Project Site contained many above-ground, uncovered planting pots containing spent soil in the cultivation areas. Either 1) fully tarp or otherwise cover spent plant stalks, root balls, soil piles and potted spent soils during the wet season to prevent soil from being transported to surface waters or leaching nutrients into the native soil and groundwater, or 2) remove all spent soils at the end of the growing season and store the materials indoors or undercover during the off-season. Alternately, spent soils in pots and planting beds may be heavily cover cropped to tie up nutrients during the wet season, but if the dense cover crop cannot be maintained due to cold weather or snow, then the soil materials must be removed or tarped and fully protected from the weather. Also see 4.3 corrective actions, above.

Standard Condition #10 - General comments and recommendations: We encourage you to chip or shred your plant stalks and compost them after harvest. Any additional cultivation-related waste can be easily contained by keeping soils and garbage greater than 200 feet from drainage areas and on gentle slopes, tarping or otherwise covering soil piles, and/or by placing straw wattles or other containment structures around the perimeter of spoil piles. Organic cultivation-related waste should be recycled if possible, and inorganic wastes and garbage should be removed from the property on a regular basis and disposed of at an appropriate facility.

4.11 Standard Condition #11. Refuse and Human Waste

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

Meets condition? No

Observations/Comments: There is a portable composting toilet at the guest house in the northwest corner of the Project Site, an outhouse near the main residence, and an outdoor kitchen. The Order requires a County permitted or approved OWTS. Proof of permitting through the Humboldt County Division of Environmental Health (HCDEH) is required.
Photos: Photos 18, 21, and 22; MP #9
Corrective or remedial actions needed: An On-Site Wastewater Treatment System is needed at the Project Site. PWA recommends you work with a professional to start the permit process to site, design and install at least two permitted septic systems (one at the guest house and one at the main house) designed to serve the peak number of residents and workers that will occur at the Project Site. The outhouse near the main house should be decommissioned by pumping (if feasible), removing the structure, and filling the pit with soil. Until the new systems are constructed, utilize at least two serviced, portable toilets (or other county approved system). If the HCDEH provides written approval (attach that written approval to the WRPP), you may continue to use your existing, unpermitted composting toilet until the new septic system(s) are designed, permitted and constructed.

b) *Refuse and garbage shall be stored in a location and manner that prevents its discharge to receiving waters and prevents any leachate or contact water from entering or percolating to receiving waters.*
Meets condition? No
Observations/Comments: Garbage is hauled off-site and disposed of properly. However, there are abandoned vehicles and tires on the property located within the bed and bank of a Class II watercourse.
Photos: Photo 12; MP #9
Corrective or remedial actions needed: Continue to store all garbage and refuse generated onsite in cans and containers that are placed in a secure location. It is important to utilize storage facilities which prevent animals from accessing or disturbing garbage or refuse. Remove old tires, car bodies, and other debris, especially those within bed and bank of the stream, and dispose of at an authorized disposal facility. As these large garbage items are imbedded in the Class II watercourse stream bed, all necessary agreements and permits prior to commencing work in any watercourse will need to be applied for and issued. You will need to dispose of existing garbage and debris in a timely manner, once the necessary permits are obtained, at an approved waste disposal facility. See Section 4.3 above, which also addresses MP #9 and the required permitting for working within stream channels.

c) *Garbage and refuse shall be disposed of at an appropriate waste disposal location.*
Meets condition? Yes
Observations/Comments: According to the client the garbage and refuse generated onsite is disposed of at an appropriate waste disposal location.
Photos: None
Corrective or remedial actions needed: PWA recommends that you dispose of existing garbage and refuse in a timely manner at an approved waste disposal facility and continue to periodically dispose of new waste material properly.

4.12 Standard Condition #12. Remediation/Cleanup/Restoration

a) *Remediation/cleanup/restoration activities may include, but are not limited to, removal of fill from watercourses, stream restoration, riparian vegetation planting and maintenance, soil stabilization, erosion control, upgrading stream crossings, road outsloping and rolling dip installation where safe and suitable, installing ditch relief culverts and overside drains, removing berms, stabilizing unstable areas, reshaping cutbanks, and rocking native-surfaced roads. Restoration and cleanup conditions and provisions generally apply to Tier 3 sites, however owners/operators of Tier 1 or 2 sites may identify or propose water resource improvement or enhancement projects such as stream restoration or riparian planting with native vegetation and, for such projects, these conditions apply similarly.*

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

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

Meets condition? Yes
Observations/Comments: See general comments below.
Photos: None
Corrective or remedial actions needed: None

Standard Condition #12 - General comments and recommendations: No major site remediation or clean-up work that otherwise threatened water quality was identified at the Project Site. All corrective and remedial actions needed to satisfy the other 11 Standard Conditions have been outlined above.

5.0 PRIORITIZED CORRECTIVE ACTIONS AND SCHEDULE TO REACH FULL COMPLIANCE

The following check list should be followed to become fully compliant with the Order. Please see the detailed comments and recommendations above for a more complete description of the problems and the needed corrective actions and monitoring requirements.

Table 1. Features Needing Improvement or Action Items (Prioritized implementation schedule for corrective actions)

Standard Condition Requiring Action		Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo	Estimated Cost	Date Completed
1 – Site Maintenance, Erosion Control and Drainage Features	1a, b, c, d, e	Moderate-High	Oct.15, 2019	- Install permanent road drainage structures which shape the road surface (such as rolling dips, ditch relief drains/culverts, etc.) on the immediate approaches to stream crossings to hydrologically disconnect road segments from surface waters and to disperse concentrated runoff. -Outslope and install rolling dips along the Quad and Access roads to reduce road related runoff, surface erosion, and routine maintenance. - Contact the County to see if the road easement for the main access road was formal, and if the County has continuing maintenance responsibilities. Seek County abandonment of the easement, or make sure they will perform the required treatments detailed in this WRPP and required by the Order. - Clean and maintain the plugged DRC's along the Guest House road, to convey flow to the opposite side of the road. - Install a rock armored dip at the spring in the road surface where the spring near the groundwater well and nursery flows across the road. - Under the Order, all legacy roads on the Project Site are required to be inventoried and assessed for erosion sources and threats to water quality.	MP #1; Photos 1-2		
	1a	Moderate	Oct. 15, 2020	If existing or potential legacy sediment sources that could impact surface waters are identified in the field, they will need to be treated using erosion prevention and erosion control treatments (see Appendix A)	--		
2 – Stream Crossing Maintenance	2a-d,f	High	Oct.15, 2020	-Before treating SC #1 and #2, verify with the County whether or not the road easement is still active and if the road maintenance is their responsibility. - Decommission SC #1 or upgrade by installing a 24-inch diameter culvert and a critical dip to prevent diversion. - Decommission SC #2 or upgrade by installing a 24-inch diameter culvert and a critical dip to prevent diversion. - Maintain SC #3 as is.	MP #2-4 Photos 3-11		

Table 1. Features Needing Improvement or Action Items (Prioritized implementation schedule for corrective actions)

Standard Condition Requiring Action		Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo	Estimated Cost	Date Completed
				Upgrading and/or decommissioning must be done to the standards required by the Order (Appendix A and G; Weaver at al. 2015). - Obtain all necessary permits prior to commencing work. Permits may include, and may not be limited to: SWRCB 401 Certification, ACOE 404 Permit, and CDFW 1600 (LSAA).			
3 – Riparian and Wetland Protection and Management	3a, b, c, d	Moderately high	Oct. 15, 2020	**NOTE:** *Before you remove or move cultivation areas and/or associated facilities, as listed below, you should read* ***Section 4.3 – General Comments and recommendations****, above. If you are applying for a County Land Use permit for commercial cultivation, the date at which these must be moved out of the buffer zone may be temporarily postponed and other temporary treatments maybe required. These are listed in 4.3, above. After receiving your land use permit, check for permission to move these facilities with the County.* - Remove the abandoned vehicles and tires near SC #2 so that they are out of any riparian buffer and dispose of them at an approved facility. - Remove/relocate the compost pile so that it is a minimum of 100 feet away from the Class II stream. It should be covered with tarps or stored indoors during the winter wet weather period. - Remove/relocate the pots in CA #3 so that they are a minimum of 100 feet away from the Class II stream. - Remove/relocate the water pump near spring (MP #1) so that it is a minimum of 50 feet away from the spring and Class III stream. - Remove/relocate the water tanks, overflow catchment tanks, and cisterns near the spring (MP #1) and stream so that they are a minimum of 50 feet away from the spring and Class III stream. - Remove/relocate the storage container so that it is a minimum of 50 feet away from the spring at POD #3. - Once the facilities have been moved out of the riparian buffer areas, any bare soils should be seeded and mulched, and all disturbed areas planted with riparian vegetation. - Obtain all necessary permits prior to commencing work. Permits may include, and may not be limited to: SWRCB 401 Certification, ACOE 404 Permit, and CDFW 1600 (LSAA).	MP #5-6; Photos 12-18		

Table 1. Features Needing Improvement or Action Items (Prioritized implementation schedule for corrective actions)

Standard Condition Requiring Action		Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo	Estimated Cost	Date Completed
5 – Water Use	5a	Moderate	On or before May 15, 2018 and continuing	- Develop a Water Budget for the Project Site to determine water needs and required storage volumes needed for forbearing during the entire dry season from May 15th - October 31st. - Under the Order, you are required to measure, document and report the water you divert, pump, store and use throughout the year. Use the simple log sheet provided in Appendix D. - PWA highly recommends, and state agencies may require, that you install flow meters on your surface water diversions, water tanks, and/or on your distribution lines to accurately document the timing and volume of your water diversion, pumping, storage, and use. - Keep a copy of your county well permit and the drilling log with this WRPP for possible inspection.	--		
	5b	Moderate	May 31, 2018 and continuing	- Existing and other conservation techniques should be continued or investigated, including: 1) irrigation scheduling; 2) planting in-ground and not in above-ground pots; 3) top mulching beds with straw to limit evaporation, and 4) timed and/or volume limited drip emitters. - PWA recommends you investigate developing rainwater harvesting activities and adding rainwater-fed storage facilities sufficient to meet dry season irrigation needs.	--		
	5b,e	Moderate-High	Oct. 15, 2020	Add rainwater-fed storage facilities (tanks and/or a pond) sufficient to meet dry season irrigation needs.	--		
	5c	Moderate	Dec. 31, 2018	- If the 25,000 gallon water tank has not been permitted by the county, you should check with the county to determine if you need to obtain a retroactive grading permit for its installation. This permit will likely require a retroactive engineering analysis and design, and filing for the county permit. - Obtain and keep a copy of the permit with this WRPP for possible inspection.	--		
	5d	Moderate	On or before May 15, 2018 and continuing	- To verify compliance with this Standard Condition, start measuring and recording your water usage using flow meters on a per plant basis, based on type and size of plant pot, full term versus short season (light deprivation) plant, and type of irrigation. - Observe and monitor soil moisture so watering, fertilizer and chemical applications are made only when necessary and overwatering and excess infiltration is avoided.	--		
	5e	High	July 1, 2018 and continuing	- As opposed to employing one or more surface water diversions and securing various water rights, consider obtaining irrigation water for your agricultural needs from your recently installed groundwater well	--		

Table 1. Features Needing Improvement or Action Items (Prioritized implementation schedule for corrective actions)

Standard Condition Requiring Action		Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo	Estimated Cost	Date Completed
			Report water data to the NCRWQCB by March 31 and to the SWRCB-DWR by June 30 each year.	or by developing rainwater capture systems to fill rigid water tanks and/or one or more off-stream, rainwater-fed ponds. - If you continue to divert water, file a Small Domestic Use (SDU) appropriation for your domestic water use. - If you continue to divert water for cultivation, file for a SIUR water right for your cannabis irrigation water uses. - Report water data to the NCRWQCB by March 31 and to the SWRCB-DWR by June 30 each year.			
		Moderate-High	Nov. 15, 2018	Move the three water tanks, mixing/overflow tank, and water pump out of the Class III and Class II riparian buffer zones to a location where they will not threaten water quality if they failed.	MP#5; Photos 15 and16		
	5f	Moderate-High	Oct.15, 2018 or sooner	Obtain a consultation with California Department of Fish and Wildlife (CDFW) and file a CDFW Lake and Streambed Alteration Agreement (LSAA) for your three diversions, spring crossing, Pelton wheel, Cars and tires, and three stream crossings.	MP #1-5; Photos 2-12, and 17	$7000-9000 in fees (not including project costs)	
7 – Fertilizers and Soil Amendments	7a	Moderate	Oct. 15, 2018	- During the wet season, all used or unused amendments, potting soils, compost and fertilizers located anywhere on the Project Site should be stored under a roof and off the ground, or tarped and off the ground, in a stable location with no chance of nutrient leaching or delivery to surface waters. - Store all hazardous materials of differing type (e.g. petroleum products vs. agricultural chemicals) in separate locations (see General Comments in Section 4.9 for more information)	MP #6; Photo 13		
	7b	High	On or before May 15, 2018 and continuing	- Under the Order, you are required to document the type, timing and volume of fertilizers and other soil amendments that are applied in your operations. This can be done using the simple log form provided in Appendix E. - Observe and monitor soil moisture so watering, fertilizer and chemical applications are made only when necessary and overwatering and excess infiltration is avoided.	--		
	7c	High	Oct. 31, 2018 and continuing	- To prevent nutrient leaching from cultivation areas, either: 1) plant dense cover crops in spent pots, holes and beds to lock up nutrients; 2) fully tarp any exposed soils and growing mediums in beds, pots, holes	--		

Table 1. Features Needing Improvement or Action Items (Prioritized implementation schedule for corrective actions)

Standard Condition Requiring Action		Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo	Estimated Cost	Date Completed
				or piles; or 3) move spent soils and amendments inside or under cover to temporarily store them during the wet season (November 1 – May 15). - If dense cover crops cannot be kept alive, all planted areas should be removed or tarped to protect them from rainfall, snowmelt and subsequent infiltration and leaching of nutrients.			
8 – Pesticides/ Herbicides		Moderate	On or before May 15, 2018 and continuing	- Under the Order you are required to keep records (logs) of the type, timing and volume of pesticides and herbicides used in your operations. This can be done using a simple log form, such as the one included in Appendix F. - All pesticides, herbicides and related materials (e.g., fungicides) must be used and applied consistent with product labeling. - When present, these chemicals should be stored within enclosed buildings in such a way they cannot enter or be released into surface or ground waters.	--		
9 – Petroleum Products and Other Chemicals	9a, b, d	High	On or before May 31, 2018 and continuing	- Place all small fuel cans, generators, fuel tanks, gasoline powered garden equipment and any other items containing petroleum products under cover, off the ground, and in a secondary containment basin (tote, tub, impermeable floor/basin, etc.). - Obtain and make available one or more spill prevention cleanup kits to clean up small spills. Spill kits should be located where fuel is stored and refueling occurs. - Store all hazardous materials of differing type (e.g. petroleum products vs. agricultural chemicals) in separate locations (see *General comments and recommendations* in Section 4.9, above, for more information)	MP #7; Photos 15 and 20		
	9	High	Oct. 15, 2018	Based on the size of fuel storage tank near the generator (assuming it is actively used), you are required to file a Hazardous Materials Business Plan (HMBP). See Section 4.9 – *General comments and recommendations*, above for additional details and instructions.	--		
10- Cultivation-Related Wastes	10a	High	Oct. 15, 2018 and continuing	- Remove/relocate any and all exposed compost piles so that they are a minimum of 100 feet away from the Class II stream. Cover or store the waste indoors when runoff or nutrient leaching cannot occur. - Cover (tarp) any exposed soils, spent plant stalks, root balls, soil piles, potted spent soils, or growing mediums in beds, pots, holes or piles, or move spent soils and amendments inside or under cover to temporarily store them during the wet season (November 1 – May 15).	MP #8; Photo 13		

Table 1. Features Needing Improvement or Action Items (Prioritized implementation schedule for corrective actions)

Standard Condition Requiring Action		Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo	Estimated Cost	Date Completed
				- Alternatively, to prevent nutrient leaching from cultivation areas, plant dense cover crops in spent pots, holes and beds to lock up nutrients. - If dense cover crops cannot be kept alive, all planted areas should be tarped to protect them from rainfall, snowmelt and subsequent infiltration and leaching of nutrients.			
11- Refuse and Human Waste	11a	Moderately high	Oct. 15, 2019	- The Order requires a County permitted OWTS. You will need to conduct wet weather testing and onsite investigations to site and design at least two permitted septic systems on the Project Site (one at the guest house and one at the main house). The permitted system(s) must be designed to serve the number of residents and workers that will occur at the Project Site when your operations are at their peak.	MP #9; Photos 18, 21 and 22		
	11a	High	Portable toilets onsite by June 30, 2018 and continuing Close outhouse; decommission by July 31, 2018	- The outhouse near the main house should be closed for use. Decommissioned the outhouse by pumping (if feasible), removing the structure, and filling the pit with soil. - In the interim and until the new septic systems are constructed and permitted, utilize at least two serviced, portable toilets (or other county approved system) sufficient for use by residents, staff and visitors at the peak of your operations. - Keep the portable toilet servicing records available with this WRPP for possible inspection by the agencies - If the HCDEH provides written approval (attach that written approval to the WRPP), you may continue to use your existing, unpermitted composting toilet until the new septic system(s) are designed, permitted and constructed.	--		
	11a	High	Dec. 31, 2020	Install two permitted septic system(s) as required and permitted by the HCDEH.	--		
	11b	Moderately High	On or before Oct. 15, 2018 and continuing	- Remove the abandoned vehicles and tires left in the stream bank/bed, near SC #2 so that they are out of any riparian buffer and dispose of them at an approved facility. Obtain all necessary permits prior to commencing this work. Permits may include, and may not be limited to: SWRCB 401 Certification, ACOE 404 Permit, and CDFW 1600 (LSAA). - Collect all garbage and refuse not already stored properly in cans and store it in a safe and secure location where the threat to waters of the state is eliminated.	MP #5; Photo 12		

6.0 MONITORING AND INSPECTION PLAN

Under the Order, sites are required to be monitored and inspected periodically to ensure conformance with the 12 Standard Conditions. In most cases, inspections and records of inspections identify conditions that have been corrected and are now in compliance; conditions that remain in compliance; and conditions that have changed and may no longer be in compliance with the Order. An inspection and monitoring plan is used to document these conditions, identify problems and make corrections using best management practices (BMPs) to protect water quality (Appendix A).

Monitoring Plan – Please refer to Appendix B and Figure 2 to review the monitoring plan and specific monitoring points for which you are responsible.

Monitoring guidelines and reporting standards have been created by the NCRWQCB as part of the Order. Monitoring of the Project Site includes visual inspection and photographic documentation of each feature of interest listed on the Project Site map, with new photographic documentation recorded with any notable changes to the feature of interest.

Site inspection schedule - According to the NCRWQCB, periodic inspections should include visual inspection of the site, including any management measures/practices, to ensure they are being implemented correctly and are functioning as expected. Inspections include photographic documentation of any controllable sediment discharge sites, as identified on the site map, and a visual inspection of those locations on the site where pollutants or wastes, if uncontained, could be transported into receiving waters, and those locations where runoff from roads or developed areas drains into or towards surface water.

At a minimum, sites shall be inspected at the following times to ensure timely identification of changed site conditions and to determine whether implementation of additional management measures is necessary to prevent or minimize discharges of waste or pollutants to surface water:

1) Before and after any significant alteration or upgrade to a given stream crossing, road segment, or other controllable sediment discharge site. Inspection should include photographic documentation, with photo records to be kept onsite.
2) Prior to October 15th to evaluate site preparedness for storm events and stormwater runoff.
3) Following the accumulation of 3 inches cumulative precipitation (starting September 1st) or by December 15th, whichever is sooner.
4) Following any rainfall event with an intensity of 3 inches precipitation in 24 hours. Precipitation data can be obtained from the National Weather Service by entering the site zip code at http://www.srh.noaa.gov/forecast; Pick the nearest or most relevant zip code and then select the 3 day history that will also show precipitation totals.

Inspection and Monitoring Checklist – Appendix B contains a checklist data form that will be used by the landowner and/or operator to: 1) document inspection dates, 2) document visual and photographic inspection results, 3) describe remediation and management measures that are being applied, 4) identify new problems and their treatments, and 5) document the progress and effectiveness of implementing remedial and corrective measures that are needed to meet the 12 Standard Conditions, as outlined in this WRPP. Appendix C contains photo documentation of your monitoring points and will need to be updated as corrective treatments are implemented and treatments are monitored and evaluated over time.

Annual Reporting – An Annual Report is to be submitted directly to the NCRWQCB or to PWA (through our 3rd Party Program). The information in the annual reporting form must be submitted by March 31st of each year. The reported information is to be reflective of current site conditions, and includes monitoring data and tasks accomplished to protect water quality. Among other things, the report includes such items as the reporting of monthly monitoring data collected during the year (e.g., chemical use, water diversions, water storage, water use, etc.), management measures (BMPs) applied during the year and their effectiveness, and tasks accomplished during the year towards meeting each of the 12 Standard Conditions identified as deficient in this WRPP.

7.0 WATER USE PLAN

Requirements - According to the Order, a Water Use Plan (WUP) shall record water source, relevant water right documentation, and amount used monthly. All water sources shall be recorded, including alternative sources such as rain catchment and groundwater, and/or hauled water. Other elements of the WUP will include:

- Developing a Water Budget for determining the timing and volume of actual water use on the site. Water related data will be summarized monthly for the preceding month.
- Designing and implementing water conservation measures to reduce water diversion and water use.
- Calculating water storage requirements needed to support cultivation activities during the dry season, and implementing those required storage measures.

The Water Use Plan must also describe water conservation measures and document your approach to ensure that the quantity and timing of water use is not impacting water quality objectives and beneficial uses (including cumulative impacts based on other operations using water in the same watershed). Water use will only be presumed to not adversely impact water quality under one of the following scenarios:

- No surface water diversions occur from May 15th to October 31st.
- Water diversions are made pursuant to a local plan that is protective of instream beneficial uses.
- Other options that may affect water quality: (e.g., percent of flow present in stream; minimum allowable riffle depth; streamflow gage at bottom of Class I stream; AB2121 equations; CDFW instream flow recommendations; promulgated flow objective in Basin Plan; etc.).

Site Water Use Plan -The record of activities, accomplishments and water monitoring results for the Water Use Plan for this site will be logged and recorded in data tables and site records (data forms) included in Appendix D of this WRPP. These will be tracked and kept up-to-date by the landowner or cultivator of the site.

Water Storage and Forbearance – The ultimate goal of the applicant is to accumulate enough water storage capacity to forebear the entire period from May 15 to October 31 each year. Under the Order, this will ensure the timing of water use is not impacting water quality objectives and beneficial uses. There is 59,000 gallons of potential water storage in rigid tanks on the Project Site (plus a 1,100 gallon mixing tank). Based on the total size of the cultivation areas (7,930 ft^2), there is not enough storage to avoid surface water diversions during the dry season from May 15

through October 31. A preliminary water budget for the Project Site suggests approximately 20,300 gallons of additional storage may be required so for your cultivation operations such that you can forbear (not divert) during this period. According to the landowner, an additional 80,000 gallons of tank storage and 300,000 gallons of storage in an off-stream-rainwater-fed pond is planned.

Water Conservation - Water conservation measures currently practiced include the use of controlled hand watering, a tank overflow catchment basin, mulching, and other techniques. Overflow shut off valves should be installed on all your water storage tanks to eliminate overflow and waste. We suggest growing plants in-ground (as compared to above-ground pots) and watering late in the afternoon or evening to minimize water loss through evaporation and maximize water up-take by the plants. Starting this year, new water conserving techniques and equipment will be utilized and tested to evaluate their effectiveness and efficiency. Test and employ timed or volume limited drip emitters, surface mulching to reduce evaporation, and incorporating water holding amendments and native soil during the initial soil preparation at the start of the season.

Water sources and use – There are three points of diversion on the property that are utilized for domestic purposes, livestock, and irrigation (Figure 2). The landowner has recently installed a permitted groundwater well to minimize the need for surface water diversions.

Based on previous cultivation practices, the operator has estimated total water use for irrigation during the main growing season to be ~100,000 gallons. Based on a cultivation area of 7,930 ft^2 and general water use rates for cannabis cultivation of 10 gallons/ft^2/year, this suggests approximately 79,300 gallons would be need for irrigation water needs. Currently, storage capacity is approximately 59,000 gallons in rigid tanks, thereby tentatively indicating an additional 20,300 gallons of water storage is needed for forbearing during the growing season. Some irrigation water may be pumped from the well during the dry season, but it is always good practice to minimize groundwater extraction during the driest period of the year to minimize your effect on the water table. You are required to keep accurate records of your water diversion, pumping, storage, and use throughout the year and to report that water data as required by the NCRWQCB and SWRCB-DWR. Make sure you are using water meters on your diversions and pumps, and that you also have meters on your main distribution lines from tanks and the groundwater well. The more frequently and accurately water use is recorded, the better you will understand the water uses and needs of your farm, the value of water conservation, and the volume of water storage that is needed for you to forbear (not divert from streams or springs) during the dry summer growing season.

Water rights applications have been filed for domestic and commercial irrigation uses, which includes three surface water diversions. Annual reporting of diversion and use rates are required to be submitted annually to the NCRWQCB no later than March 31 to cover water data for the preceding calendar year, and to the State Water Resources Control Board, Division of Water Right, by or before June 30. As more accurate data is gathered, refined targets can be made to ensure adequate storage exists to protect downstream water quality and beneficial uses during the driest time of the year. Finally, a Lake and Streambed Alteration Agreement (LSAA) will be sought through the California Department of Fish and Wildlife (CDFW) for the three surface diversions, Pelton wheel, the cars and tires in the stream bed/bank, and the three (3) stream crossings on the Project Site.

8.0 LIST OF CHEMICALS

The WRPP must contain a list of chemicals being stored onsite, in addition to quantities used and frequency of application. These include fertilizers/soil amendments, pesticides, herbicides, fungicides, petroleum products and other chemicals used in, or associated with, your cultivation activities and related operations.

Because this is the first year of enrollment, information regarding chemical use and storage is deficient or anecdotal. Appendixes E and F contain monitoring forms that should be used to list the chemical inventory record over time, as supplies are added to the site and used during the growing season. The landowner or operator will use these forms to track the types, storage volumes, timing of application, and volume of use of these products throughout the year. The initial chemicals and amendment list that may be used and stored onsite include:

Fertilizers and Amendments

Azomite
Glacial Rock Dust
Green Sand
Oyster Shell
Fish Bone
Crab Meal
Precipitated Bone
Chicken Manure
Epsom Salt
Sea Bird Guano
Worm Castings/Seeds
Dr. Earth (4-4-4)
Rice Hulls
Straw
Molasses

Pest Management/Fungicides

Urine
Fish Emulsion Lady Bugs
Stethorus punctillum (Lesser Mite Destroyer)
Neoseiulus sp. (Cucumeris Mite)
Beneficial Nematodes
Neem Oil
Potassium Bicarbonate

Petroleum and Other Products

Gasoline
Diesel
Motor oil

9.0 LANDOWNER/LESSEE CERTIFICATION/SIGNATURES

This Water Resource Protection Plan (WRPP) has been prepared by Pacific Watershed Associates, an approved Third Party Program acting on behalf of the North Coast Regional Water Quality Control Board (NCRWQCB).

"I have read and understand this WRPP, including Section 2.0 – Certifications, Conditions and Limitations. I agree to comply with the requirements of the California Regional Water Quality Control Board North Coast Region Order No. 2015-0023 (Waiver of Waste Discharge Requirements and General Water Quality Certification for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or Operations with Similar Environmental Effects in the North Coast Region), including the recommendations and actions listed in this WRPP."

Name of Legally Responsible Person (LRP): J JOHN MILLER

Title (owner, lessee, operator, etc.): Owner

Signature: _____ Date: 7-12-18

WRPP prepared by (if different from LRP): **Pacific Watershed Associates, Inc.**

WRPP prepared and finalized on (date): 12 July 2018

Signature: _____ Date: 12 July 2018

Appendix A

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

Geologic and Geomorphic Studies ♦ Wildland Hydrology ♦ Civil Engineering ♦ Erosion Control ♦ Soil/Septic Evaluation
Pacific Watershed Associates ♦ P.O. Box 4433 ♦ Arcata, California, 95518 ♦ Ph: (707) 839-5130 ♦ Fx: (707) 839-8168
www.pacificwatershed.com

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

I. Introduction

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

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

II. Standard BMPs for Construction

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

A. General BMPs to Avoid or Minimize Adverse Impacts

Temporal Limitations on Construction

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

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

Limitation on Earthmoving

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

Limitations on Construction Equipment

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

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

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

Revegetation and Removal of Exotic Plants

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

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

Erosion Control

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

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

Miscellaneous

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

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

B. BMPs for Specific Activities

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

The following measures shall be employed:

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

Structure for Water Control and Stream Crossings

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

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

Limitations on Work in Streams and Permanently Ponded Areas

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

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

Temporary Stream Diversion and Dewatering: All Live Streams

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

Protection of Sensitive Species

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

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

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

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

A. Site Maintenance, Erosion Control, Drainage Features

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

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

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

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

B. Stream Crossing Maintenance

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

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

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

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

86. The roadway adjacent to and over the crossing is an area of potential discharge. All road surfaces approaching a crossing shall be drained before the crossing, adequately filtered through vegetation or other material, and not discharged to a watercourse. If turbid water is discharged at a stream crossing, additional measures to control erosion at the source(s) or to remove sediment prior to discharge shall be implemented. Road surfaces shall be of rock, pavement, or other material appropriate for type and level of use.
87. If a culvert is used, the approaches and fill slopes shall be properly compacted during installation and shall be stabilized with rock or other appropriate surface protection to minimize surface erosion and slumping to the receiving waters. If possible, the road surface over the culvert shall have a critical-dip to ensure that if the culvert becomes plugged, water can flow over the road surface without washing away the fill prism. If site-specific conditions do not allow for a critical dip, alternatives such as emergency overflow culverts, oversized culvers, flared inlets, and debris racks may be warranted.

C. Riparian and Wetland Protection and Management:

88. Buffer width will be in compliance with Tier category.
89. Trees within riparian areas shall be retained for natural recruitment to streams. Large woody debris (LWD) shall be retained in stream or within riparian areas. The size of wood that can be beneficial to the stream will vary depending on the size of the stream (i.e., larger pieces of wood are necessary to withstand flows in large streams). In the event that LWD or trees are disturbed during excavation, care shall be taken to separate the LWD from soil. The pieces shall be stockpiled separately until they can be replaced in appropriate locations to enhance instream or riparian conditions. Placement of instream wood for habitat enhancement should be done under the consultation of a qualified professional and in conformance with applicable regulatory permits.
90. Avoidance of disturbance in riparian areas (within 200 feet of a watercourse) should result in protection and restoration of the quality/health of the riparian stand so as to promote: 1) shade and microclimate controls; 2) delivery of wood to channels, 3) slope stability and erosion control, 4) ground cover, and 5) removal of excess nutrients. This recognizes the importance of the riparian zone

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

D. Spoils Management

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

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

E. Water Storage and Use

WATER USE

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

WATER STORAGE

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

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

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

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

F. Irrigation Runoff

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

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

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

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

H. Cultivation-Related Wastes

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

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

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

I. Refuse and Human Waste

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

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

IV. References

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Appendix B

Monitoring Plan and Photo Log

APPENDIX B: MONITORING PLAN AND PHOTO LOGS

Monitoring Plan – In general, the entire road network, cultivation area and associated facilities need to be monitored throughout the year to catch any problems that might arise and to monitor the effectiveness of corrective actions which are implemented. Refer to Figure 2 for the location of site specific monitoring points you are responsible for tracking. Regardless, the entire project site needs to be regularly inspected and monitored to ensure that the site achieves and maintains compliance with the 12 Standard Conditions. If additional deficiencies develop, or individual problems arise, then corrective actions must be implemented immediately and these problem areas will need to be further monitored according to the WRPP.

For this Project Site, 9 Monitoring Points (MPs) have been identified. MPs #1 and 2 focus on site road maintenance, erosion control and drainage features. MPs #3-4 relate to stream crossings and MPs #5-6 address riparian setback issues; the stream crossings and everything, except the storage container, comprising MP#5 will require a Lake and Streambed Alteration Agreement (LSAA) with the California Department of Fish and Wildlife. MP #7 addresses proper storage, spill prevention measures, and Humboldt County permit requirements relating to hazardous materials storage (fuels and other combustibles). MP #8 is in reference composting, spent soils, and winterizing exposed areas previously planted out and preventing nutrient leaching into surface waters and/or ground water, or soil delivery to surface waters. MP #9 relates to kitchen and bathroom facilities, and proper disposal methods/systems.

The goal of the monitoring on this Project Site is to ensure the original problems or non-compliant features (e.g., road drainage issues; under-designed stream crossings, etc.) have been effectively treated and that environmental problems or threats to water quality do not arise or are adequately mitigated during the year. Consult with PWA if a problem is detected at any of these monitoring locations or elsewhere on the property, or if you would like our assistance in monitoring or developing corrective actions (BMPs) for problems that develop. Please also report to PWA when one or more of the corrective actions in the WRPP have been implemented, and include photos and descriptions of the actions taken.

Site inspection schedule - According to the NCRWQCB, periodic inspections should include visual inspection of the site, including any management measures/practices, to ensure they are being implemented correctly and are functioning as expected. Inspections include photographic documentation of any controllable sediment discharge sites, as identified on the site map, and a visual inspection of those locations on the site where pollutants or wastes, if uncontained, could be transported into receiving waters, and those locations where runoff from roads or developed areas drains into or towards surface water.

At a minimum, sites shall be inspected at the following times to ensure timely identification of changed site conditions and to determine whether implementation of additional management measures is necessary to prevent or minimize discharges of waste or pollutants to surface water:

1) Before and after any significant alteration or upgrade to a given stream crossing, road segment, or other controllable sediment discharge site. Inspection should include photographic documentation, with photo records to be kept on-site.
2) Prior to October 15 to evaluate site preparedness for storm events and stormwater runoff.
3) Following the accumulation of 3 inches cumulative precipitation (starting September 1st) or by December 15th, whichever is sooner.
4) Following any rainfall event with an intensity of 3 inches precipitation in 24 hours. Precipitation data can be obtained from the National Weather Service by entering the site zip code at http://www.srh.noaa.gov/forecast; Pick the nearest or most relevant zip code and then select the 3 day history that will also show precipitation totals.

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	**Monitoring Point**	**Standard Condition**	**Date**	**Pre-, during, or post-treatment**	**Description**
1	MP #1	4.1	6/7/2017	Pre-	View of landslide that delivered sediment to a Class III watercourse in the past. Note the remaining perched road fill.
2	MP #1	4.1	6/7/2017	Pre-	View of the spring where it crosses the road surface and is the origin of a Class III watercourse.
3	MP #2	4.2	6/7/2017	Pre-	SC #1- Cistern with emerging flow upstream of and connected to SC #1 watercourse
4	MP #2	4.2	6/7/2017	Pre-	SC #1- View looking downslope from cistern towards SC #1
5	MP #2	4.2	6/7/2017	Pre-	SC #1- View of the fill crossing on a Class II watercourse from the left road approach
6	MP #2	4.2	6/7/2017	Pre-	SC #1- View of a partially washed out fill crossing on a Class II watercourse
7	MP #3	4.2	6/7/2017	Pre-	SC #2- View from the left road approach of the fill crossing on a Class III watercourse
8	MP #4	4.2	6/7/2017	Pre-	SC #3- View looking upstream from the inlet of a 24-inch diameter, plastic culvert on a Class III watercourse

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	**Monitoring Point**	**Standard Condition**	**Date**	**Pre-, during, or post-treatment**	**Description**
9	MP #4	4.2	6/7/2017	Pre-	SC #3- View of the inlet
10	MP #4	4.2	6/7/2017	Pre-	SC #3- View of the outlet
11	MP #4	4.2	6/7/2017	Pre-	SC #3- View looking downstream of the outlet
12	MP #5	4.3, 4.11	6/7/2017	Pre-	View of the abandoned vehicles and tires within the bed and bank of a Class II watercourse
13	MPs #6, 8	4.3, 4.7, 4.10	6/7/2017	Pre-	View of the compost pile within the 100 foot riparian buffer of a Class II watercourse
14	MP #6, 8	4.3, 4.10	6/7/2017	Pre-	View of Cultivation Area (CA) #3 that is within the 100 foot riparian buffer of a Class II watercourse
15	MP #5, 7	4.3, 4.9	6/7/2017	Pre-	View of the water pump within the 50 foot riparian buffer of a the spring

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	**Monitoring Point**	**Standard Condition**	**Date**	**Pre-, during, or post-treatment**	**Description**
16	MP #5	4.3	6/7/2017	Pre-	View of the three water tanks that are within the 50 foot riparian buffer of the spring
None	MP #5	4.3	6/7/2017	Pre-	A storage container that is within the 50 foot riparian buffer of the spring at POD #3
17	MP #5	4.3	6/7/2017	Pre-	View of the Pelton wheel above a Class II watercourse.
18	MP #6, 9	4.3, 4.11	6/7/2017	Pre-	View of the outdoor kitchen within the riparian buffer of a Class II watercourse.
19	-	4.5	6/7/2017	Pre-	The 25,000 gallon water tank constructed on a reportedly engineered graded pad.
20	MP #7	4.9	6/7/2017	Pre-	A 15,000 watt generator and a fuel tank used to power the shop and guest house
22	MP #9	4.11	6/7/2017	Pre-	View of the portable composting toilet at the guest house

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	**Monitoring Point**	**Standard Condition**	**Date**	**Pre-, during, or post-treatment**	**Description**

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	**Monitoring Point**	**Standard Condition**	**Date**	**Pre-, during, or post-treatment**	**Description**

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	**Monitoring Point**	**Standard Condition**	**Date**	**Pre-, during, or post-treatment**	**Description**

Appendix C

Photo Documentation of Monitoring Points

Appendix C: Photo Documentation of Monitoring Points
4.1 Standard Condition #1: Site Maintenance, Erosion Control and Drainage Features

Photo 1 - View of landslide that previously delivered sediment to a Class III watercourse. Note the remaining perched road fill held by small tree roots. Although there is no current delivery, this slide needs to be monitored for movement.

Photo 2 - View of the spring (blue arrow) where it crosses the road surface, which is near the origin of a Class III watercourse.

4.2 Standard Condition #2: Stream Crossing Maintenance

Photo 3 - SC #1; POD #2 with emerging flow that leads to SC #1

Photo 4 - SC #1; View looking downslope from POD #2 towards SC #1 (blue arrow)

Photo 5 -SC #1; View of the fill crossing on a Class II watercourse (blue arrow) from the left road approach

Photo 6 - SC #1; View of a partially washed out fill crossing on a Class II watercourse

Photo 7 - SC #2; View from the left road approach of the fill crossing on a Class III watercourse

Photo 8 - SC #3; View looking upstream from the inlet of a 24-inch diameter, plastic culvert on a Class III watercourse

Photo 9 - SC #3; View of the inlet with rock armored fill.

Photo 10 - SC #3; View of the outlet

Photo 11 - SC #3; View looking downstream of the outlet

4.3 Standard Condition #3: Riparian and Wetland Protection and Management

Photo 12 - View of the abandoned vehicles and tires within the bed and bank of a Class II watercourse

Photo 13 - View of the compost pile within the 100 foot riparian buffer of a Class II watercourse

Photo 14 - View of Cultivation Area (CA) #3 that is within the 100 foot riparian buffer of a Class II watercourse

Photo 15 - View of the water pump within the 50 foot riparian buffer of the spring. Note that there is cover provided but no secondary containment.

Photo 16 - View of the three water tanks that are within the 50 foot riparian buffer of the spring.

Photo 17 - View of the Pelton wheel above a Class II watercourse; note the arrow pointing at the watercourse.

Photo 18 – View of the Outdoor Kitchen situated at the break-in-slope and within the riparian buffer of the Class II watercourse below (to the right).

4.5 Standard Condition #5. Water Storage and Use

Photo 19 - The 25,000 gallon water tank constructed on an engineered graded pad (pers. comm. Landowner, 2017).

4.9 Standard Condition #9. Petroleum Products and other Chemicals

Photo 20 – 1,000 gallon fuel tank and 15,000 watt generator without proper storage or spill prevention measures.

4.11 Standard Condition #11: Refuse and Human Waste

Photo 21 - View of the outhouse near the main house.

Photo 22 - View of the portable composting toilet at the guest house.

Appendix D

PWA Water Log Sheets

Water Use by Source
- Log Sheet -

	WD ID:	PWA ID:	Watershed:
	Location:	Sheet ___ of ___	Year:

Water Source *(tank, bladder, pond, well, delivered, other)*	Water unit (gallons or acre feet)	Amount utilized from storage per month (gallons or acre feet), by type											
		January	February	March	April	May	June	July	August	Sept	October	November	December
Monthly Totals													

Comments: As per NCRWQCB: "Report water volume used, listing each source separately. This may include use of stored water, immediate use of pumped groundwater, diverted surface water, or delivered water. If water is delivered, list delivery date, delivery volume, and name and address of water purveyor"

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Water Input to Storage
- Log Sheet -

	WD ID:	PWA ID:	Watershed:
Location:		Sheet ___ of ___	Year:

Water Source (e.g., rainwater catchment, stream diversion, spring diversion, well, water delivery, etc.)	Water unit (gallons or acre feet)	Amount input to storage per month (gallons or acre feet), by source											
		January	February	March	April	May	June	July	August	September	October	November	December
Monthly Totals													

Comments: As per NCRWQCB: "Report water volume input to storage, listing each source separately. This may include inputs from rainfall catchment, surface water diversions

Total Surface Water Diversion
- Log Sheet -

WD ID:	PWA ID:	Watershed:
Location:	Sheet ___ of ___	Year:

Water Diversion Source (e.g., stream, in-stream pond, spring, etc.)	Water unit (gallons or acre feet)	Amount diverted per month (gallons or acre feet)											
		January	February	March	April	May	June	July	August	September	October	November	December
Monthly Totals													

Comments:

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Appendix E

PWA Fertilizer-Amendment Log Sheets

Fertilizer and Amendment Application Log Sheet

WD ID:	PWA ID:	Watershed:
	Year:	Sheet #: _____of _____

Product name	Fertilizer or Ammendment (circle one)	Type (circle type)	Nutrient content (N-P-K ratio)	Recommended application amount from product label (e.g. # of ounces per application)	Application units (grams, ounces, liters, gallons, etc.)	Recommended application schedule (daily, weekly, etc.)	Actual amount applied in this application (same units)	Date applied (Mo/Day)	Location (Cultivation area #, Greenhouse #, Hoophouse #, etc.)	Initials	Comments
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									
	Fert./Amend.	liquid/solid									

Appendix F

PWA Pesticide-Herbicide Log Sheets
Legal Pest Management Practices

Pesticide and Herbicide Application Log Sheet

WD ID:	PWA ID:	Watershed:

	Location:						Year:	Sheet #: _____of _____	
Product name	**Pesticide or Herbicide (circle one)**	**Product type (circle type)**	**Recommended application amount from product label (e.g. # of ounces per application)**	**Application units (grams, ounces, liters, gallons, etc.)**	**Recommended application schedule (daily, weekly, etc.)**	**Actual amount (in same units) used per application**	**Date applied (mo/day)**	**Initials**	**Comments**
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							
	Pest./Herb.	liquid/solid							

LEGAL PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWERS IN CALIFORNIA

PESTS OF MARIJUANA IN CALIFORNIA

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

HOW TO INTERPRET THE TABLES

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

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

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

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

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

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

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

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

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

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

REFERENCES

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

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

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

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

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

[a] 40 CFR (Code of Federal Regulations)

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

[1] Biofungicides

[2] Bacterial-based insect pathogen

[3] Fungal-based insect pathogen

Table 2. PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWN OUTDOORS

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

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

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

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

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

Table 4. PESTS OF MARIJUANA BY PLANT PART

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

Appendix G

Hazardous Materials Storage Guidelines

Appendix G. Hazardous Materials Storage Guidelines

Proper storage of hazardous materials (e.g., flammable liquids or gasses, many agricultural chemicals, oxidizers, acids, caustic substances) is essential for maintaining safe operations and for protection of the environment. Commercial operations that store hazardous materials are required to prepare a Hazardous Materials Business Plan (HMBP) and maintain Material Safety Data Sheets (MSDS) for each hazardous chemical that they store or use. County health agencies may require HMBPs to be submitted for their review. The HMBP information must be communicated to employees annually and be kept in a location that is readily accessible by employees. MSDSs explain how to medically treat a person that has been exposed to a hazardous substance and how to safely cleanup a spill.

Generally, incompatible hazardous materials must be stored in separate locations, with distinct secondary containment vessels for each type of material. Secondary containment is required for hazardous liquids and must be sized to contain a spill volume equivalent to the largest hazardous material container or 10% of the total volume, whichever is greater. Flammable and combustible hazardous materials must be separated from oxidizers by a distance of no less than 20 feet. The following guidelines should be followed when handling and storing hazardous materials.

Always label containers with the substance inside for both hazardous and non-hazardous materials. For flammable hazardous materials, make certain that an appropriate fire extinguisher is available nearby the storage area. Dry powder fire extinguishers are the most versatile. Water filled fire extinguishers should not be used on certain types of hazardous material fires (e.g. water-reactive metals, strong acids, petroleum).

Acids (e.g., hydrochloric acid, pool cleaner, citric acid) must be segregated from:
Reactive metals such as sodium, potassium, magnesium, etc.
Flammable and combustible materials.
Chemicals which could generate toxic or flammable fumes when mixed.
Bases.

Bases (e.g., Portland cement, lime, lye, or drain cleaner) must be segregated from:
Acids, metals, organic peroxides and easily ignitable materials.
Solvents.
Oxidizing acids and oxidizers.

Oxidizers (e.g. ammonium nitrate, ammonium phosphate, oxygen gas) must be segregated from:
Combustible and flammable liquids and gasses (e.g. oxygen-acetylene torches) by at least 20 feet of separation.
Reducing agents such as zinc, alkali metals, and formic acid.

Flammable materials (e.g., gasoline, fuses, gunpowder, acetylene cylinders) must be segregated from:

Oxidizers, caustic materials, acids, and bases.

It is good housekeeping practice to store compatible hazardous materials exclusively away from agricultural chemicals. Although uncommon, some organic agricultural amendments may be caustic, ignitable, or corrosive. Segregation of hazardous materials from non-hazardous materials eliminates the potential for cross-contamination of materials and exposure of workers to hazardous fumes or residues.

Guidelines for proper storage of hazardous materials and regulatory oversight (California Code of Regulations Title 22) are provided by the California Department of Toxic Substances Control (DTSC). The regulations are located in Social Security, Division 4.5, Environmental Health Standards for the Management of Hazardous Waste.

Appendix H

PWA Typical Drawings

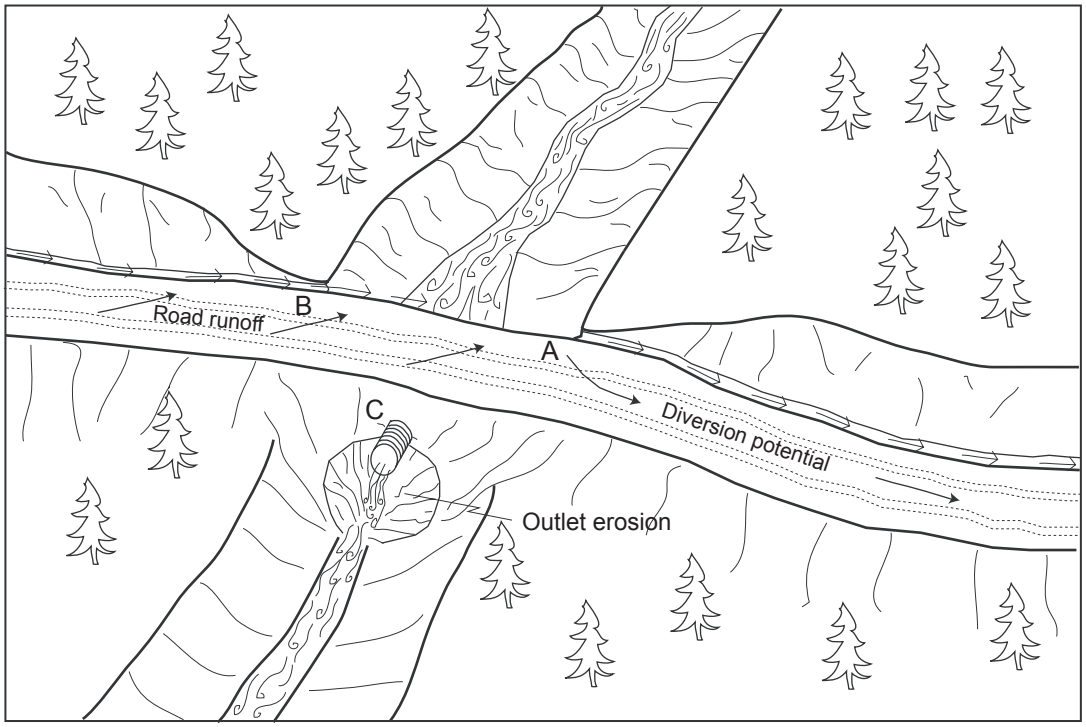
Typical Problems and Applied Treatments for a Non-fish Bearing Upgraded Stream Crossing

Problem condition (before)

A - Diversion potential

B - Road surface and ditch drain to stream

C - Undersized culvert high in fill with outlet erosion

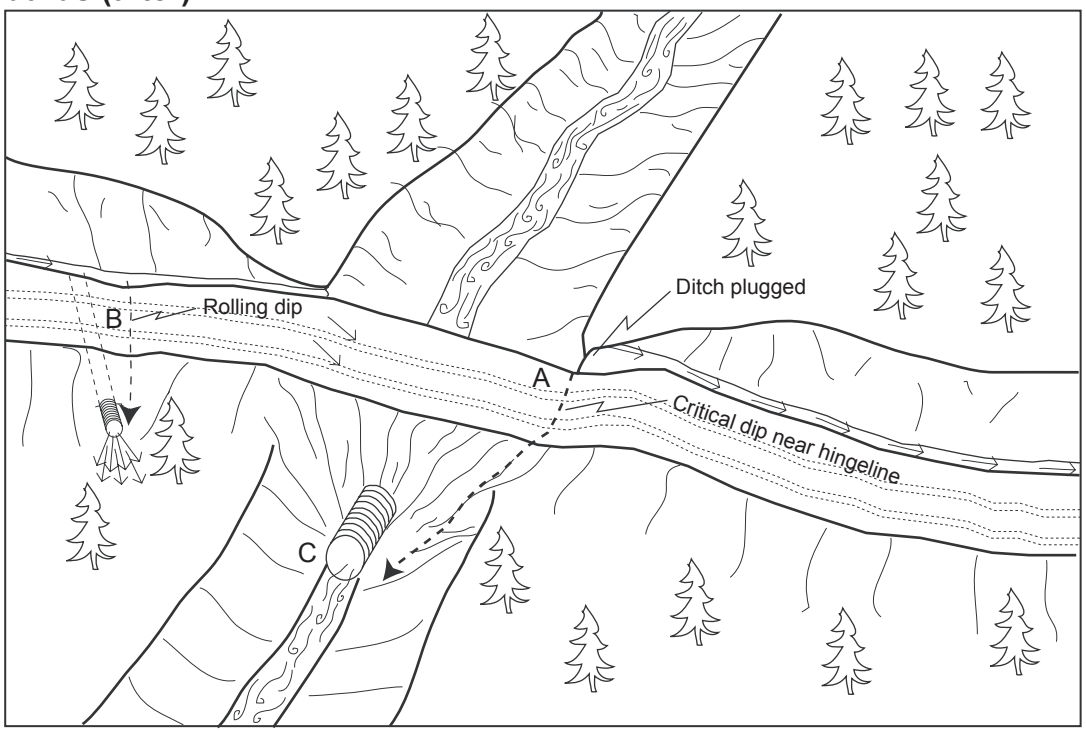


Treatment standards (after)

A - No diversion potential with critical dip installed near hingeline

B - Road surface and ditch disconnected from stream by rolling dip and ditch relief culvert

C - 100-year culvert set at base of fill



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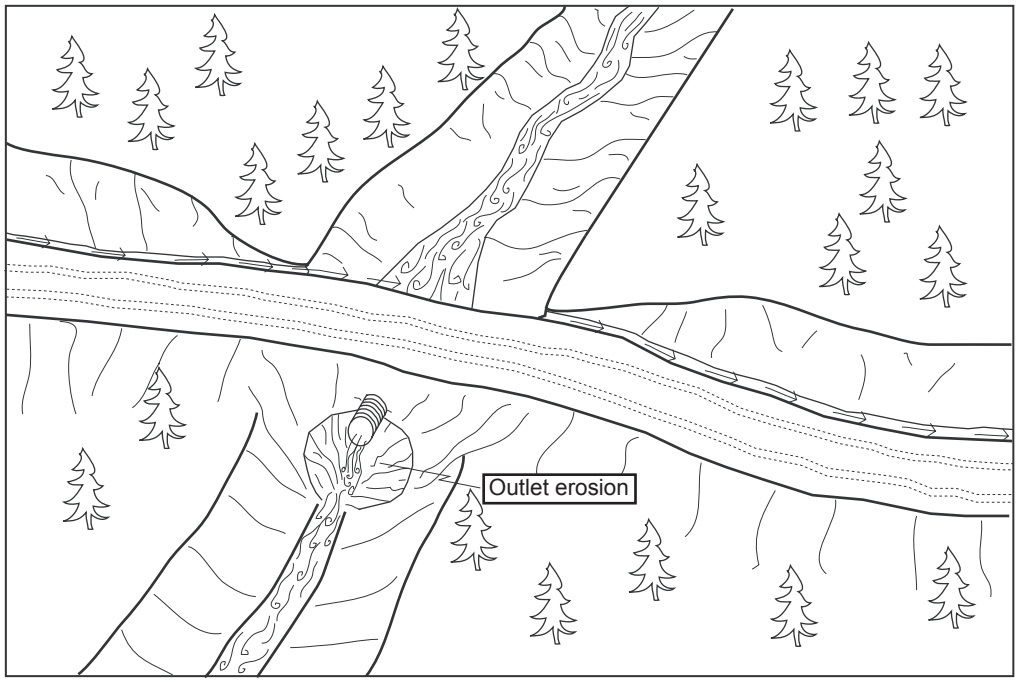
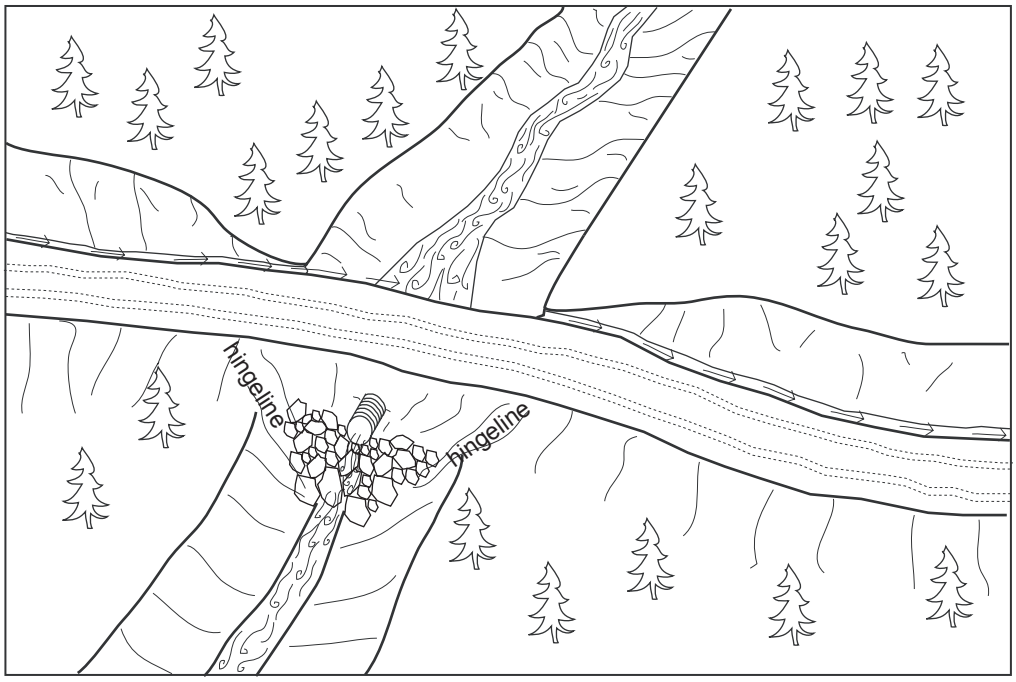
PWA Typical Drawing #1a

Armoring Fill Faces to Upgrade Stream Crossings



Problem: Culvert set high in outboard fill has resulted in scour of the outboard fill face and natural channel.
Conditions: The existing stream crossing has a culvert sufficient in diameter to manage design stream flows and has a functional life.



Action: The area of scour is backfilled with rip-rap to provide protection in the form of energy dissipation for the remaining fill face and channel.

Treatment Specifications:

1) Placement of rip-rap should be between the left and right hingelines and extend from a keyway excavated below the existing channel base level at the base of the fill slope up and under the existing culvert.
2) Rock size and volume is determined on a site by site basis based on estimated discharge and existing stream bed particle size range (See accompanying road log).

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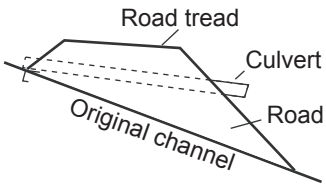
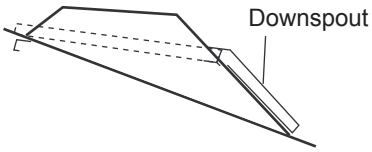
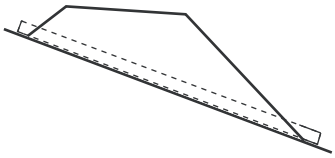
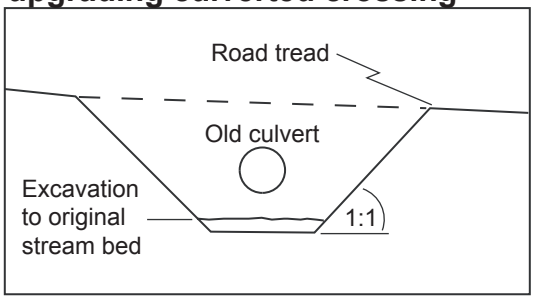
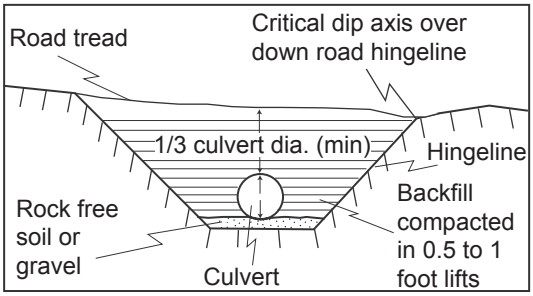
Typical Design of a Non-fish Bearing Culverted Stream Crossing

Existing	Upgraded	Upgraded (preferred)
		
1. Culvert not placed at channel grade. 2. culvert does not extend past base of fill.	1. Culvert not placed at channel grade. 2. Downspout added to extend outlet past road fill.	1. Culvert placed at channel grade. 2. Culvert inlet and outlet rest on, or partially in, the originial streambed.

Excavation in preparation for upgrading culverted crossing



Upgraded stream crossing culvert installation



Note:
Road upgrading tasks typically include upgrading stream crossings by installing larger culverts and inlet protection (trash barriers) to prevent plugging. Culvert sizing for the 100-year peak storm flow should be determined by both field observation and calulations using a procedure such as the Rational Formula.

Stream crossing culvert Installation

1. Culverts shall be aligned with natural stream channels to ensure proper function, and prevent bank erosion and plugging by debris.
2. Culverts shall be placed at the base of the fill and the grade of the original streambed, or downspouted past the base of the fill.
3. Culverts shall be set slightly below the original stream grade so that the water drops several inches as it enters the pipe.
5. To allow for sagging after burial, a camber shall be between 1.5 to 3 incher per 10 feet culvert pipe length.
6. Backfill material shall be free of rocks, limbs or other debris that could dent or puncture the pipe or allow water to seep around pipe.
7. First one end then the other end of the culvert shall be covered and secured. The center is covered last.
8. Backfill material shall be tamped and compacted throughout the entire process:
   - Base and side wall material will be compacted before the pipe is placed in its bed.
   - Backfill compacting will be done in 0.5 - 1 foot lifts until 1/3 of the diameter of the culvert has been covered. A gas powered tamper can be used for this work.
9. Inlets and outlets shall be armored with rock or mulched and seeded with grass as needed.
10. Trash protectors shall be installed just upstream from the culvert where there is a hazard of floating debris plugging the culvert.
11. Layers of fill will be pushed over the crossing until the final designed road grade is achieved, at a minimum of 1/3 to 1/2 the culvert diameter.

Erosion control measures for culvert replacement

Both mechanical and vegetative measures will be employed to minimize accelerated erosion from stream crossing and ditch relief culvert upgrading. Erosion control measures implemented will be evaluated on a site by site basis. Erosion control measures include but are not limited to:

1. Minimizing soil exposure by limiting excavation areas and heavy equipment distrubance.
2. Installing filter windrows of slash at the base of the road fill to minimize the movement of eroded soil to downslope areas and stream channels.
3. Retaining rooted trees and shrubs at the base of the fill as “anchor” for the fill and filter windrows.
4. Bare slopes created by construction operations will be protected until vegetation can stabilize the surface. Surface erosion on exposed cuts and fills will be minimized by mulching, seeding, planting, compacting, armoring, and/or benching prior to the first rains.
5. Excess or unusable soil will be stored in long term spoil disposal locations that are not limited by factors such as excessive moisture, steep slopes greater than 10%, archeology potential, or proximity to a watercourse.
6. On running streams, water will be pumped or diverted past the crossing and into the downstream channel during the construction process.
7. Straw bales and/or silt fencing will be employed where necessary to control runoff within the construction zone.

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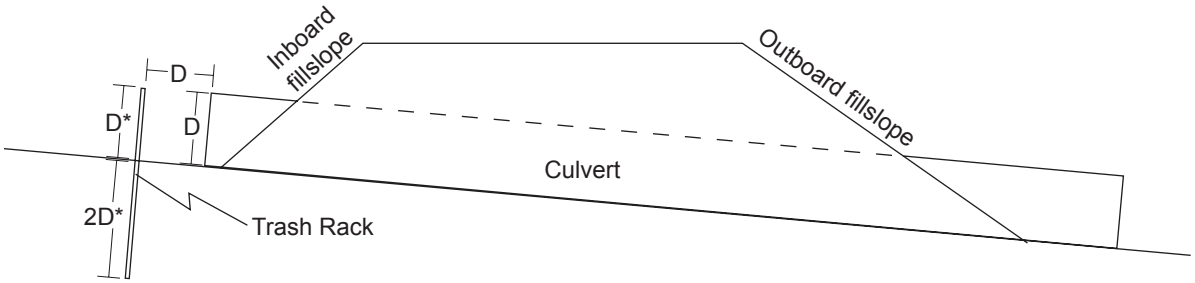
Typical Design of a Single-post Culvert Inlet Trash Rack

Cross section view



D - Culvert diameter

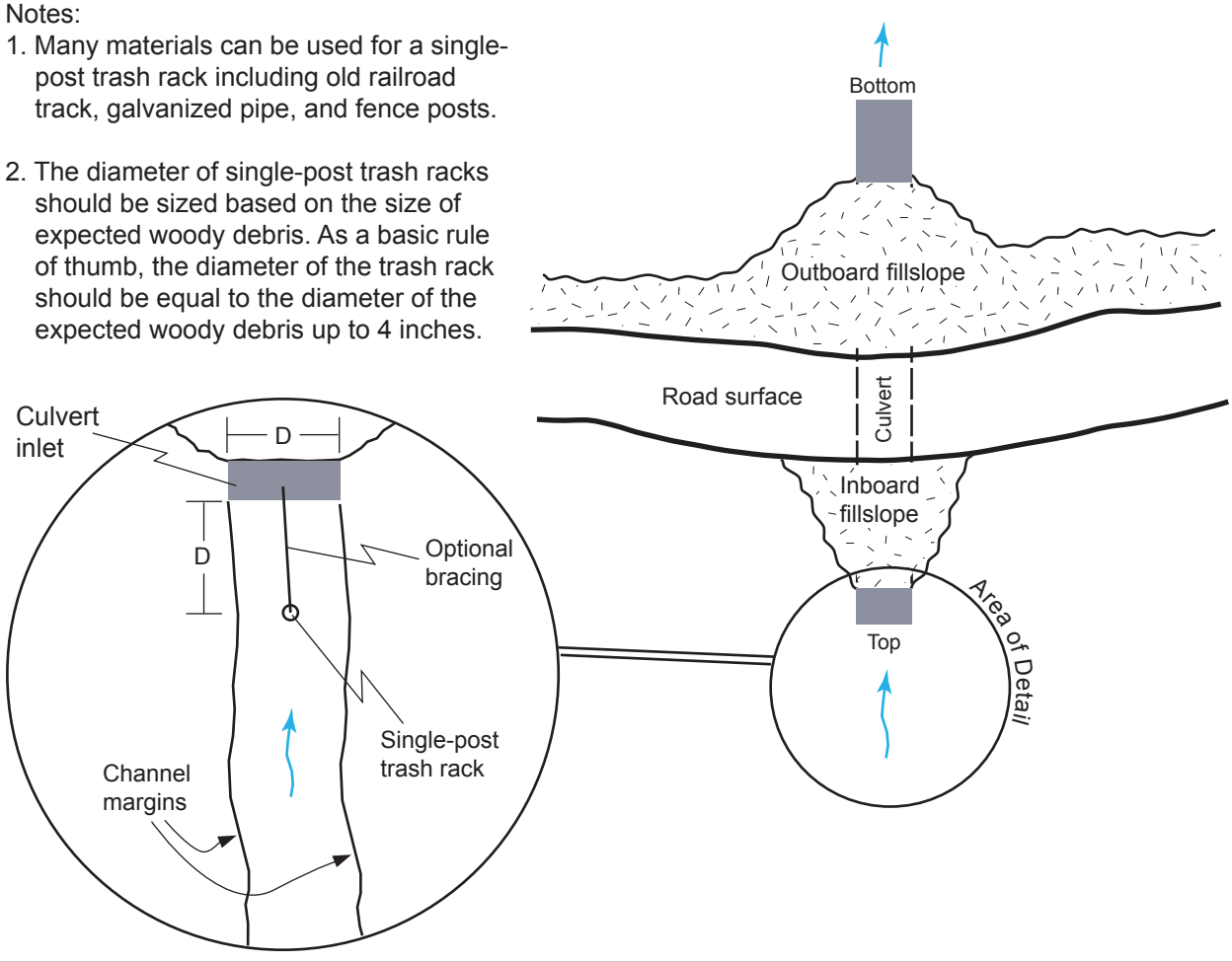
D* - If the culvert is designed for the 100-year peak storm flow, the trash rack height above the streambed should equal D.
If the culvert is undersized, then the trash rack needs to be extended vertically above the streambed to match or exceed the expected headwall height.

Plan view

Notes:

1. Many materials can be used for a single-post trash rack including old railroad track, galvanized pipe, and fence posts.

2. The diameter of single-post trash racks should be sized based on the size of expected woody debris. As a basic rule of thumb, the diameter of the trash rack should be equal to the diameter of the expected woody debris up to 4 inches.



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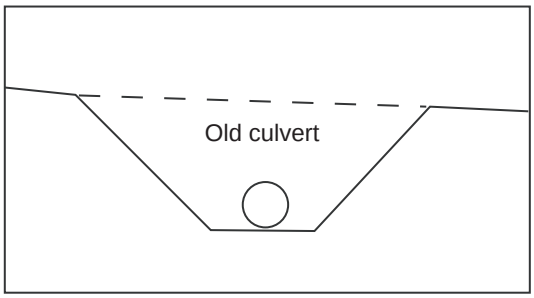
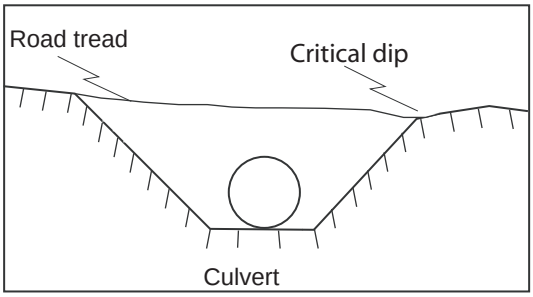
Typical Design of Upgraded Stream Crossings





Stream crossing culvert Installation

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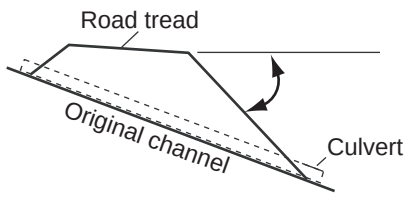
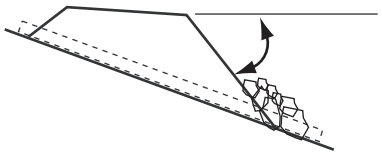
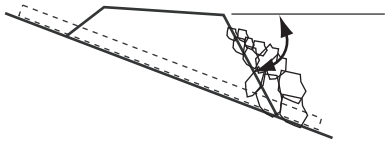
   - backfill compacting will be done in 0.5 - 1 foot lifts until 1/3 of the diameter of the culvert has been covered. A gas powered tamper can be used for this work.
9. Inlets and outlets shall be armored with rock or mulched and seeded with grass as needed.
10. Trash protectors shall be installed just upstream from the culvert where there is a hazard of floating debris plugging the culvert.
11. Layers of fill will be pushed over the crossing until the final designed road grade is achieved, at a minimum of 1/3 to 1/2 the culvert diameter.

Note:
Road upgrading tasks typically include upgrading stream crossings by installing larger culverts and inlet protection (trash barriers) to prevent plugging. Culvert sizing for the 100-year peak storm flow should be determined by both field observation and calculations using a procedure such as the Rational Formula.

Armoring fill faces

Fill angles ≤ 2:1	Fill angles (between 2:1 & 1.5:1)	Fill angles (between 2:1 & 1.5:1)
 No rock armor needed	 Armor 1/4 up fill face	 Armor 3/4 way up fill face

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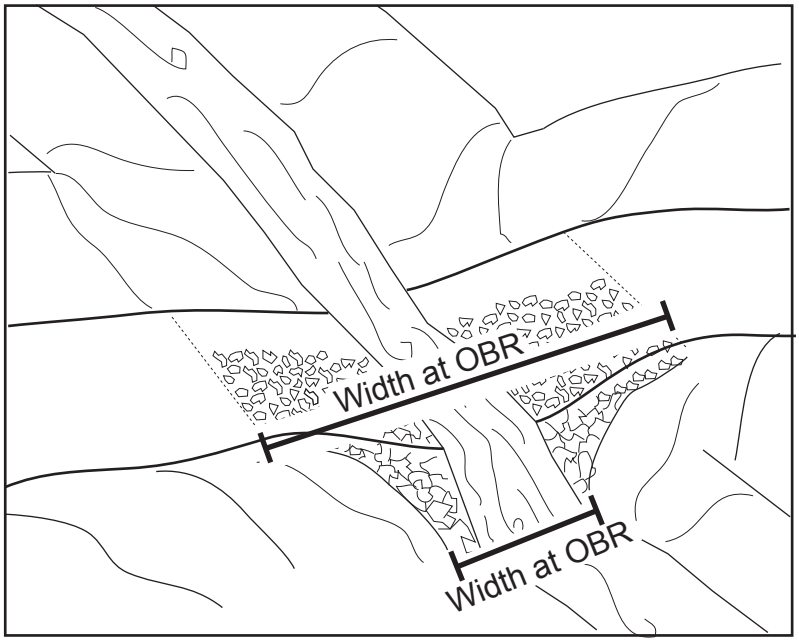
PWA Typical Drawing #4

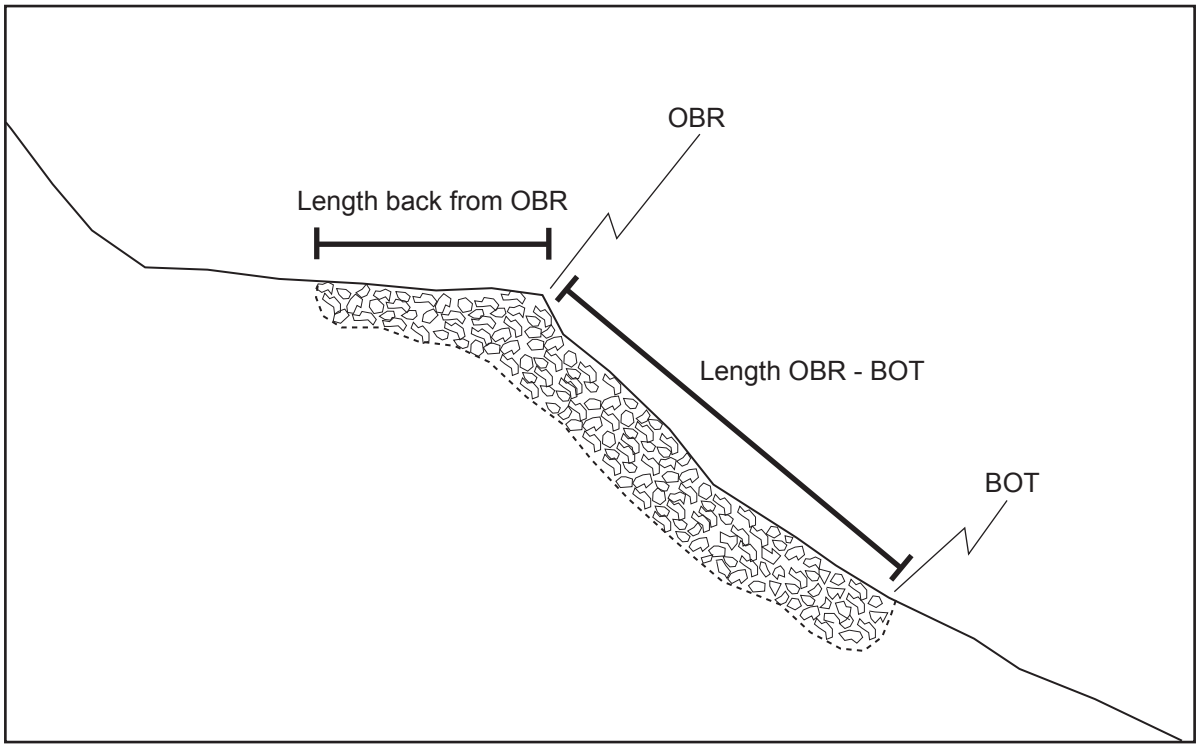
Typical Dimensions Refered to for Armored Fill Crossings

Widths in oblique view



OBR - Outboard edge of road

Lengths in profile view



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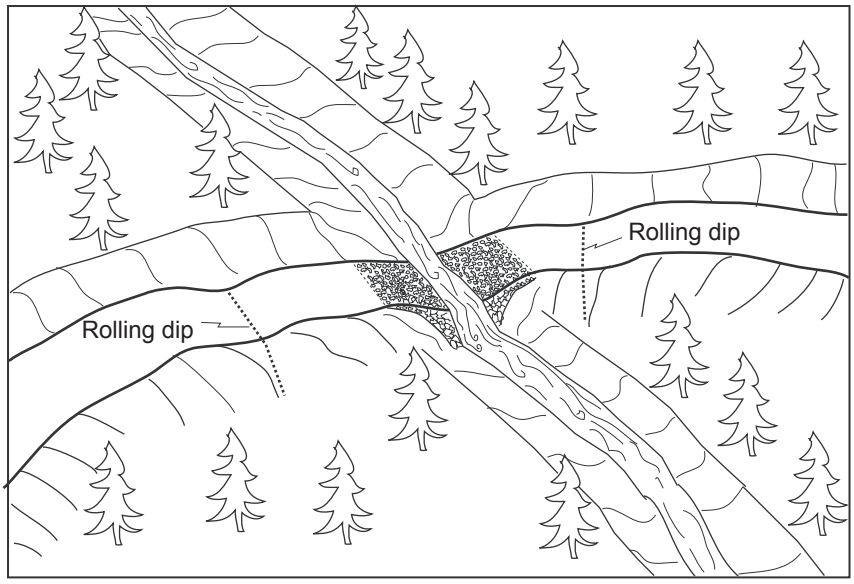
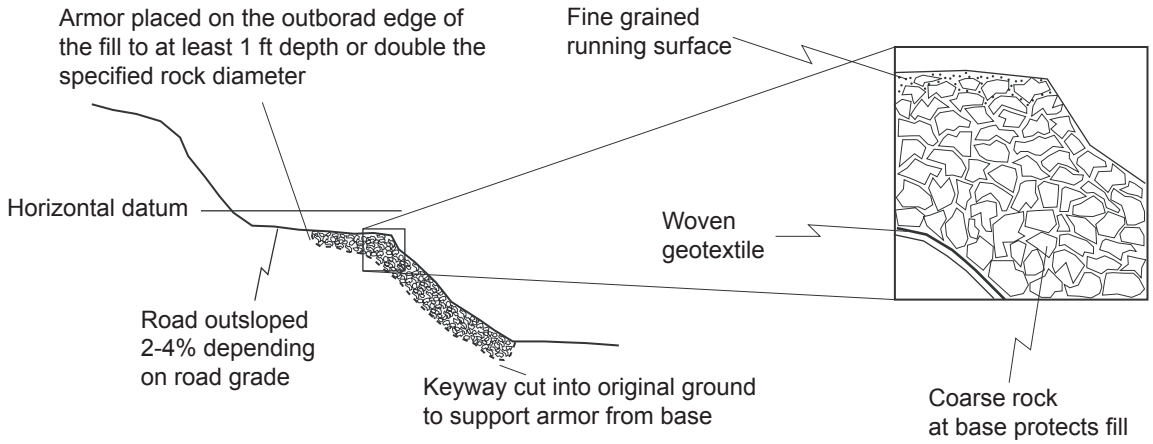
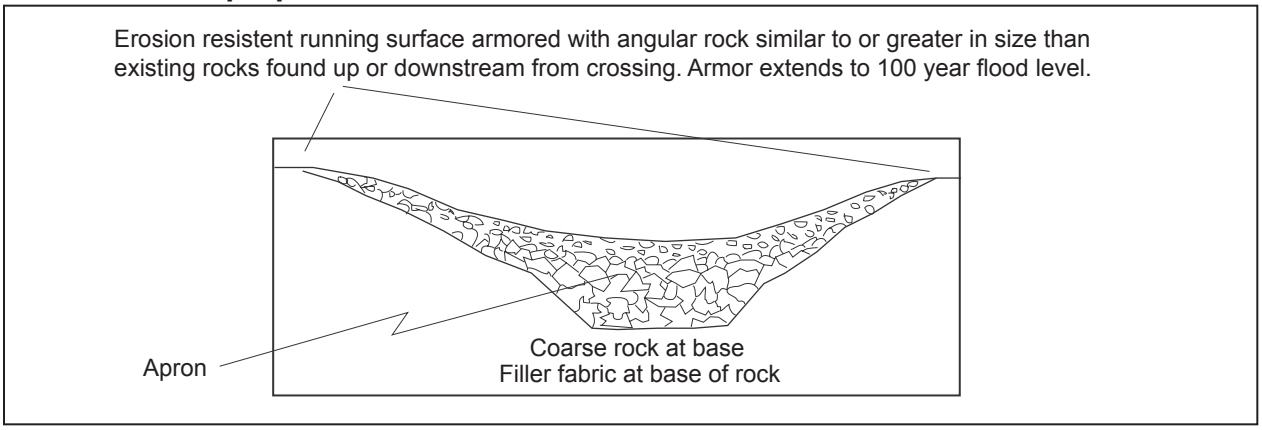
Typical Armored Fill Crossing Installation



Cross section parallel to watercourse



Cross section perpendicular to watercourse



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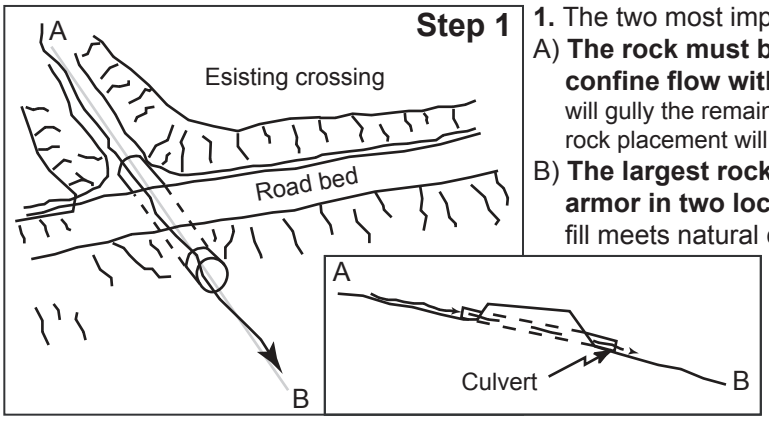
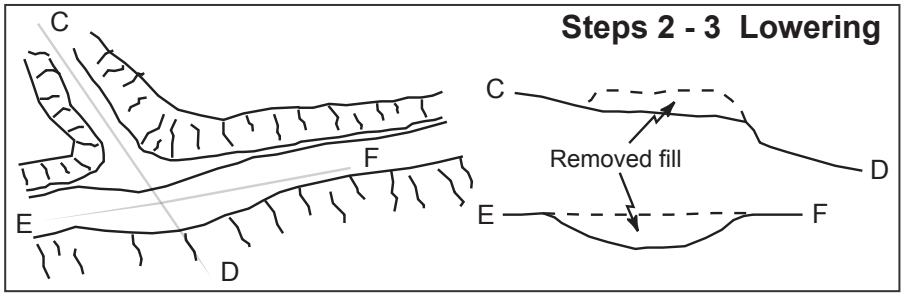
Ten Steps for Constructing a Typical Armored Fill Stream Crossing



1. The two most important points are:

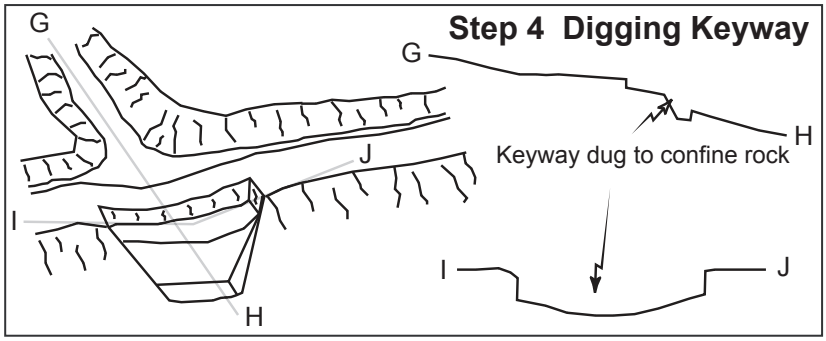
A) **The rock must be placed in a "U" shape across the channel to confine flow within the armored area.** (Flow around the rock armor will gully the remaining fill. Proper shape of surrounding road fill and good rock placement will reduce the likelihood of crossing failure).

B) **The largest rocks must be used to buttress the rest of the armor in two locations:** (i) The base of the armored fill where the fill meets natural channel. (This will butress the armor placed on the outboard fill face and reduce the likelihood of it washing downslope). (ii) The break in slope from the road tread to the outer fill face. (This will butress the fill placed on the outer road tread and will determine the "base level" of the creek as it crosses the road surface).



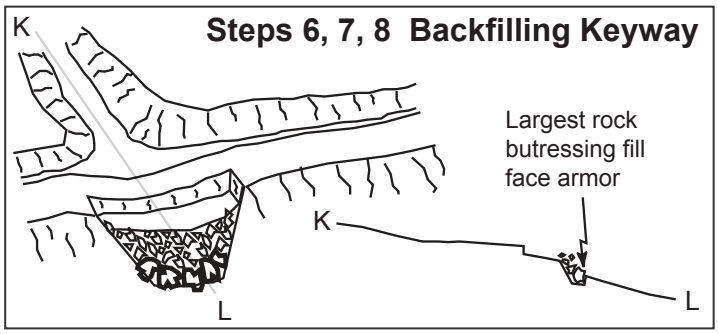
2. Remove any existing drainage structures including culverts and Humboldt logs.

3. Construct a dip centered at the crossing that is large enough to accomodate the 100-year peak storm flow and prevent diversion (C-D, E-F).



4. Dig a keyway (to place rock in) that extends from the outer 1/3 of the road tread down the outboard road fill to the point where outbaord fill meets natural channel (up to 3 feet into the channel bed depending on site specifics) (G-H, I-J).

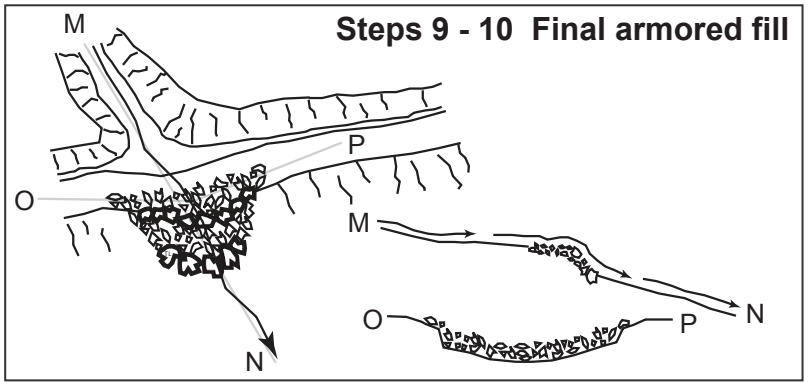
5. Install geofabric (optional) within keyway to support rock in wet areas and to prevent winnowing of the crossing at low flows.



6. Put aside the largest rock armoring to create 2 buttresses in the next step.

7. Create a buttress using the largest rock (as described in the site treatments specifications) at the base of fill. (This should have a "U" shape to it and will define the outlet of the armored fill.)

8. Backfill the fill face with remaining rock armor making sure the final armored area has "U" shape that will accomodate the largest expected flow (K-L).



9. Install a second buttress at the break in slope between the outboard road and the outboard fill face. (This should define the base level of the stream and determine how deep the stream will backfill after construction). (M-N)

10. Back fill the rest of the keyway with the unsorted rock armor making sure the final armored area has a "U" shape that will accommodate the largest expected flow (O-P).

Typical Drawing #7

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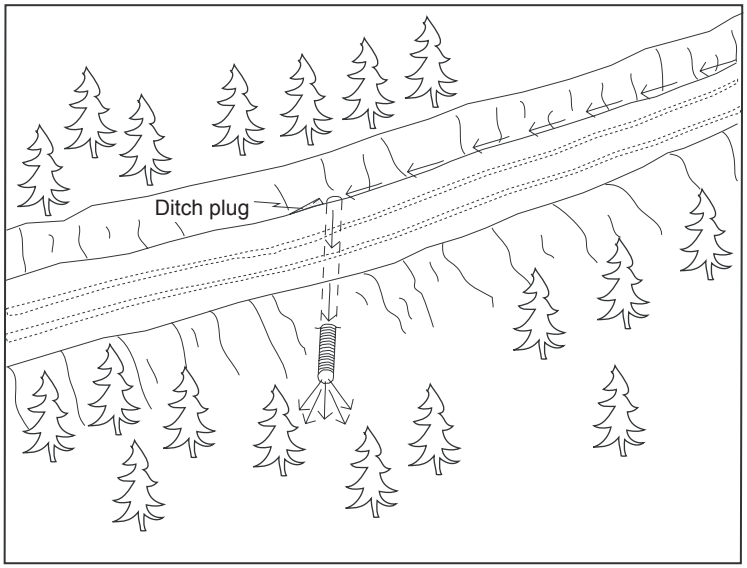
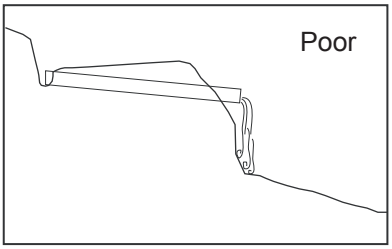
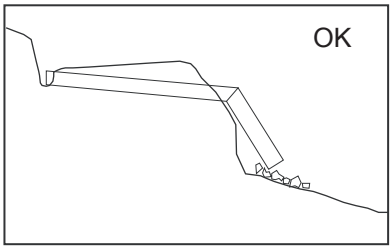
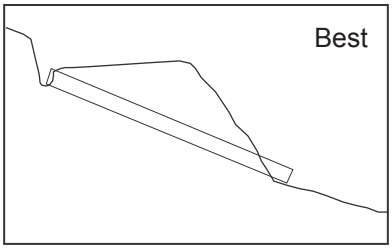
Typical Ditch Relief Culvert Installation









Ditch relief culvert installation

1) The same basic steps followed for stream crossing installation shall be employed.
2) Culverts shall be installed at a 30 degree angle to the ditch to lessen the chance of inlet erosion and plugging.
3) Culverts shall be seated on the natural slope or at a minimum depth of 5 feet at the outside edge of the road, whichever is less.
4) At a minimum, culverts shall be installed at a slope of 2 to 4 percent steeper than the approaching ditch grade, or at least 5 inches every 10 feet.
5) Backfill shall be compacted from the bed to a depth of 1 foot or 1/3 of the culvert diameter, which ever is greater, over the top of the culvert.
6) Culvert outlets shall extend beyond the base of the road fill (or a flume downspout will be used). Culverts will be seated on the natural slope or at a depth of 5 feet at the outside edge of the road, whichever is less.

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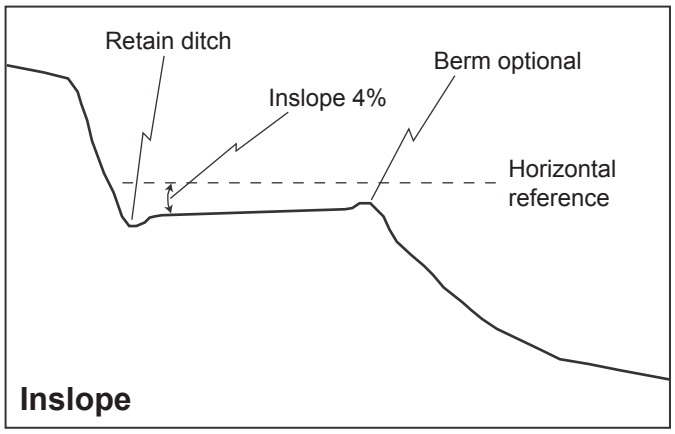
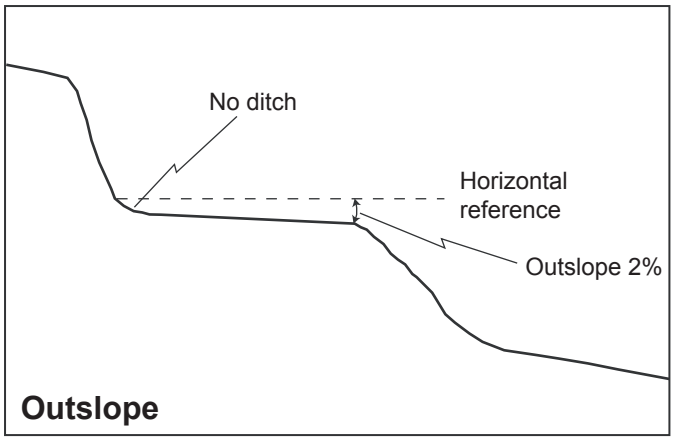
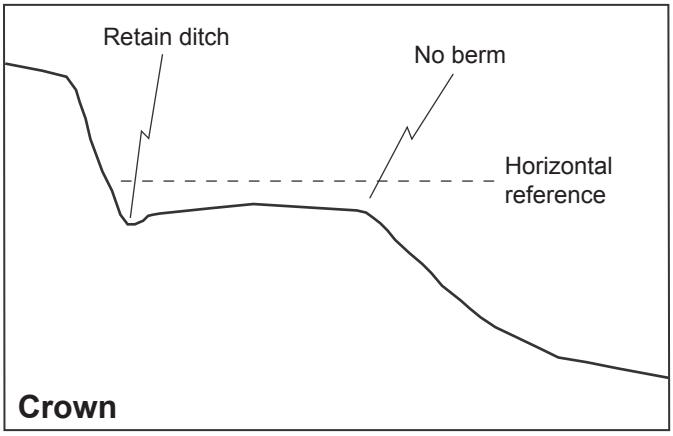
Typical Designs for Using Road Shape to Control Road Runoff







Outsloping Pitch for Roads Up to 8% Grade		
Road grade	**Unsurfaced roads**	**Surfaced roads**
4% or less	3/8" per foot	1/2" per foot
5%	1/2" per foot	5/8" per foot
6%	5/8" per foot	3/4" per foot
7%	3/4" per foot	7/8" per foot
8% or more	1" per foot	1 1/4" per foot

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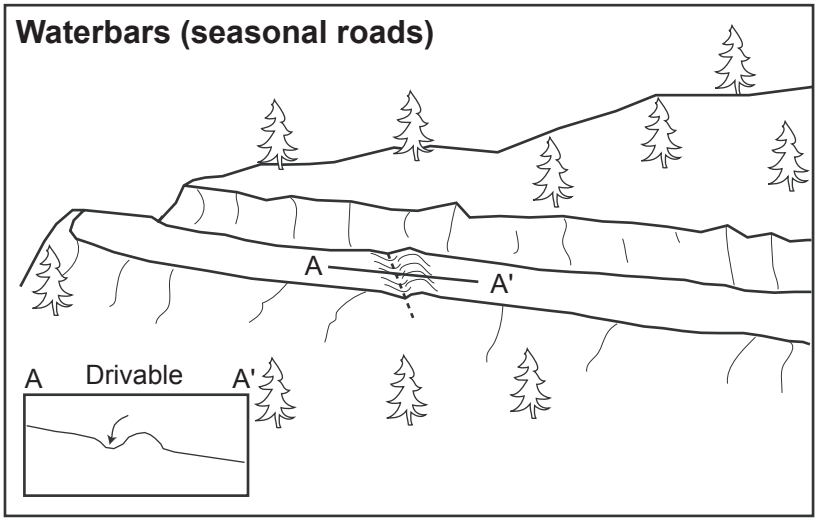
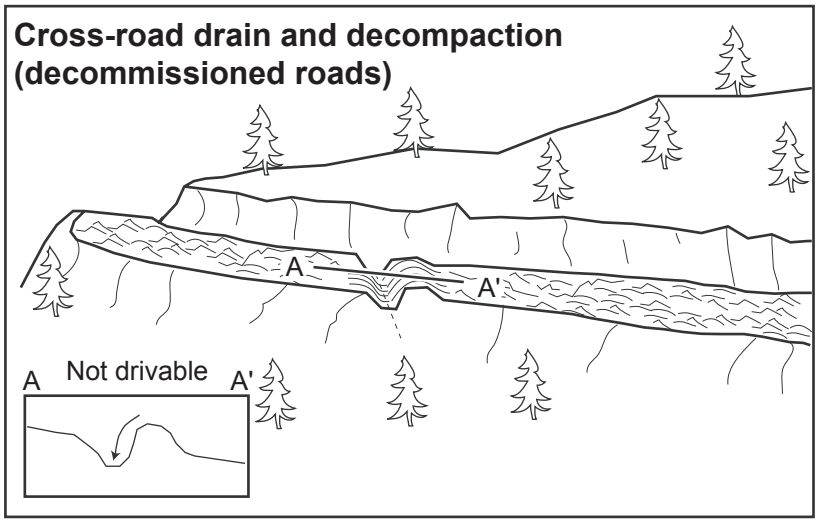
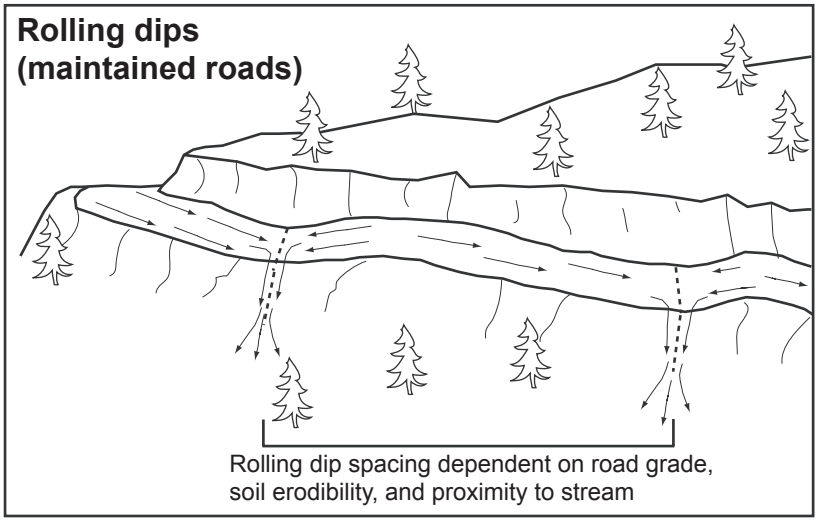
Typical Methods for Dispersing Road Surface Runoff with Waterbars, Cross-road Drains, and Rolling Dips







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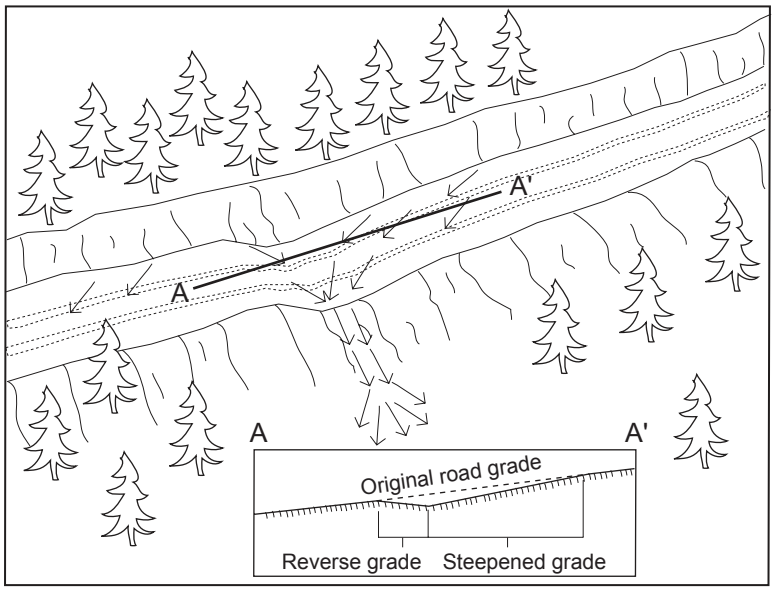
Typical Road Surface Drainage by Rolling Dips



Rolling dip installation:

1. Rolling dips will be installed in the roadbed as needed to drain the road surface.
2. Rolling dips will be sloped either into the ditch or to the outside of the road edge as required to properly drain the road.
3. Rolling dips are usually built at 30 to 45 degree angles to the road alignment with cross road grade of at least 1% greater than the grade of the road.
4. Excavation for the dips will be done with a medium-size bulldozer or similar equipment.
5. Excavation of the dips will begin 50 to 100 feet up road from where the axis of the dip is planned as per guidelines established in the rolling dip dimensions table.
6. Material will be progressively excavated from the roadbed, steepening the grade unitl the axis is reached.
7. The depth of the dip will be determined by the grade of the road (see table below).
8. On the down road side of the rolling dip axis, a grade change will be installed to prevent the runoff from continuing down the road (see figure above).
9. The rise in the reverse grade will be carried for about 10 to 20 feet and then return to the original slope.
10. The transition from axis to bottom, through rising grade to falling grade, will be in a road distance of at least 15 to 30 feet.

Table of rolling dip dimensions by road grade

Road grade %	**Upslope approach distance** (from up road start to trough) ft	**Reverse grade distance** (from trough to crest) ft	**Depth at trough outlet** (below average road grade) ft	**Depth at trough inlet** (below average road grade) ft
<6	55	15 - 20	0.9	0.3
8	65	15 - 20	1.0	0.2
10	75	15 - 20	1.1	0.01
12	85	20 - 25	1.2	0.01
>12	100	20 - 25	1.3	0.01

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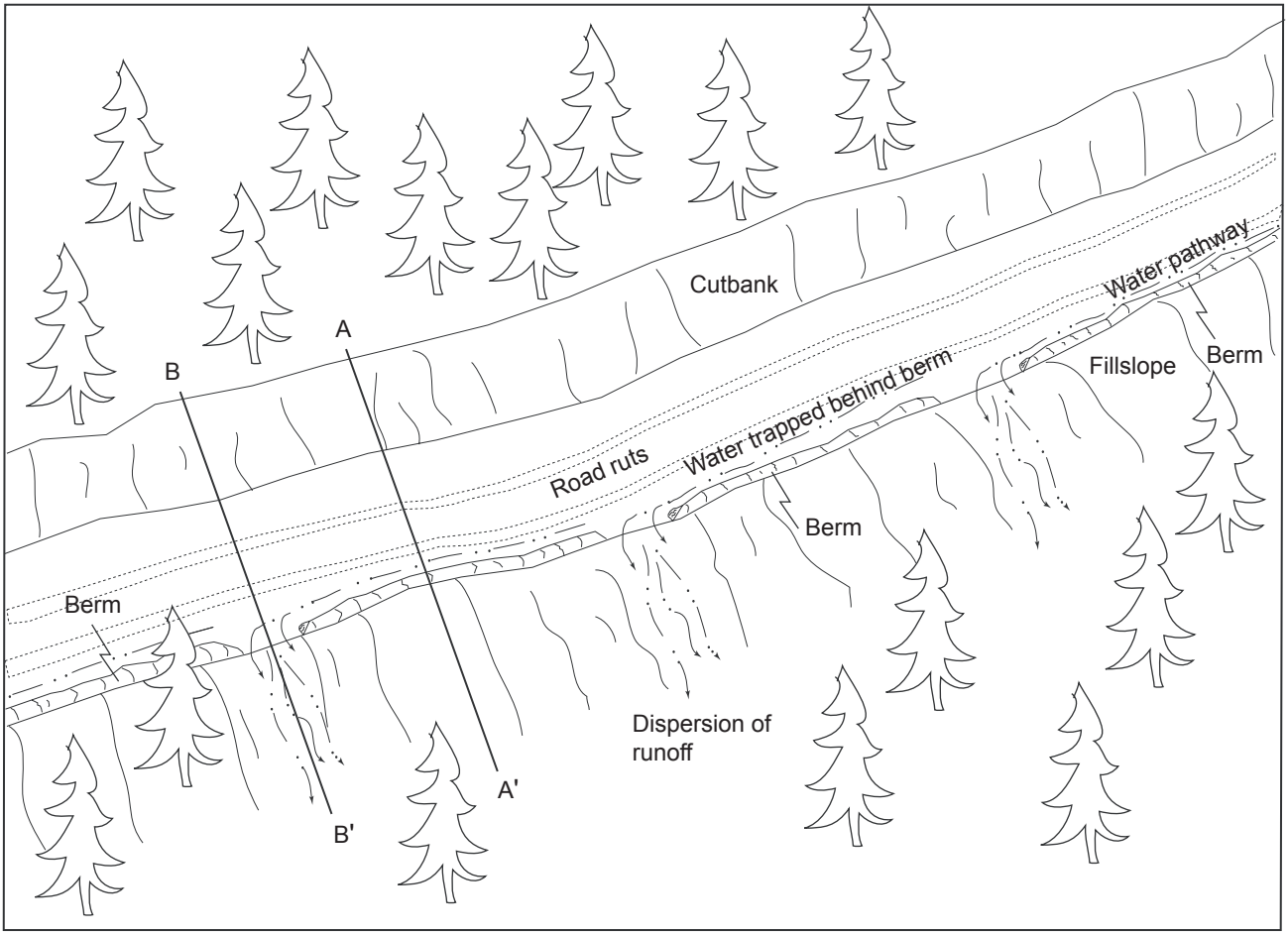
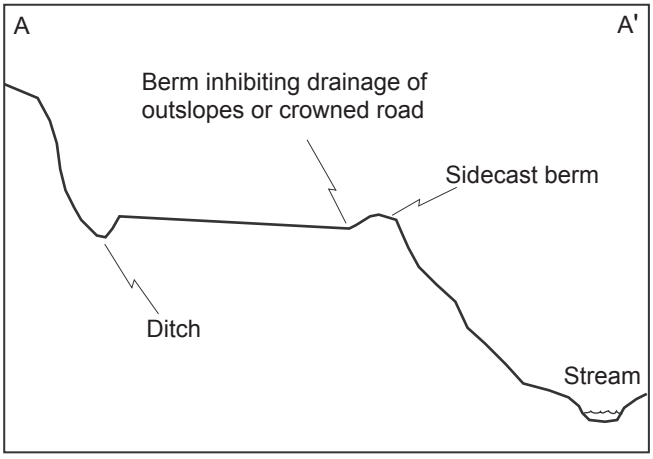
Typical Sidecast or Excavation Methods for Removing Outboard Berms on a Maintained Road

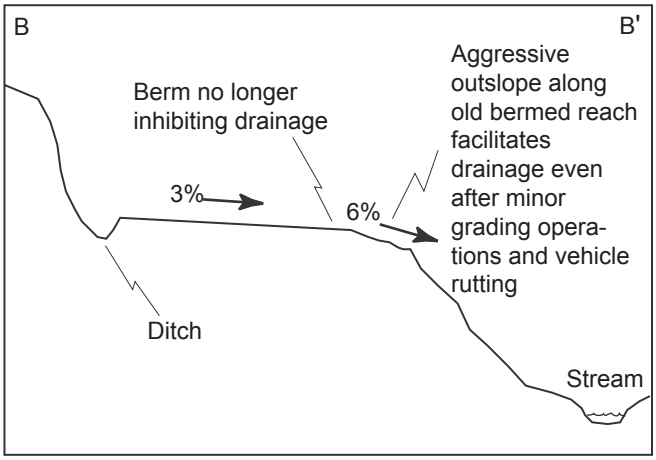
1. On gentle road segments berms can be removed continuously (see B-B').
2. On steep road segments, where safety is a concern, the berm can be frequently breached (see A-A' & B-B') Berm breaches should be spaced every 30 to 100 feet to provide adequate drainage of the road system while maintaining a semi-continuous berm for vehicle safety.



Road cross section between berm breaches



Road cross section at berm breaches



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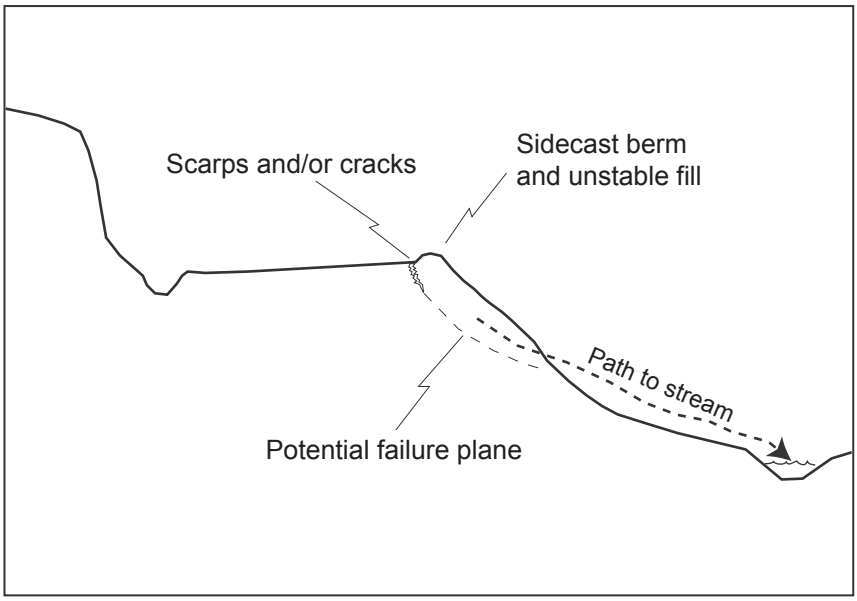
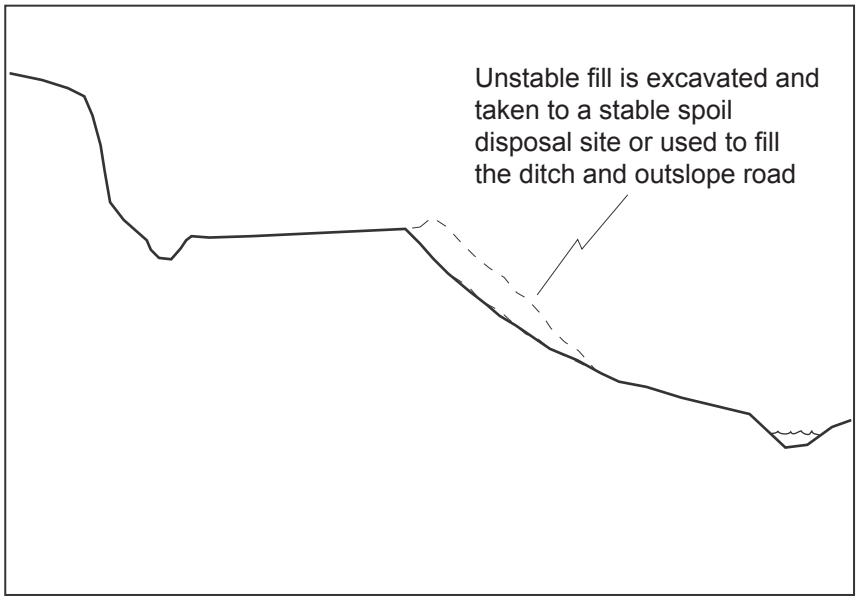
Typical Excavation of Unstable Fillslope on an Upgraded Road

Before



After



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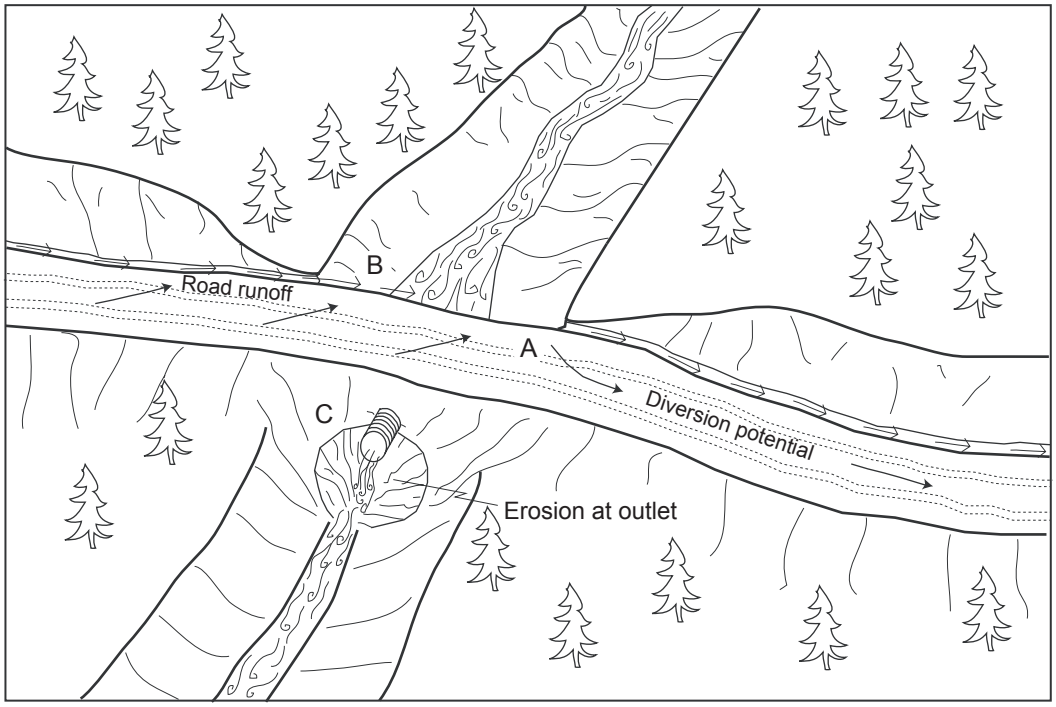
Typical Problems and Applied Treatments for a Decommissioned Stream Crossing

Problem condition (before)

A - Diversion potential

B - Road surface and ditch drain to stream

C - Undersized culvert high in fill with outlet erosion

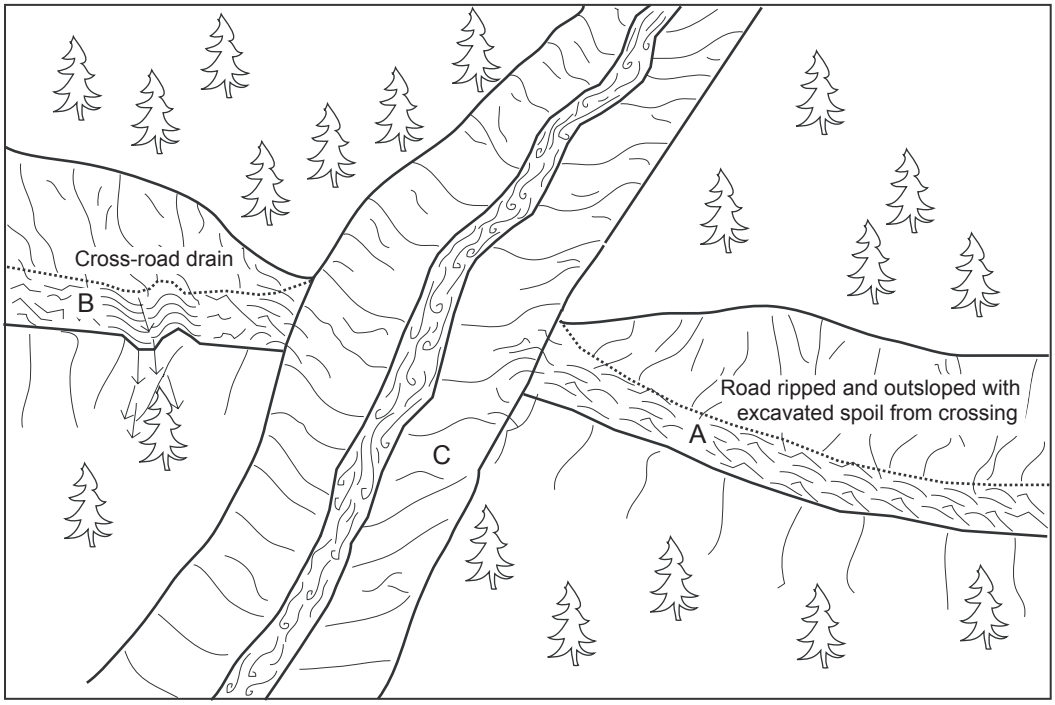


Treatment standards (after)

A - Diversion prevented by road surface ripping and outsloping using excavated spoils

B - Road surface and ditch disconnected from stream by road surface decompaction and cross-road drains

C - Stream crossing fill completely excavated



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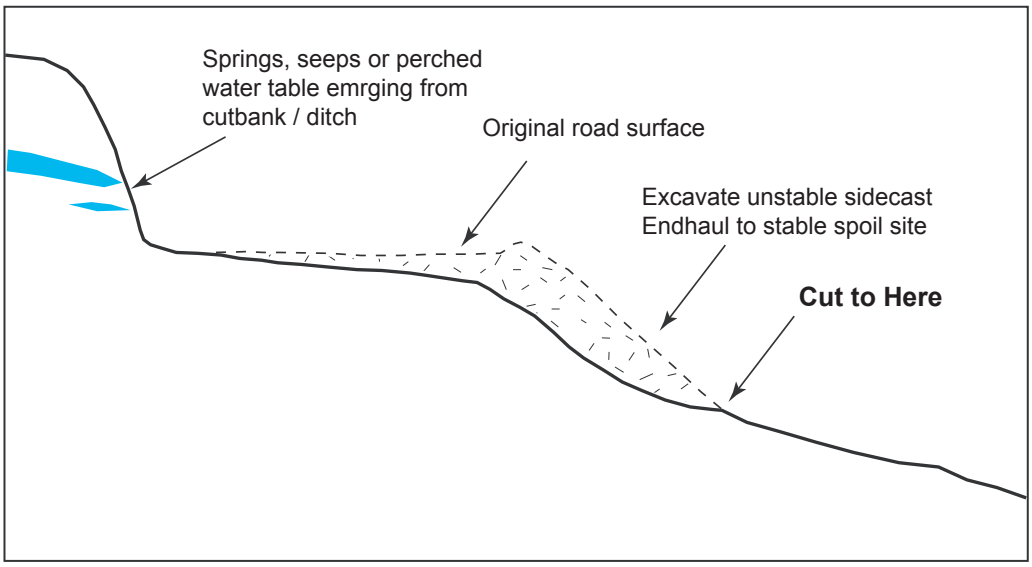
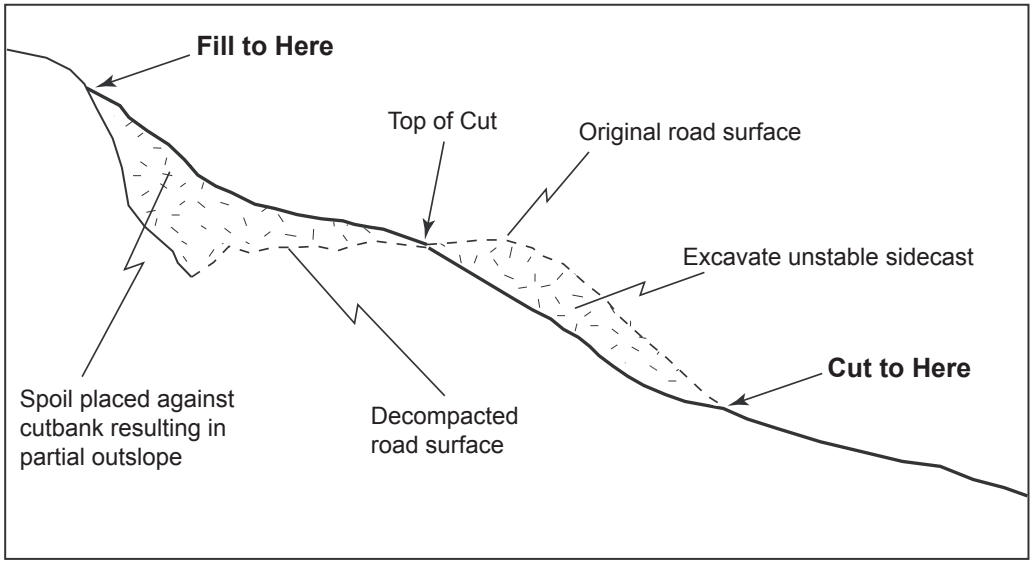
Typical Design for Road Decommisioning Treatments Employing Export and In-Place Outsloping Techniques

Export outslope (EPOS)



In-place outslope (IPOS)



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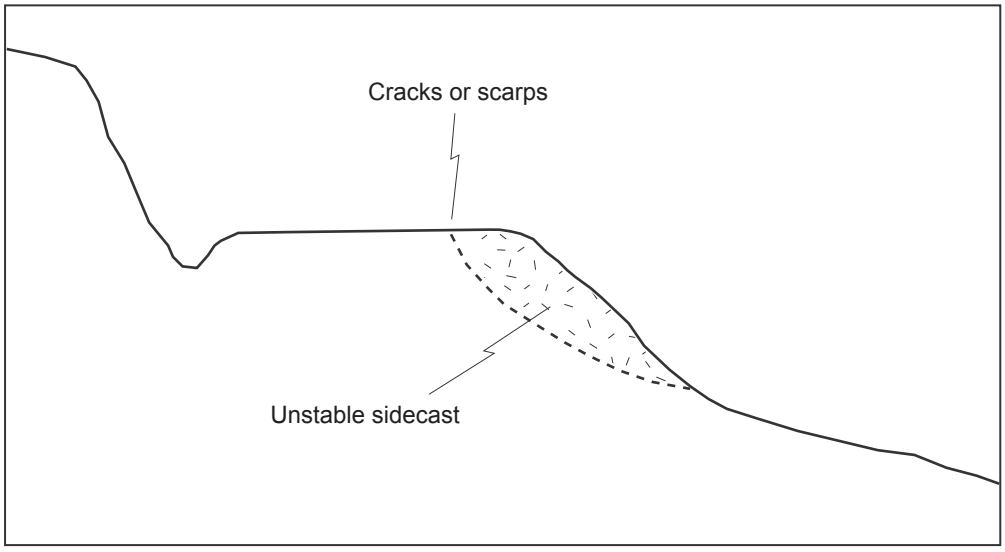
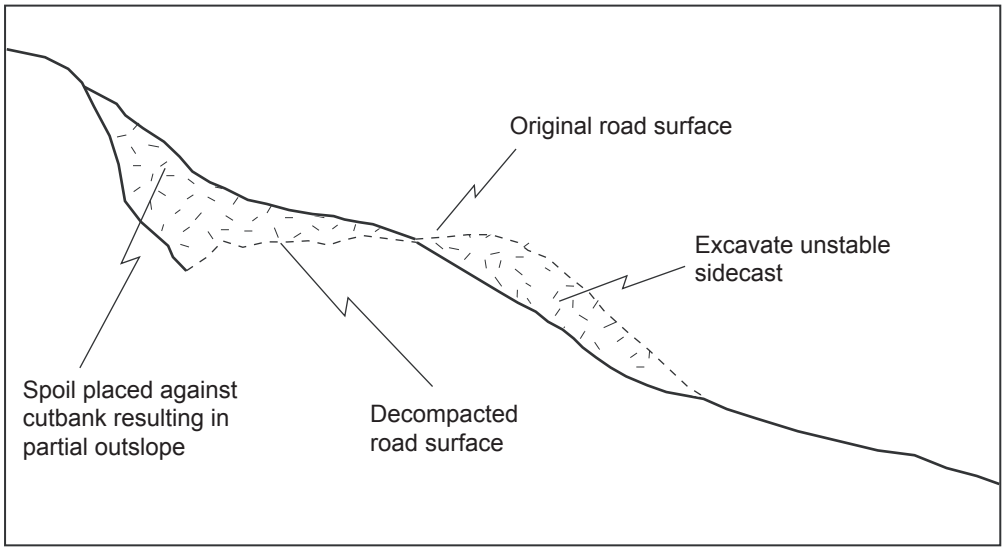
Typical Excavation of Unstable Fillslope on a Decommissioned Road

Before



After



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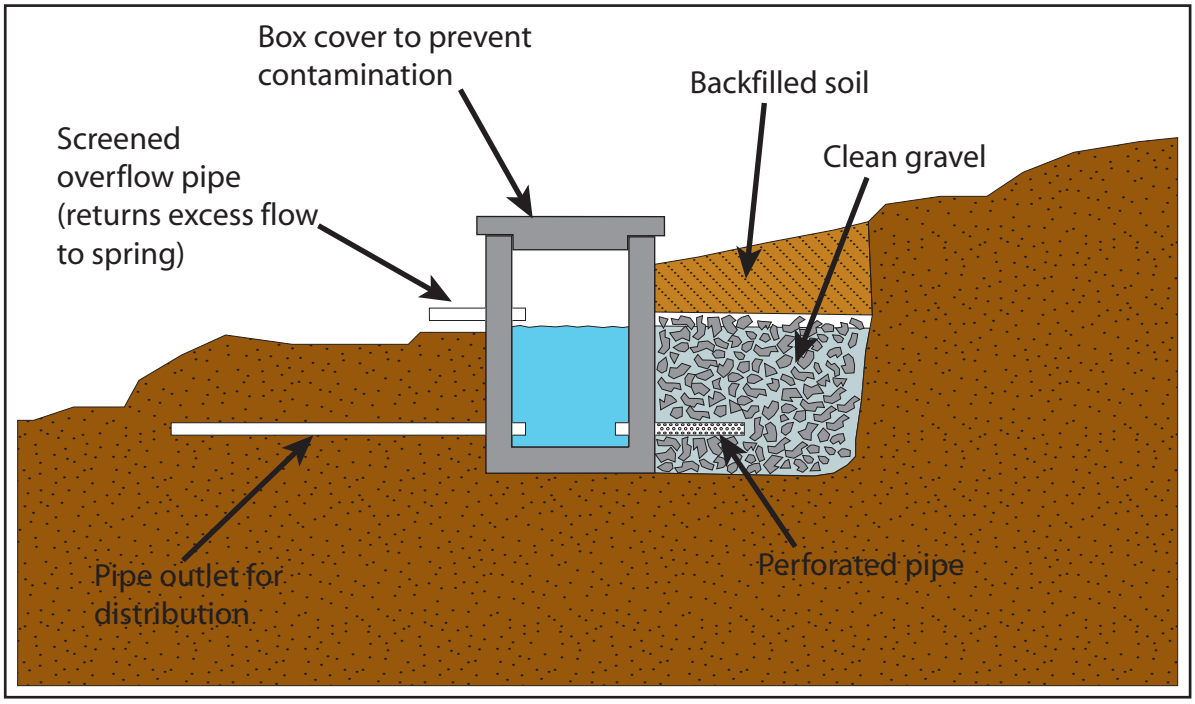
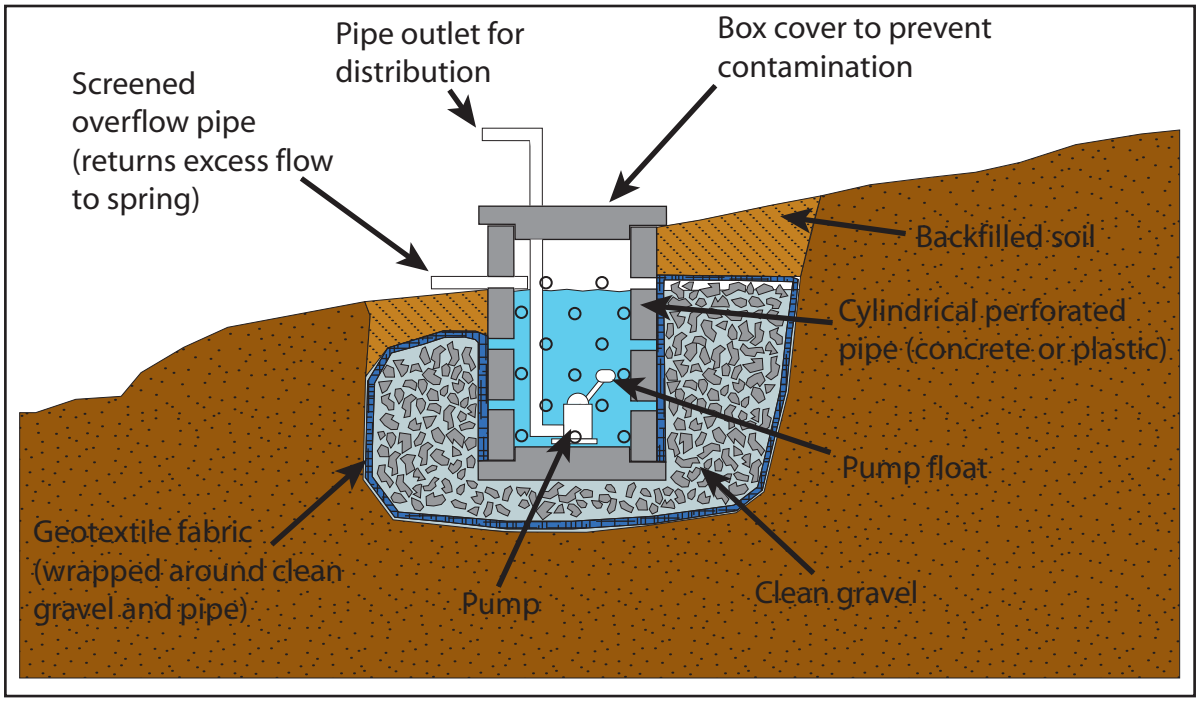
Typical design drawings of spring boxes

Piped spring box - gravity system



Perforated spring box - pumped system



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PWA Typical Drawing #20