

Water Resource Protection Plan

APN: 211-374-013

Prepared by:

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Purpose

This Water Resource Protection Plan (WRPP) has been prepared on behalf of the discharger for the Humboldt County property identified as Parcel Number 211-374-013, by agreement and in response to the California Water Code Section 13260(a), which requires that any person discharging waste or proposing to discharge waste within any region that could affect the quality of the waters of the state, other than into a community sewer system, shall file with the appropriate regional water board a Report of Waste Discharge (ROWD) containing such information and data as may be required by the Regional Water Board. The Regional Water Board may waive the requirements of Water Code section 13260 for specific types of discharges if the waiver is consistent with the Basin Plan and in the public interest. Any waiver is conditional and may be terminated at any time. A waiver should include monitoring requirements to verify the adequacy and effectiveness of the waiver's conditions. Order R1-2015-0023 conditionally waives the requirement to file a ROWD for discharges and associated activities described in finding 4.

Scope of Report

Order No. R1-2015-0023 states that "Tier 2 Dischargers and Tier 3 Dischargers who intend to cultivate cannabis before, during, or following site cleanup activities shall develop and implement a water resource protection plan that contains the elements listed and addressed below. Dischargers must keep this plan on site, and produce it upon request by Regional Water Board staff. Management practices shall be properly designed and installed, and assessed periodically for effectiveness. If a management measure is found to be ineffective, the plan must be adapted and implemented to incorporate new or additional management practices to meet standard conditions. Dischargers shall certify annually to the Regional Water Board individually or through an approved third party program that the plan is being implemented and is effectively protecting water quality, and report on progress in implementing site improvements intended to bring the site into compliance with all conditions of this Order."

Methods

The methods used to develop this WRPP include both field and office components. The office component consisted of aerial photography review and interpretation, existing USGS quad map review, GIS mapping of field data, review of on-site photography points, streamflow calculations, and general planning. The field component included identifying and accurately mapping all watercourses, wet areas, and wetlands located downstream of the cultivation areas, associated facilities, and all appurtenant roads accessing such areas. An accurate location of the Waters of the State is necessary to make an assessment of whether potential and existing erosion sites/pollution sites have the potential to discharge waste to an area that could affect waters of the State (including groundwater). Next, all cultivation areas, associated facilities, and all appurtenant roads accessing such areas were assessed for discharges and related controllable water quality factors from the activities listed in Order R1-2015-0023, Finding 4a-j. The field assessment also included an evaluation and determination of compliance with the Standard Conditions per Provision I.B of Order No. R1-2015-0023. The water resource protection plans required under Tier 2 are meant to describe the specific measures a discharger implements to achieve compliance with standard conditions. Therefore, all required components of the water resource protection plan per Provision I.B of Order No. R1-2015-0023 were physically inspected and evaluated. A comprehensive summary of each Standard Condition as it relates to the subject property is appended.

Property Description

The property assessed is a 20-acre parcel that is located 3.2 miles west-northwest of Myers Flat, California at an elevation of approximately 900 feet. The property is located within the West ½ of the Northeast ¼ of the Northwest ¼ of Section 23, Township 2 South, Range 3 East, HB&M, on the Myers Flat 7.5' Quadrangle. There are two watercourses located on the property, both of which are tributary to the South Fork Eel River and ultimately the Eel River.

Monitoring Plan

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

Monitoring of the site includes visual inspection and photographic documentation of each feature of interest listed on the site map, with new photographic documentation recorded with any notable changes to the feature of interest. At a minimum, all site features must be monitored annually, to provide the basis for completion of the annual re-certification process. Additionally, sites shall be monitored at the following times to ensure timely identification of changed site conditions and to determine whether implementation of additional management measures is necessary to iteratively prevent, minimize, and mitigate discharges of waste to surface water: 1) just prior to October 15 to evaluate site preparedness for storm events and storm water runoff, 2) following the accumulation of 3" total precipitation or by November 15, whichever is sooner, and 3) following any rainfall event with an intensity of 3" precipitation in 24 hours. Precipitation data can be obtained from the National Weather Service Forecast Office (e.g. by entering the zip code of the parcel location at <http://www.srh.noaa.gov/forecast>).

Monitoring Plan Reporting Requirements

Order No. R1-2015-0023, Appendix C must be submitted to the Regional Water Board or approved third party program upon initial enrollment in the Order (NOI) and annually thereafter by March 31. Forms submitted to the Regional Water Board shall be submitted electronically to northcoast@waterboards.ca.gov. If electronic submission is infeasible, hard copies can be submitted to: North Coast Regional Water Quality Control Board, 5550 Skylane Boulevard, Suite A, Santa Rosa, CA 95403.

Assessment of Standard Conditions

Assessment of Standard Conditions consisted of field examinations on January 30, 2017, February 8, 2017, and February 23, 2017. The examinations evaluated areas near, and areas with the potential to directly impact, watercourses for sensitive conditions including, but not limited to, existing and proposed roads, skid trails and landings, unstable and erodible watercourse banks, unstable upslope areas, debris, jam potential, inadequate flow capacity, changeable channels, overflow channels, flood prone areas, and riparian zones. Field examinations also evaluated all roads and trails on the property, developed areas, cultivation sites, and any structures and facilities appurtenant to cultivation on the property. Anywhere the Standard Conditions are not met on the property, descriptions of the assessments and the prescribed treatments are outlined following each associated section below.

Summary of Standard Conditions Compliance

1. Site maintenance, erosion control, and drainage features Y☐/N☒
2. Stream crossing maintenance Y☐/N☒
3. Riparian and wetland protection and management Y☐/N☒
4. Spoils management Y☐/N☒
5. Water storage and use Y☒/N☐
6. Irrigation runoff Y☒/N☐
7. Fertilizers and soil amendments Y☒/N☐
8. Pesticides and herbicides Y☒/N☐
9. Petroleum products and other chemicals Y☐/N☒
10. Cultivation-related wastes Y☐/N☒
11. Refuse and human waste Y☒/N☐

A. Standard Conditions, Applicable to All Dischargers

1. Site Maintenance, erosion control and drainage features (Compliance: Y☐ / N☒)
 - 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.

Physical reconnaissance of the property revealed that all roads on the property that are used by full-sized vehicles are rocked and showing no signs of erosion that results in sediment delivery to surface waters. There are numerous ATV trails that create a network on the southern portion of the property. Several trails that are located within watercourse buffer zones are experiencing minor surface erosion and subsequent sediment delivery to surface waters. All ATV trails that are located within watercourse buffer zones shall be abandoned, seeded with native annual and perennial grasses, and then have straw mulch applied. Sections of trails that are difficult to have the straw mulch stay in place due to concentrated surface flows and/or a steep slope gradient, shall have the straw mulch anchored to the dirt surface per the attached specifications, or shall be treated with packed slash.

- 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.

At Map Point #1 (MP 1), surface runoff from the northern cultivation area is accumulating and causing minor surface erosion. The Discharger shall rock armor the flow path with rip rap of adequate size to prevent any further erosion from occurring. The Discharger shall also allow vegetation to become established within the flow path so that it can function as a bio-swale. The rip-rap and vegetation will promote filtration of pollutants, infiltration of surface flows, and uptake of any remaining nutrients. The rock-armored flow path/bio-swale shall direct the runoff into the slash pile located on the vegetated slope to the west of the southern cultivation area. Upon implementation of all mitigation measures aforementioned, all roads and other defined corridors will have adequate measures in place to prevent or minimize erosion along the flow paths and at their respective outlets.

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

Physical reconnaissance of the property revealed no unstable areas per 14CCR 895.1 in the California Forest Practice Rules handbook.

- 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 not hydrologically connected¹, as feasible, from surface waters, including wetlands, ephemeral, intermittent and perennial streams.

Upon implementation of the mitigation measures aforementioned, all cleared/developed areas with the potential for sediment erosion and transport are expected to be maintained so that they are not hydrologically connected to surface waters.

- 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.

Upon implementation of the mitigation measures aforementioned, all ditch relief drains, rolling dip outlets, road pads, and terraced surfaces are expected to be maintained so as to promote infiltration/dispersal of outflows, and have no evidence of soil transport to receiving waters.

¹ Connected roads are road segments that deliver road surface runoff, via the ditch or road surface, to a stream crossing or to a connected drain that occurs within the high delivery potential portion of the active road network. A connected drain is defined as any cross-drain culvert, water bar, rolling dip, or ditch-out that appears to deliver runoff to a defined channel. A drain is considered connected if there is evidence of surface flow connection from the road to a defined channel or if the outlet has eroded a channel that extends from the road to a defined channel. (http://www.forestsandfish.com/documents/Road_Mgmt_Survey.pdf)

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

Not applicable. There are currently no stockpiled construction materials on the property.

2. Stream Crossing Maintenance (Compliance: Y ☐ / N ☒)

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

There are eight stream crossings located on the property, four of which are not adequately sized to pass the expected 100-year peak streamflow. Timberland Resource Consultants is preparing a Lake and Streambed Alteration Notification on behalf of the Discharger, and no work will begin prior to approval by CDFW, and approval of Appendix D.

Stream Crossing #1 (SC 1) consists of a 12" diameter CPP (Corrugated Plastic Pipe) on a Class III watercourse, which is currently undersized to pass the expected 100-year peak streamflow. The Discharger shall replace this culvert with a minimum 36" diameter culvert per the attached specifications.

Stream Crossing #2 (SC 2) consists of a dirt ford on a Class II watercourse. This crossing is one of several on the ATV trail network that is going to be abandoned. The Discharger shall permanently abandon this crossing and remediate the disturbed area per the attached specifications.

Stream Crossing #3 (SC 3) consists of an 18" diameter CPP on a Class II watercourse, which is currently undersized to pass the expected 100-year peak streamflow. This crossing is on an ATV trail that is going to be abandoned to minimize potential impacts to water quality. The Discharger shall permanently abandon the crossing and remediate the disturbed area per the attached specifications.

Stream Crossing #4 (SC 4) consists of a culvert of unknown size on a Class II watercourse, which has failed and overtopped. The Discharger shall permanently abandon the crossing and remediate the disturbed area per the attached specifications.

Stream Crossing #5 (SC 5) consists of a dirt ford on a Class III watercourse. This crossing is one of several on the ATV trail network that is going to be abandoned. The Discharger shall permanently abandon this crossing and remediate the disturbed area per the attached specifications.

Stream Crossing #6 (SC 6) consists of an 18" diameter CPP on a Class III watercourse. It is recommended that the Discharger utilize the pond's armored embankment at SC 7 as the crossing for this location if it is ever needed. The Discharger shall permanently abandon this crossing and remediate the disturbed area per the attached specifications.

Stream Crossing #7 (SC 7) consists of an 8" diameter culvert that functions as the overflow outlet for the on-stream pond. The culvert is currently undersized to pass the 100-year peak streamflow. The Discharger shall replace this culvert with a minimum 18" diameter culvert per the attached specifications. The outlet of the culvert shall be rock armored to minimize erosion potential.

Stream Crossing #8 (SC 8) consists of a rocked ford on a Class III watercourse. This crossing is adequately sized to pass the expected 100-year peak streamflow.

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

Upon implementation of all mitigation measures mentioned in Section A.2.a, all culverts and stream crossings will be designed and maintained to address debris associated with the expected 100-year peak streamflow.

This document utilizes the Rationale Method to determine the 100-year flood flow utilizing methods recommended in *"Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood, and Sediment"*. 2004 Peter Cafferata, Thomas Spittler, Michael Wopat, Greg Bundros, and Sam Flanagan. This report recommends that the rational method be limited to watersheds less than 100 acres. The 100-year return-period precipitation data is from: http://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca

For determining culvert size, the Manning equation spreadsheet was used with a Hydraulic Radius = More than Half Full Flow. To account for a 0.67 HW/D ratio (ensure the culvert will accommodate the 100 year flow and debris load), the equation used 67% of pipe diameter as "depth of flow". Slope variable was estimated in the field (conservatively) and the n-value was either 0.012 for smooth-walled pipes or 0.025 for corrugated pipes. The assumption for new pipe installations are smooth-walled pipes and culverts set to grade.

- 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.

Field reconnaissance revealed that all stream crossings allow passage of aquatic organisms. There are no stream crossings on fish bearing streams located on the property.

- 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.

At Map Point #4 (MP 4), water from the above road's ditch relief culvert is flowing around the western boundary of the pond before discharging into the pond's spillway at Stream Crossing #6 (SC 6) and causing erosion of the bank. The Discharger shall construct an inlet channel that directs the flows from the above ditch relief drain into the inlet of the pond.

- e. Culverts shall align with the stream grade and natural stream channel at the inlet and outlet where feasible.²

Upon implementation of all mitigation measures aforementioned, the only stream crossings on the property will be SC 1, SC 7, and SC 8. The culverts on SC 1 and SC 7 align with the stream grade and natural stream channel at the inlet and outlet. When the culverts are replaced at SC 1 and SC 7, the Discharger shall ensure that the new culverts align with the stream grade and natural stream channel at the inlet and the outlet. SC 8 is a rocked ford on a Class III watercourse, which aligns with the stream grade and natural stream channel at the inlet and outlet.

- 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.³

Field reconnaissance revealed that all stream crossings appear to be maintained so as to prevent stream diversion in the event that the culvert or crossing becomes plugged. All stream crossings are located within topographic depressions, thus there is a very low risk for stream diversion in the event of a failed or plugged culvert or crossing.

² At a minimum, the culvert shall be aligned at the inlet. If infeasible to align the culvert outlet with the stream grade or channel, outlet armoring or equivalently effective means may be applied.

³ If infeasible to install a critical dip, an alternative solution may be chosen.

3. Riparian and Wetland Protection and Management (Compliance: Y ☐ / N ☒)

- 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 I or II watercourse or within 50 feet of any Class III watercourse or wetlands. The Regional Water Board or its or its Executive Officer may apply additional or alternative⁴ conditions on enrollment, including site-specific riparian buffers and other BMPs beyond those identified in water resource protection plans to ensure water quality protection.

The northern cultivation area is adjacent to a stream that transitions from a Class III watercourse to a Class II watercourse. Timberland Resource Consultants and their Wildlife Biologist assessed the stream during February of 2017. At the time of assessment, no aquatic vertebrates were observed anywhere in the stream. Utilizing habitat indicators, the location where the stream appeared to transition from a Class III to a Class II was determined. To determine the stream classification with more certainty, an assessment will have to be performed again in late summer.

The northern cultivation area is located 47 feet away from the Class III section of the watercourse. The northern cultivation area is also located approximately 98 feet away from where the stream was determined to transition to a Class II watercourse. The southern cultivation area is located approximately 95 feet from the adjacent Class II watercourse.

Both cultivation areas encroach a few feet within the riparian buffer zone of the adjacent Class III and Class II watercourse. Aside from the few feet of encroachment, there is a small rocked road and a seasonal ATV trail that is also located within the riparian buffer zone. The small rocked road is well maintained and showing no signs of erosion. The Discharger shall maintain this road with a high standard, considering that it is located adjacent to the cultivation areas and within the riparian buffer zone. The ATV trail is going to be abandoned and revegetated as prescribed in A.1.a., which will reestablish a contiguous riparian buffer zone. The Discharger has installed straw waddles to filter pollutants from the surface runoff leaving the northern cultivation area. As prescribed in A.1.b, the Discharger will be installing a bio-swale to filter any pollutants in the runoff leaving the northern cultivation area. The cultivation area is very well maintained and no cultivation-related pollutants were observed to have migrated outside of the greenhouses. The mitigation measures prescribed will increase the effectiveness of the riparian buffer zone, and are expected to be equally protective of water quality to compensate for the several feet of encroachment.

⁴ Alternative site-specific riparian buffers that are equally protective of water quality may be necessary to accommodate existing permanent structures or other types of structures that cannot be relocated.

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

As mentioned in A.3.a, there is a small rocked road and a seasonal ATV trail that is located within the riparian buffer zone. The cultivation areas also encroach between 2 to 5 feet within the riparian buffer zone. Aside from the several feet of the cultivation area, the rocked road, and the ATV trail, all buffers are maintained at natural slope with native vegetation.

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

All buffers appear to be of sufficient width to filter wastes from runoff and to maintain the essential functions of the watercourses.

4. Spoils Management (Compliance: Y ☐ / N ☒)

- a. Spoils⁵ shall not be stored or placed in or where they can enter any surface water.

There are several locations on the property where soil spoils are being stored. The soil pile located next to the upper greenhouses is stored in a location where soil can enter the adjacent Class II watercourse. The Discharger shall relocate all of the soil from that location to a flat area outside of all watercourse buffer zones.

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

There are several locations on the property where soil spoils are being stored. To prevent sediment delivery to surface waters, the Discharger shall spread out all waste soil and contour it to the natural shape of the land. The Discharger shall then seed the area with native vegetation and then apply straw mulch. All soil piles that are being stored for future use shall be covered with a well-secured tarp prior to the winter period or any significant rainfall event.

- 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.

No spoils generated through development or maintenance of roads, driveways, earthen fill pads, or cleared or filled areas were observed anywhere on the property.

⁵ Spoils are waste earthen or organic materials generated through grading or excavation, or waste plant growth media or soil amendments. Spoils include but are not limited to soils, slash, bark, sawdust, potting soils, rock, and fertilizers.

5. Water Storage and Use (Compliance: Y ☒ / N ☐)

- a. Size and scope of an operation shall be such that the amount of water used shall not adversely impact water quality and/or beneficial uses, including and in consideration with other water use by operations, instream flow requirements and/or needs in the watershed, defined at the scale of a HUC-12⁶ watershed or at a smaller hydrologic watershed as determined necessary by the Regional Water Board Executive Officer.

Cultivation on the property consists of two cultivation areas. The northern cultivation area consists of two 24 foot by 100 foot greenhouses on an approximate 16% slope. The southern cultivation area includes one 18 foot by 55 foot greenhouse on an approximately 18% slope. Total cultivation area on the property equates to approximately 5,790 square feet. The Discharger states that the average water use for cultivation purposes is approximately 1,125 gallons per week. Water for cultivation purposes is sourced from a well that has a solar powered pump, yields approximately 1.5 gallons per minute, and has an approximate depth of 145 feet. Water for domestic purposes is sourced from a 3' diameter cistern that has an approximate depth of 25 feet and produces approximately 1.5 gallons per minute.

- 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.

The Discharger irrigates during the early morning of each day, which prevents evaporation from the surface of the soil. The Discharger also maintains a relatively small total cultivation area, thus reducing the amount of water needed for irrigation.

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

The Discharger does not divert surface water at any time.

- d. Water is applied using no more than agronomic rates.⁷

The Discharger states that water is applied using no more than agronomic rates. Timberland Resource Consultants observed no conditions to suggest otherwise.

⁶ See definition and link to maps at: <http://water.usgs.gov/GIS/huc.html>

⁷ "Agronomic rates" is defined as the rates of fertilizer and irrigation water that a plant needs to enhance soil productivity and provide the crop or forage growth with needed nutrients for optimum health and growth, without having any excess water or nutrient percolate beyond the root zone.

- 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.

The Discharger does not divert surface water at any time. It is recommended that the Discharger install a water meter to ensure accurate water use monitoring is occurring.

- 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.

All water storage tanks are installed on flat stable surfaces and appear to be maintained so as to prevent release into waters of the state.

6. Irrigation Runoff (Compliance: Y ☒ / N ☐)

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.

There is no evidence of irrigation runoff having occurred at any time. The Discharger states that water and fertilizers are applied at or below standard agronomic rates, thus minimizing pollutant entrainment and preventing any irrigation runoff from occurring.

7. Fertilizers and Soil Amendments (Compliance: Y☑/ N☐)

- 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.

Fertilizers and soil amendments are adequately stored in lidded containers that are located in the barn. The current storage location is sufficient to prevent any pollutants from being transported to surface waters or leached into ground water.

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

The Discharger states that fertilizers and soil amendments are applied and used per packaging instructions and/or at proper agronomic rates. Timberland Resource Consultants observed no conditions to suggest otherwise.

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

Both cultivation areas appear to be maintained in a manner so as to prevent nutrients from leaving the site during the growing season and post-harvest. No evidence of irrigation runoff was observed.

8. Pesticides/Herbicides (Compliance: Y☑/ N☐)

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 labeling 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.

Pesticides are stored with the fertilizers and soil amendments in the barn. The Discharger ensures that all pesticides and herbicides are used per the specifications on the product's label, and that they are placed, used, and stored in a manner that ensures that they will not enter or be released into surface or ground waters.

9. Petroleum products and other chemicals (Compliance: Y ☐ / N ☒)

- 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.

There is a kerosene tank located on the east side of the barn, which appears to be stored so as to prevent spillage. The storage tank appears to be of suitable material and construction to be compatible with the substance stored and the conditions of storage.

- 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.

There is a kerosene tank located on the east side of the barn that does not have a means for secondary containment. The Discharger shall provide a means for secondary containment for the entire capacity of the tank with sufficient freeboard to contain precipitation.

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

Not applicable. There are no diked areas on the property with the purpose of containing discharged chemicals.

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

Not applicable. The Discharger does not have any fuel storage tanks that require implementation of spill prevention, control, and countermeasures (SPCC), or to have appropriate cleanup materials available onsite.

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

Not applicable. There are no underground storage tanks 110 gallons or larger on the property.

10. Cultivation-related wastes (Compliance: Y ☐ / N ☒)

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 stored⁸ 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 ground waters.

At Map Point #2 (MP 2), water diversion equipment that is no longer being used is being inadequately stored within the riparian buffer zone of the Class II watercourse. The Discharger shall remove all the old equipment including the barrels, water lines, and all other components present. Cultivation-related wastes were also disposed of at Map Point #3 (MP 3), including plant wastes and some pieces of plastic mesh netting. The Discharger shall remove all the cultivation-related wastes from this location and dispose of them at an appropriate waste disposal location. Plant wastes may be composted as long as it is not located within any watercourse buffer zones. There are also several locations within watercourse channels and throughout the property where there are remnant man-made debris. The Discharger shall remove all foreign debris from the watercourse channels, and any wastes from the property, and dispose of them at an appropriate waste disposal location. Aside from the wastes mentioned, the Discharger utilizes a compost pile for all plant wastes. All other cultivation related wastes are adequately contained before being taken to an appropriate waste disposal location.

11. Refuse and human waste (Compliance: Y ☒ / N ☐)

- 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.

A septic system is utilized for the disposal of domestic sewage. The Discharger states that the septic system was installed in compliance with applicable policies and regulations. The Discharger shall ensure that the septic system meets applicable County health standards, local agency management plans and ordinances, and/or the Regional Water Board's Onsite Wastewater Treatment System policy, and not represent a threat to surface water or groundwater.

⁸ Plant waste may also be composted, subject to the same restrictions cited above for cultivation-related waste storage.

- 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.

All refuse and garbage is adequately stored in lidded trash bins that are located on the east side of the barn. The storage location is adequate to prevent discharge to receiving waters and to prevent any leachate or contact water from entering or percolating to receiving waters.

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

The Discharger states that all garbage and refuse is disposed of at an appropriate waste disposal location.

12. Remediation/Cleanup/Restoration

Remediation/cleanup/restoration activities may include, but are not limited to, removal of fill from watercourses, stream restoration, riparian vegetation planting and maintenance, soil stabilization, erosion control, upgrading stream crossings, road outsloping and rolling dip installation where safe and suitable, installing ditch relief culverts and overside drains, removing berms, stabilizing unstable areas, reshaping cutbanks, and rocking native-surfaced roads. Restoration and cleanup conditions and provisions generally apply to Tier 3 sites, however owners/operators of Tier 1 or 2 sites may identify or propose water resource improvement or enhancement projects such as stream restoration or riparian planting with native vegetation and, for such projects, these conditions apply similarly. Appendix B accompanying this Order includes environmental protection and mitigation measures that apply to cleanup activities such as: temporal limitations on construction; limitations on earthmoving and construction equipment; guidelines for removal of plants and revegetation; conditions for erosion control, limitations on work in streams, riparian and wetland areas; and other measures.

Mitigation measures are listed below in the Mitigation Report and also noted above in Standard Conditions.

Identified Sites Requiring Remediation (See Standard Conditions Assessment)

Unique Map Point(s)	Map Point Description	Associated Standard Condition	Temporary BMP	Permanent BMP	Priority for Action	Time Schedule for completion of Permanent BMP	Completion Date
ATV trail network on southern section of property.	Several trails located within watercourse buffer zones as well as two stream crossings are experiencing erosion and subsequent sediment discharge.	A.1.a A.1.b A.1.d A.1.e A.2	No longer use the ATV trail network that is within the watercourse buffer zones.	Permanently abandon the ATV trails that are within the watercourse buffer zones. Seed and straw mulch all bare soil surfaces, anchoring down the straw as needed.	2	10-15-2017	
MP 1	Surface runoff from the northern cultivation area is accumulating and causing minor surface erosion.	A.1.b	N/A	Rock armor the flowpath and allow vegetation to become established within it so that it can function as a bioswale. The outlet of the flow path should be directed into the slash pile located to the west of the southern cultivation area.	3	10-15-2018	
SC 1	Existing 12" diameter culvert that is not adequately sized.	A.2.a A.2.b	N/A	This culvert will be replaced with a minimum 36" diameter culvert per the attached specifications. A 1600 Notification will be submitted to CDFW prior to installation.	3	10-15-2018	
SC 7	Existing 8" diameter culvert/pond outlet that is not adequately sized.	A.2.a A.2.b	N/A	This culvert will be replaced with a minimum 18" diameter culvert per the attached specifications. A 1600 Notification will be submitted to CDFW prior to installation.	3	10-15-2018	
SC 2 -SC 5	These crossings are a part of an ATV trail network that is going to be abandoned.	A.2.a A.2.b A.2.d A.2.e	N/A	These crossings will be permanently abandoned per the attached specifications. A 1600 Notification will be submitted to CDFW prior to abandonment.	3	10-15-2018	
SC 6	This is a redundant crossing composed of an 18" diameter CPP on a class III watercourse. It is recommended that the Discharger utilize the pond's embankment as the crossing if it is ever needed.	A.2.d	N/A	This crossing will be permanently abandoned per the attached specifications. A 1600 Notification will be submitted to CDFW prior to abandonment.	3	10-15-2018	

Northern cultivation area	The greenhouse encroaches 3 feet within the Class III section of the watercourse and 2 feet within the Class II section of the watercourse.	A.3.a, A.3.b	N/A	The Discharger has installed straw wattles to filter pollutants from the surface runoff leaving the northern cultivation area. The Discharger will be also installing a bio-swale to filter runoff from the northern cultivation area. The Discharger will also be abandoning and revegetating the ATV trail adjacent to the southern cultivation area. The Discharger will also continue to maintain the rocked road and the cultivation areas with a high standard to ensure protection of water quality.	3	10-15-2018	
Southern cultivation area	The greenhouse encroaches 5 feet within the 100 foot-Class II watercourse buffer zone.	A.3.a, A.3.b	N/A	The Discharger has installed straw wattles to filter pollutants from the surface runoff leaving the northern cultivation area. The Discharger will be also installing a bio-swale to filter runoff from the northern cultivation area. The Discharger will also be abandoning and revegetating the ATV trail adjacent to the southern cultivation area. The Discharger will also continue to maintain the rocked road and the cultivation areas with a high standard to ensure protection of water quality.	3	10-15-2018	
Soil pile next to MP 1	The soil pile is located where it can enter surface water.	A.4.a A.4.b	N/A	This soil will be relocated to a flat area outside of all watercourse buffer zones. The soil should be covered with a tarp during the winter period if it is to be reused. If it is waste soil, it should be taken to an appropriate waste disposal location or contoured to the land and seeded and straw mulched.	2	10-15-2017	

All soil piles	Soil piles are being stored in a manner that has the potential for migration and subsequent sediment delivery.	A.4.b	N/A	All waste soils will either be taken to an appropriate waste disposal location or be contoured to the natural shape of the land, followed by seeding and then straw mulching.	3	10-15-2018	
Kerosene tank on east side of barn	The kerosene tank does not have a means for secondary containment.	A.9.b	N/A	A means for secondary containment will be provided for the entire capacity of the tank with sufficient freeboard to contain precipitation.	3	10-15-2019	
MP 2	Water diversion equipment that is no longer being used is improperly stored.	A.10	N/A	The cultivation related wastes will be removed from this location and taken to an appropriate waste disposal location.	2	10-15-2017	
MP 3	These are several locations where small amounts of cultivation related wastes were disposed of including plant matter and plastic mesh netting.	A.10	N/A	The cultivation related wastes will be removed from this location and taken to an appropriate waste disposal location. Plant matter may be composted outside of all watercourse buffer zones.	2	10-15-2017	
Entire property	There are several locations throughout the property and in some watercourse channels where remnant man-made wastes remain.	A.10	N/A	These remnant pieces of waste will be removed and taken to an appropriate waste disposal location.	3	10-15-2018	
Septic system	The septic system was installed to code by the Discharger, however it has not been inspected by qualified personnel to assess compliance with all applicable standards and regulations.	A.11.a	N/A	The septic system will be inspected by qualified personnel to assess compliance with all applicable standards and regulations.	4	Soonest time possible within 5 years	

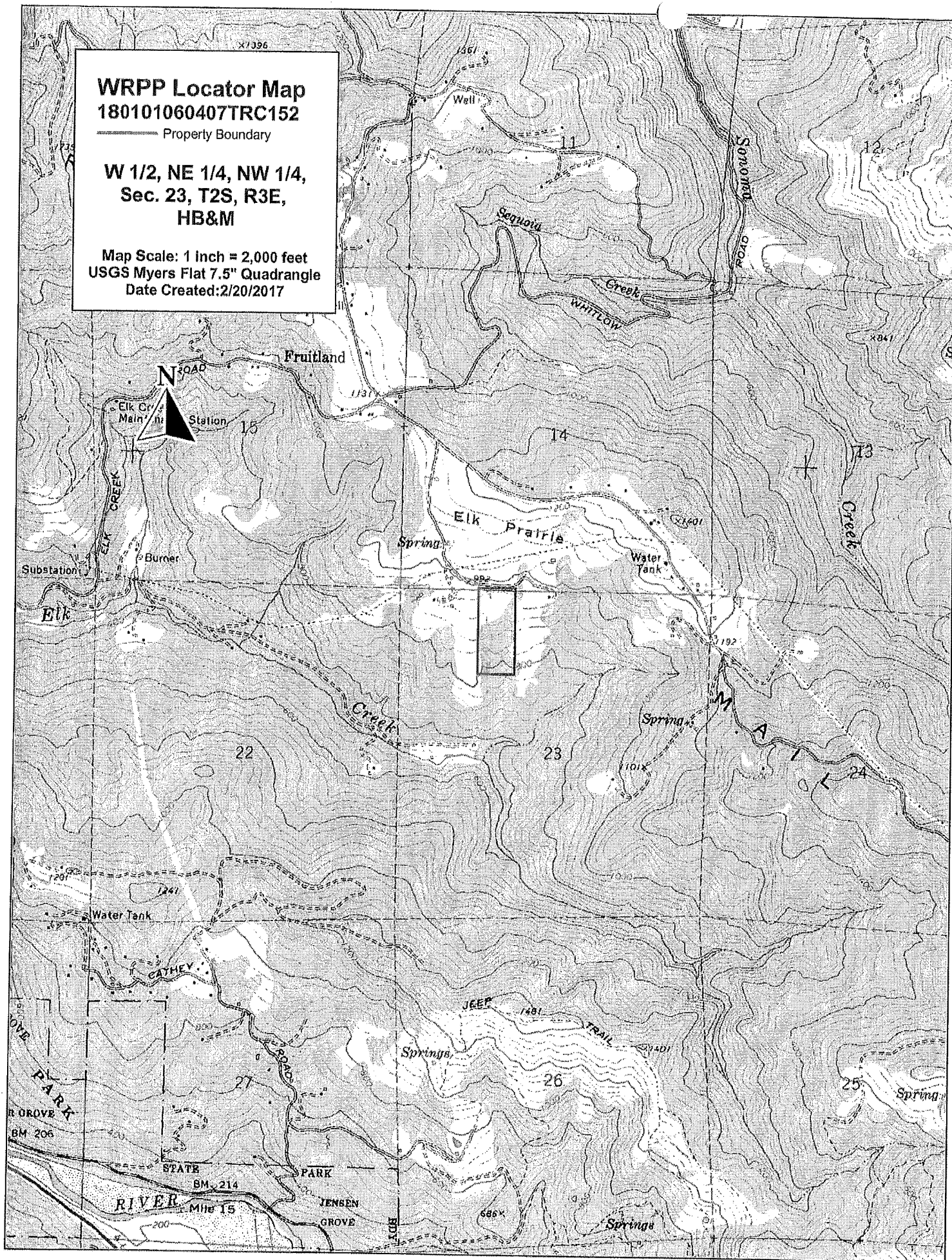
Treat Priority: Treatment Priority (1) indicates a very high priority with treatment being planned to occur immediately, (2) indicates a high priority site with treatment to occur prior to the start of the winter period (Nov. 15), (3) indicates a moderate priority with treatment being planned to occur within one year, or prior to the winter period (Nov. 15) of the 2nd season of operations, and (4) indicates a low priority with treatment being planned to occur in the shortest time possible, but no later than the expiration of this Order (five years).

WRPP Locator Map
180101060407TRC152









Property Boundary

**W 1/2, NE 1/4, NW 1/4,
Sec. 23, T2S, R3E,
HB&M**

Map Scale: 1 Inch = 2,000 feet
USGS Myers Flat 7.5" Quadrangle
Date Created: 2/20/2017



WRPP Site Map 180101060407TRC152









-  Property Boundary
-  Permanent Rocked Road
-  Seasonal Dirt Road
-  ATV trail
-  Greenhouse
-  Pond
-  Class III Watercourse
-  Class II Watercourse

-  Water Storage Tank
-  Stream Crossing
-  Well
-  Pump House
-  Soil Storage
-  Residence
-  Barn
-  Map Point

Map Scale: 1 inch = 150 feet
Humboldt County 2016 DOQ
Date Created: 2/2/2017

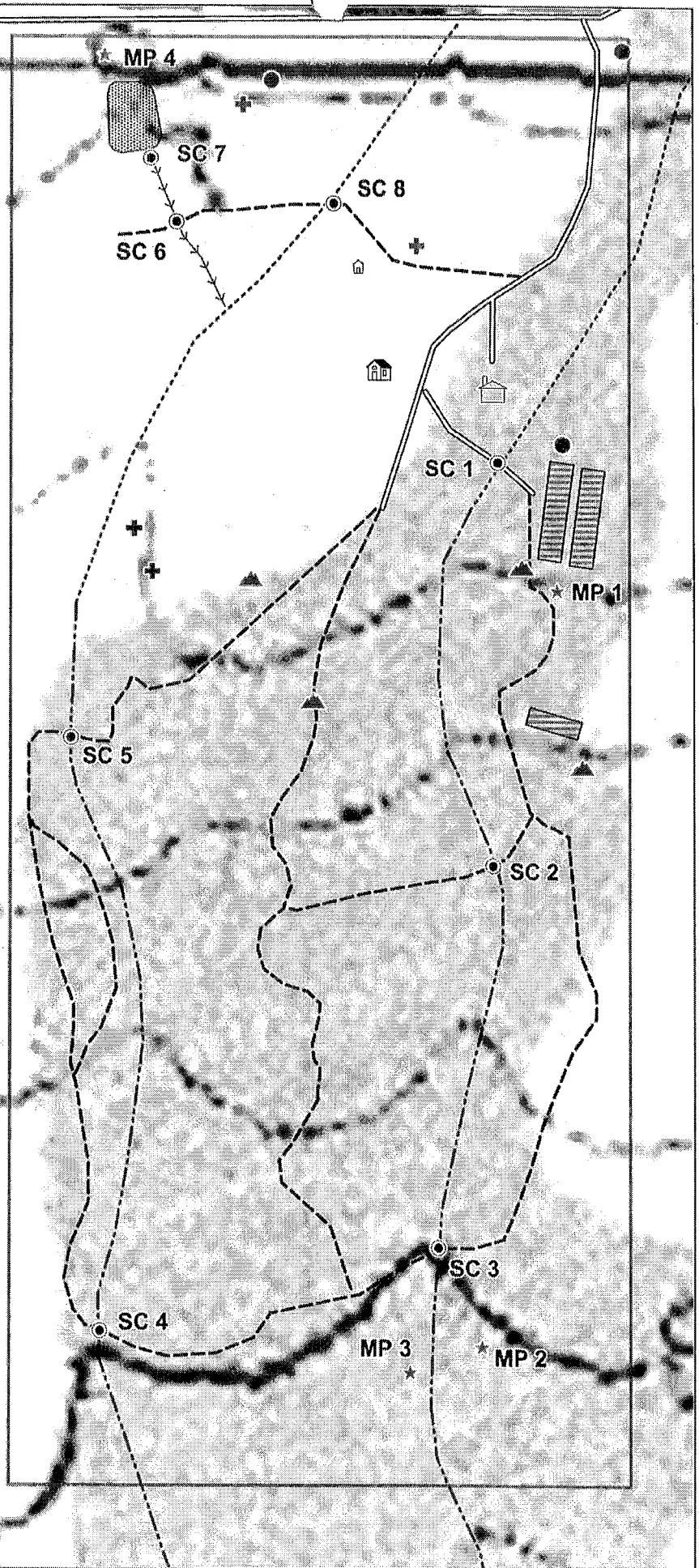


WRPP Site Map **180101060407TRC152**









-  Property Boundary
-  Permanent Rocked Road
-  Seasonal Dirt Road
-  ATV trail
-  Greenhouse
-  Pond
-  Class III Watercourse
-  Class II Watercourse








-  Water Storage Tank
-  Stream Crossing
-  Well
-  Pump House
-  Soil Storage
-  Residence
-  Barn
-  Map Point

Map Scale: 1 inch = 150 feet
 USGS Myers Flat 7.5" Quadrangle
 Date Created: 2/2/2017

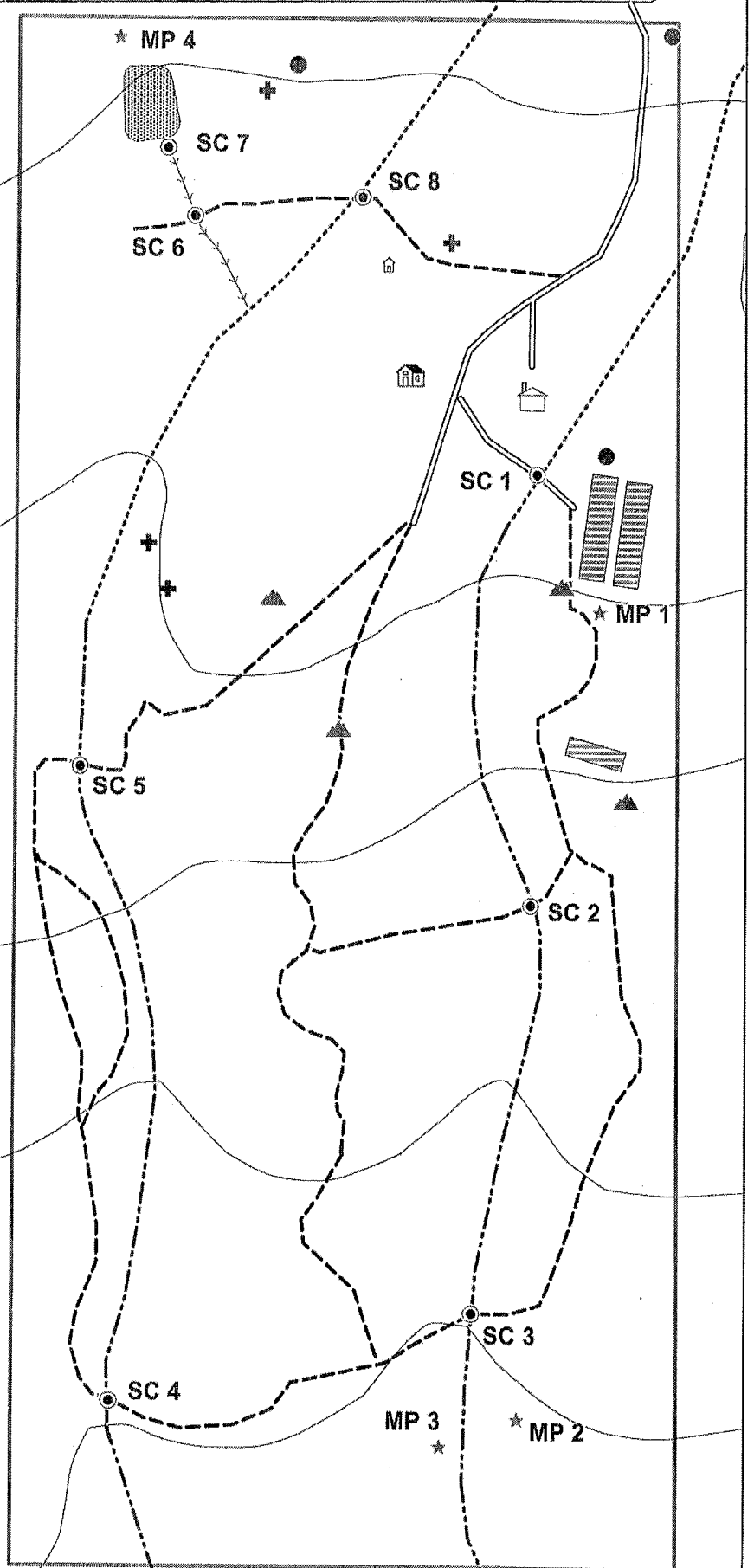


WRPP Site Map **180101060407TRC152**

-  Property Boundary
-  Permanent Rocked Road
-  Seasonal Dirt Road
-  ATV trail
-  Greenhouse
-  Pond
-  Class III Watercourse
-  Class II Watercourse

-  Water Storage Tank
-  Stream Crossing
-  Well
-  Pump House
-  Soil Storage
-  Residence
-  Barn
-  Map Point

Map Scale: 1 inch = 150 feet
 USGS Myers Flat 7.5" Quadrangle
 Date Created: 2/2/2017



Photographs

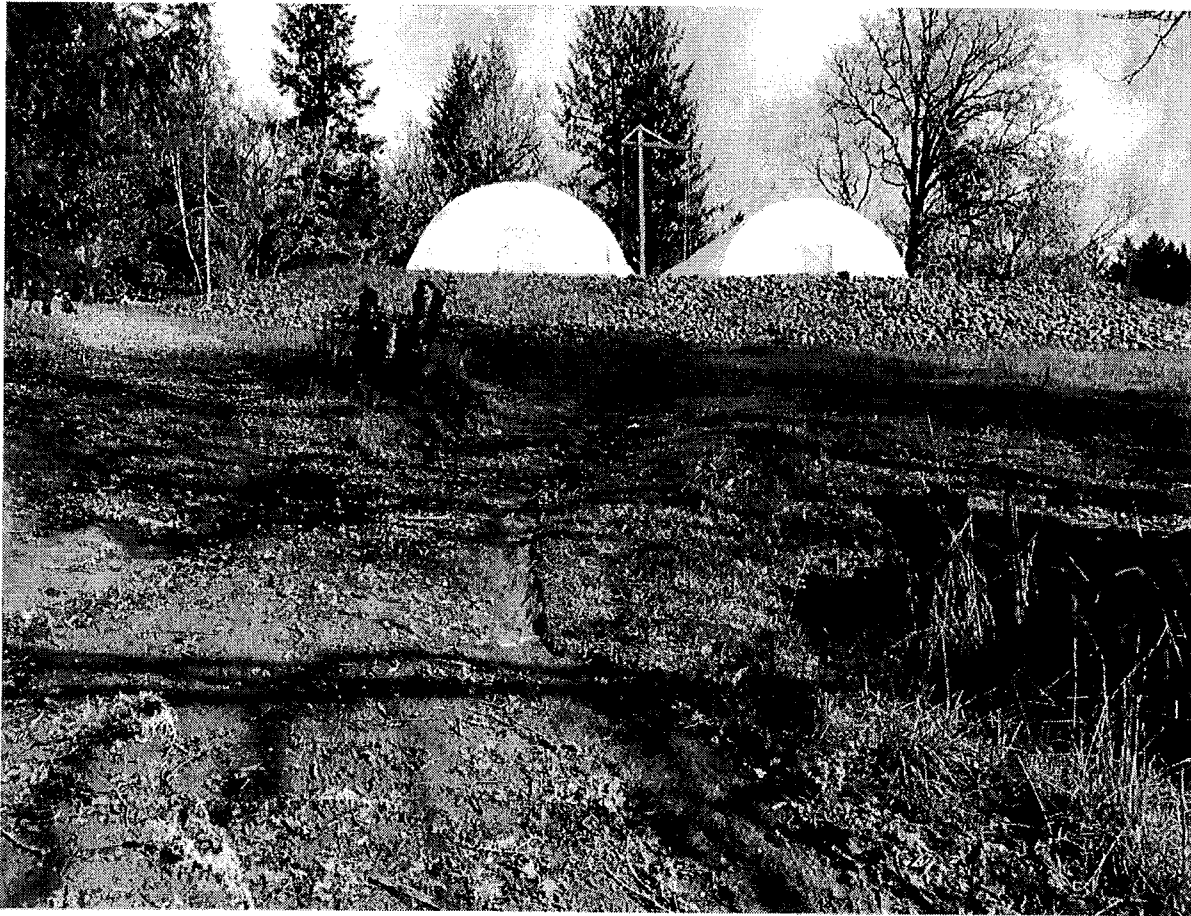


Photo #1: This is a photograph of the flow path originating from the northern cultivation area seen at the top of this photo. The flow path is going to be rock armored and have vegetation allowed to become established. Photo date: Feb 23, 2017.

Photographs



Photo #2: This is a photograph of stream crossing at SC 1. This culvert is going to be upgraded to a minimum 36" diameter culvert. Photo date: Feb. 23, 2017.

Photographs



Photo #3: This is a photo of the stream crossing at SC 6. This crossing is going to be permanently abandoned. The erosion seen in this image is being caused by surface flows coming from the ditch relief culvert from the above road. The water will be directed to the inlet of the pond and will no longer reach this location. Photo date: Feb 23, 2017.

Photographs



Photo #4: This is a photo of the remnant cultivation related wastes located at Map Point #2. These wastes will be removed and properly disposed of. Photo date: Feb. 23, 2017.

**STATEMENT OF CONTINGENT AND LIMITING CONDITIONS
CONCERNING THE PREPARATION AND USE OF WATER RESOURCE
PROTECTION PLAN**

Prepared by Timberland Resource Consultants

1. This Water Resource Protection Plan has been prepared for the property within APN 211-374-013 in Humboldt County, at the request of the Client.
2. Timberland Resource Consultants does not assume any liability for the use or misuse of the information in this Water Resource Protection Plan.
3. The information is based upon conditions apparent to Timberland Resource Consultants at the time the inspection was conducted, and as disclosed to Timberland Resource Consultants by the landowner and/or Discharger. Changes due to land use activities or environmental factors occurring after this inspection, have not been considered in this Water Resource Protection Plan.
4. Maps, photos, and any other graphical information presented in this report are for illustrative purposes. Their scales are approximate, and they are not to be used for locating and establishing boundary lines.
5. The conditions presented in this Water Resource Protection Plan may differ from those made by others or from changes on the property occurring after the inspection was conducted. Timberland Resource Consultants does not guarantee this work against such differences.
6. Timberland Resource Consultants did not conduct an investigation on a legal survey of the property.
7. Persons using this Water Resource Protection Plan are advised to contact Timberland Resource Consultants prior to such use.
8. Timberland Resource Consultants will not discuss this report or reproduce it for anyone other than the Client named in this report without authorization from the Client.



Chad Yoakley

Timberland Resource Consultants

Attachments

BMP: General BMPs

- If operations require moving of equipment across a flowing stream, such operations shall be conducted without causing a prolonged visible increase in stream turbidity. For repeated crossings, the operator shall install a bridge, culvert, or rock-lined crossing.
- During construction in flowing water, which can transport sediment downstream, the flow shall be diverted around the work area by pipe, pumping, temporary diversion channel or other suitable means. When any dam or artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall at all times be allowed to pass downstream to maintain fish life below the dam. Equipment may be operated in the channel of flowing live streams only as necessary to construct the described construction.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. The disturbed portion of any stream channel shall be restored to as near their original condition as possible. Restoration shall include the mulching of stripped or exposed dirt areas at crossing sites prior to the end of the work period.
- Structures and associated materials not designed to withstand high seasonal flow shall be removed to areas above the high water mark before such flows occur.
- No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete washing, oil or petroleum products, or other organic or earthen material from any logging, construction, or associated activity of whatever nature shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream.

BMP: Permanent Culvert Crossing

- New culvert installations shall be sized to accommodate a 100-year storm.
- If the new culvert is replacing a poorly installed old culvert the crossing may need to be abandoned to the following standard:
 - When fills are removed they shall be excavated to form a channel that is as close as feasible to natural watercourse grade and orientation, and that is wider than the natural channel.
 - Excavated banks shall be laid back to a 2:1 (50%) or natural slope.
- New culverts shall be placed at stream gradient, or have downspouts, or have energy dissipaters at outfall.
 - Align culverts with the natural stream channel orientation to ensure proper function, prevent bank erosion and minimize debris plugging. See Figure 97 below.
 - Place culverts at the base of the fill and at the grade of the original streambed or install a downspout past the base of the fill. Downspouts should only be installed if there are no other options.
 - Culverts should be set slightly below the original stream grade so that the water drops several inches as it enters the pipe.
 - Culvert beds should be composed of rock-free soil or gravel, evenly distributed under the length of the pipe.
 - Compact the base and sidewall material before placing the pipe in its bed.
 - Lay the pipe on a well-compacted base. Poor basal compaction will cause settling or deflection in the pipe and can result in separation at a coupling or rupture in the pipe wall.
 - Backfill material should be free of rocks, limbs or other debris that could dent or puncture the pipe or allow water to seep around the pipe.
 - Cover one end of the culvert pipe, then the other end. Once the ends are secure, cover the center.
 - Tamp and compact backfill material throughout the entire process, using water as necessary for compaction.
 - Backfill compacting will be done in 0.5 – 1.0 foot lifts until 1/3 of the diameter of the culvert has been covered.
 - Push layers of fill over the crossing to achieve the final design road grade, at a minimum of one-third to one-half the culvert diameter.
- Critical dips shall be installed on culvert crossings to eliminate diversion potential. Refer to Figure 86 below.
- Road approaches to crossings shall be treated out to the first drainage structure (i.e. waterbar) or hydrologic divide to prevent transport of sediment.
- Road surfaces and ditches shall be disconnected from streams and stream crossings to the greatest extent feasible. Ditches and road surfaces that can not be feasible disconnected from streams or stream crossings shall be treated to reduce sediment transport to streams.
- If downspouts are used they shall be secured to the culvert outlet and shall be secure on fill slopes.
- Culverts shall be long enough so that road fill does not extend or slough past the culvert ends.
- Inlet of culverts and associate fill shall be protected with appropriate measures that extend at least as high as the top of the culvert.
- Outlet of culverts shall be armored with rock if road fill sloughing into channel can occur.
- Armor inlets and outlets with rock, or mulch and seed with grass as needed (not all stream crossings need to be armored).
- Where debris loads could endanger the crossing a debris catchment structure shall be constructed upstream of the culvert inlet.
- Bank and channel armoring may occur when appropriate to provide channel and bank stabilization.

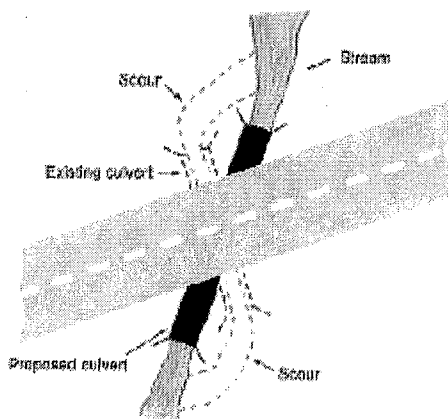


FIGURE 97. Culvert alignment should be in relation to the stream and not the road. It is important that the stream enters and leaves the culvert in a relatively straight horizontal alignment so streamflow does not have to turn to enter the inlet or discharge into a bank as it exits. This figure shows a redesigned culvert installation that replaces the bending alignment that previously existed. Channel turns at the inlet increase plugging potential because wood going through the turn will not align with the inlet. Similarly, channel turns at the inlet and outlet are often accompanied by scour against the channel banks (Wisconsin Transportation Information Center, 2004).

BMP: Permanent Culvert Crossing (Cont.)

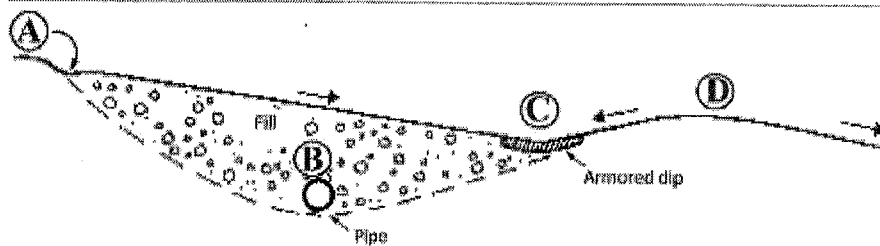
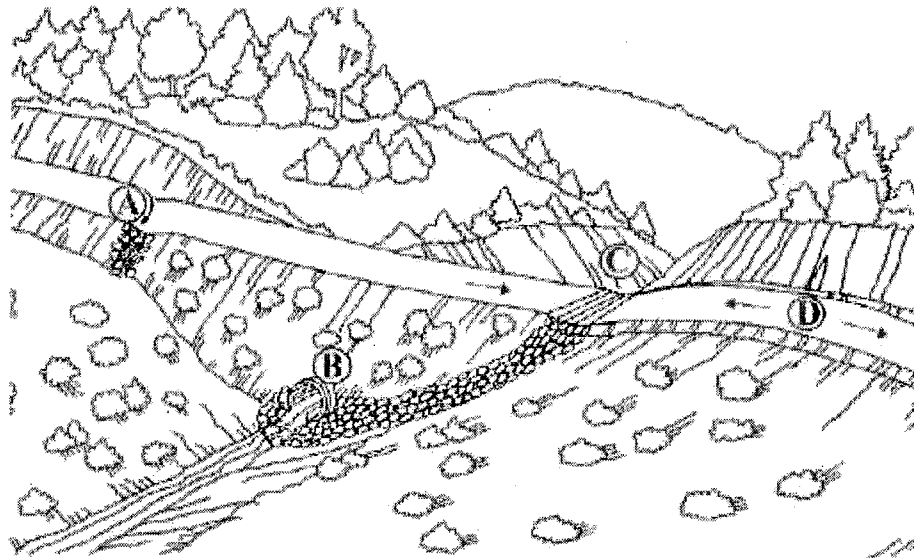


FIGURE 84. Critical dips or dipped crossing fills should be centered near a stream crossing's down-road hinge line, not over the centerline of the crossing where overtopping could cause washout or severe erosion of the fill. If the stream crossing culvert (B) plugs, water will pond behind the fill until reaching the critical dip or low point in the crossing (C) and flowing back down into the natural stream channel. The down-road ditch must be plugged to prevent streamflow from diverting down the ditch line. For extra protection in this sketch, riprap armor has been placed at the critical dip outfall and extending downslope to the stream channel. This is only required or suggested on stream crossings where the culvert is highly likely to plug and the crossing fill overtopped. The dip at the hinge line is usually sufficient to limit erosional damage during an overtopping event. Road surface and ditch runoff is disconnected from the stream crossing by installing a rolling dip and ditch relief culvert just up-road from the crossing (A) (Keller and Sherar, 2003).

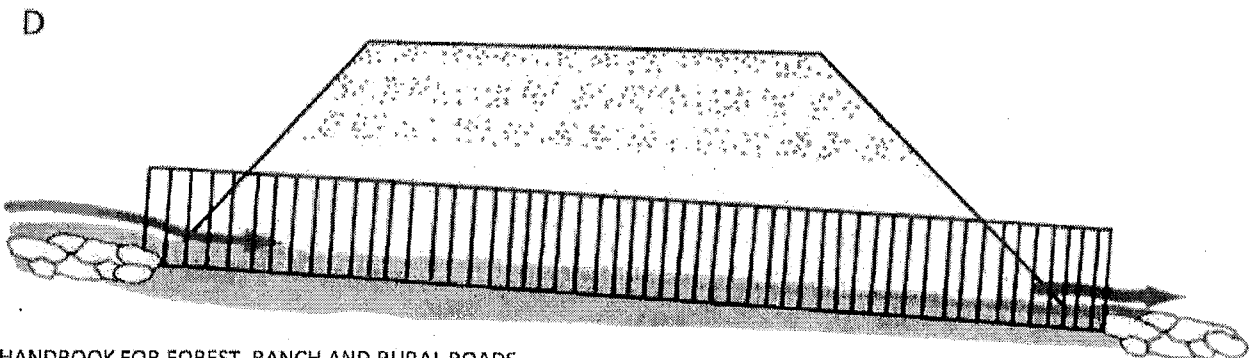
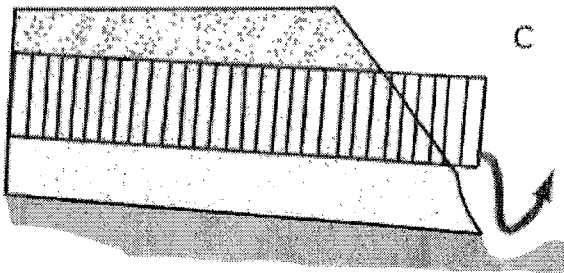
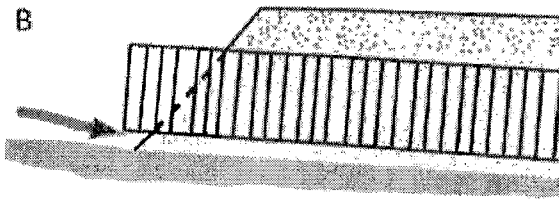
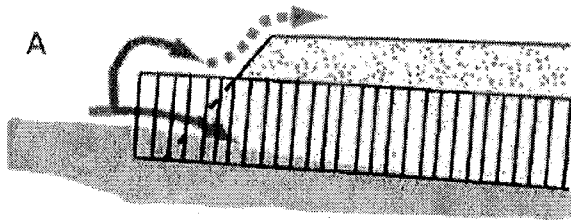
BMP: Permanent Culvert Crossing (Cont.)

FIGURE 155. Proper culvert installation involves correct culvert orientation, setting the pipe slightly below the bed of the original stream, and backfilling and compacting the fill as it is placed over the culvert. Installing the inlet too low in the stream (A) can lead to culvert plugging, yet if set too high (B) flow can undercut the inlet. If the culvert is placed too high in the fill (C), flow at the outfall will erode the fill. Placed correctly (D), the culvert is set slightly below the original stream grade and protected with armor at the inlet and outlet. Culverts installed in fish-bearing stream channels must be inset into the streambed sufficiently (>25% embedded) to have a natural gravel bottom throughout the culvert (Modified from: MDSL, 1991).

BMP: Inlet and Outlet Armoring

- Inlets of culverts and associate fills shall be protected with rock armoring that extends at least as high as the top of the culvert.
- Outlets of culverts shall be provided a rocked energy dissipater at the outfall of the culvert.
- Outlets of culverts and associate fills shall be protected with rock armoring that extends at least as high as the top of the culvert if road fill sloughing into channel can occur.
- Prior to inlet and outlet rocking, the inlet and outlets shall be prepared. Preparation will include removal of vegetation and stored materials from the inlet and outlet.
- Inlets may require construction of an inlet basin.
- Slopes at the outlet should be shaped to a 2:1 or natural slope prior to placing rock armor.
- Rock used at culvert inlets and outlets should be a matrix of various sized rocks and rip-rap that range from a 3" dia. to a 2' dia.
- The largest rocks should be places at the base of the culvert or fill. Incrementally smaller rocks shall be placed over the larger rocks at the armoring extend up the slope. Voids and spaces shall be back filled with smaller gravels and rocks.

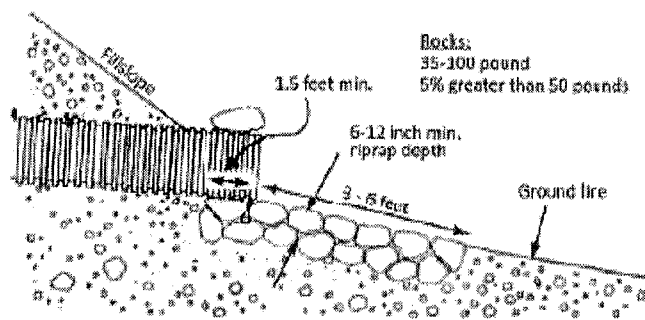


FIGURE 107A. Riprap armor at culvert outlet (Modified from: Keller et al., 2011).

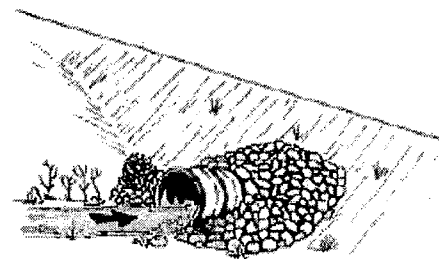


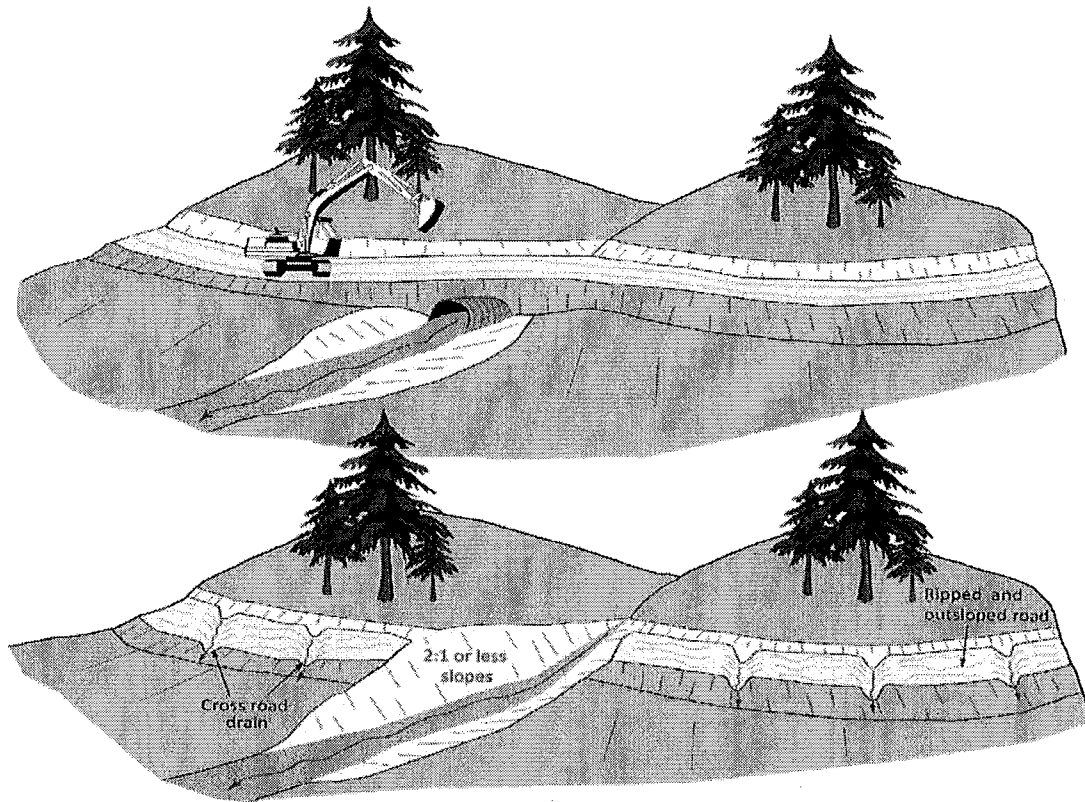
FIGURE 107B. Riprap armor at culvert inlet (Keller and Sherar, 2003).

HANDBOOK FOR FOREST, RANCH AND RURAL ROADS

BMP: Stream Bank Armoring (Riprap)

- Riprap should be installed on top of geotextile fabric or a clean mixture of coarse gravel and sand.
- The riprap should be keyed into the streambed and extend below the maximum expected scour depth with an adequately sized key base width at a thickness of a minimum of 2x the median (D50) rock diameter with the largest stone sizes placed at the base of the riprap structure.
- The armor should be set into the streambank so it does not significantly protrude into, or constrict, the natural channel, or otherwise reduce channel capacity.
- The riprap should extend along the length of unstable or over steepened bank and up the bank sufficiently to encompass the existing bank instability and/or design flood elevations.

Permanent Crossing Decommissioning Specifications



Permanent Crossing Decommissioning Specifications (Cont.)



On roads that are to be closed (decommissioned), all stream crossing culverts and fills should be removed. Stream crossing excavations are best performed using an excavator. The original channel should be excavated and exhumed down to the former streambed, with a channel width equal or greater than the natural channel above and below the crossing. Sideslopes should be laid back to a stable angle, typically a 2:1 (50%) gradient, or less. Spoils can be endhailed off-site or stored on the road bench adjacent the crossing, provided it is placed and stabilized where it will not erode or fail and deliver to a watercourse.

Permanent Crossing Decommissioning Specifications (Cont.)

- Excavating and removing all fill materials placed in the stream channel when the crossing was originally built.
 - Fill material should be excavated to recreate the original channel grade (slope) and orientation.
 - The excavated channel bed should be as wide, or slightly wider than, the original watercourse channel.
 - This can be better determined by observing the channel width of the watercourse up slope of crossing to be removed at a point in which the crossing or any other disturbance has not affected the natural channel slope and width.
 - If the channel sideslopes were disturbed, they should be graded (excavated) back to a stable angle (generally less than 50% (2:1)) to prevent slumping and soil movement.
 - The bare soils should then be mulched, seeded, and planted to minimize erosion until vegetation can protect the surface.
- The approaching, hydrologically connected road segments should be cross-road drained to prevent road runoff from discharging across the freshly excavated channel sideslopes.

United States Department of Agriculture



STRAW MULCHING

What is it?

The application of straw as a protective cover over seeded areas to reduce erosion and aid in revegetation or over bare soils that will be landscaped later to reduce erosion.

When is it used?

This method is used on slopes which have been seeded and have high potential for erosion. It requires some type of anchoring by matting, crimping or other methods to prevent blowing or washing away.

Straw mulch forms a loose layer when applied over a loose soil surface. To protect the mulch from wind drifting and being moved by water, it must be covered with a netting such as plastic or punched into the soil with a spade or roller, or by spraying it with a tacking agent. The mulch should cover the entire seed or bare area. The mulch should extend into existing vegetation or be stabilized on all sides to prevent wind or water damage which may start at the edges.

Methods and Materials:

On gentle to moderate slopes, straw mulch can be applied by hand broadcasting to a uniform depth of 2 - 3 inches. On steep slopes, the straw should be blown onto the slope to achieve the same degree of cover. When applied properly, approximately 20-40 percent of the original ground surface can be seen. The application rate per acre should be about 2 tons (or one 74 pound bale per 800 square feet). Straw should be clean rice, barley, or wheat straw.

Anchoring of straw mulch can be accomplished using the following methods:

Hand Punching:

A spade or shovel is used to punch straw into the slope until all areas have straw standing perpendicularly to the slope and embedded at least 4 inches into the slope. It should be punched about 12 inches apart.

Roller Punching:

A roller equipped with straight studs not less than 6 inches long, from 4 - 6 inches wide and approximately one inch thick is rolled over the slope.

Crimper Punching:

Like roller punching, the crimper has serrated disk blades about 4 - 8 inches apart which force straw mulch into the soil. Crimping should be done in two directions with the final pass across the slope.

Matting:

Matting is used on large, steep areas which cannot be punched with a roller or by hand. Jute, wood excelsior or plastic netting is applied over unpunched straw.

Where to Get Help:

Technical Assistance is available from your local USDA Natural Resources Conservation Service office or your local Resource Conservation District regarding this practice and other treatments.

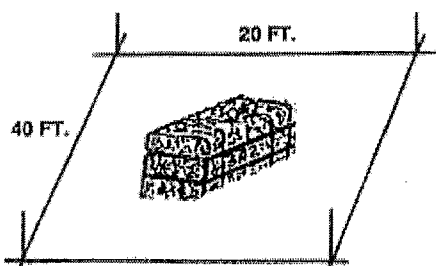
July 2002 Arizona

Straw Mulching

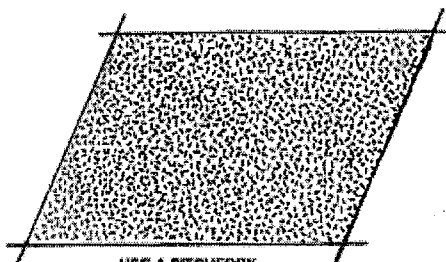
SPREAD THE STRAW

MARK OFF 800 SQ FT. PLOTS

SPREAD EVENLY



PLACE ONE STRAW BALE
PER PLOT (~74 POUNDS).
THIS IS EQUIVALENT
TO 2 TONS PER ACRE.



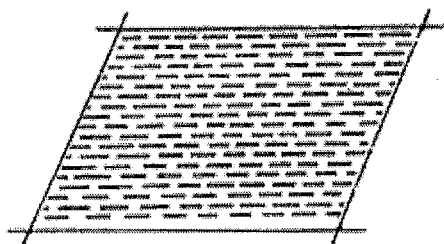
USE A PITCHFORK,
SPADING FORK,
OR BY HAND

ANCHOR THE STRAW

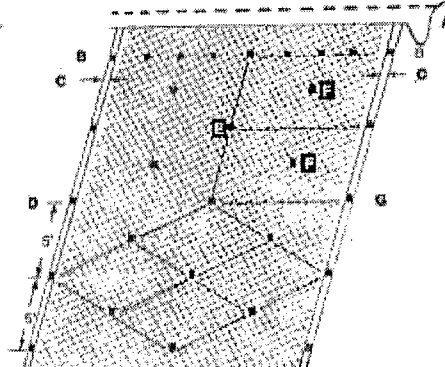
CRIMP BY HAND

OR

USE PLASTIC NETTING



WORK ACROSS THE SLOPE.
PUNCH STRAW 4 INCHES DEEP.
A SQUARE END SPADE WORKS WELL.
MAKE PUNCH EVERY 12 INCHES.



Construction Notes

1. Lay matting in strips down the slope over the straw. Bury upper end in 6-8 inch deep and wide trench. Most netting comes in 14-17 feet wide rolls.
2. Secure the upper end with stakes every 2 feet.
3. Overlap seams on each side 4-5 inches.
4. Secure seams with stakes every 5 feet.
5. Stake down the center every 5 feet.
6. Stake middles to create diamond pattern that provides stakes spaced 4-5 feet apart.
7. Use pointed 1x2 inch stakes 8-9 inches long. Leave 1-2 inch top above netting or use "U" shaped metal pins at least 9 inches long.
8. When joining 2 strips, overlap upper strip 3 feet over lower strip and secure with stakes every 2 feet like in "B" above.