

Water Resource Protection Plan for APN 217-391-015

Submitted to:

*California Regional Water Quality Control Board -
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, California 95403*

Prepared by:

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July 27, 2016



Water Resource Protection Plan

This document serves as the water resource protection plan for site APN 217-391-15 pursuant to Order No. R1-2015-0023. On August 13, 2015, the North Coast Regional Water Quality Control Board (Regional Water Board) adopted a General 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, Order No. R1-2015-0023. One of the requirements of the order is to prepare a Water Resource Protection Plan (WRPP) for all sites that are **enrolled under Tier 2 of the order**.



Site Location Map for:
 Dakota Ringo & Nancy Nunez
 Section 24, T2S, R4E, HB&M
 Section 19, T2S, R5E, HB&M
 Blocksburg USGS 7.5' Quadrangle

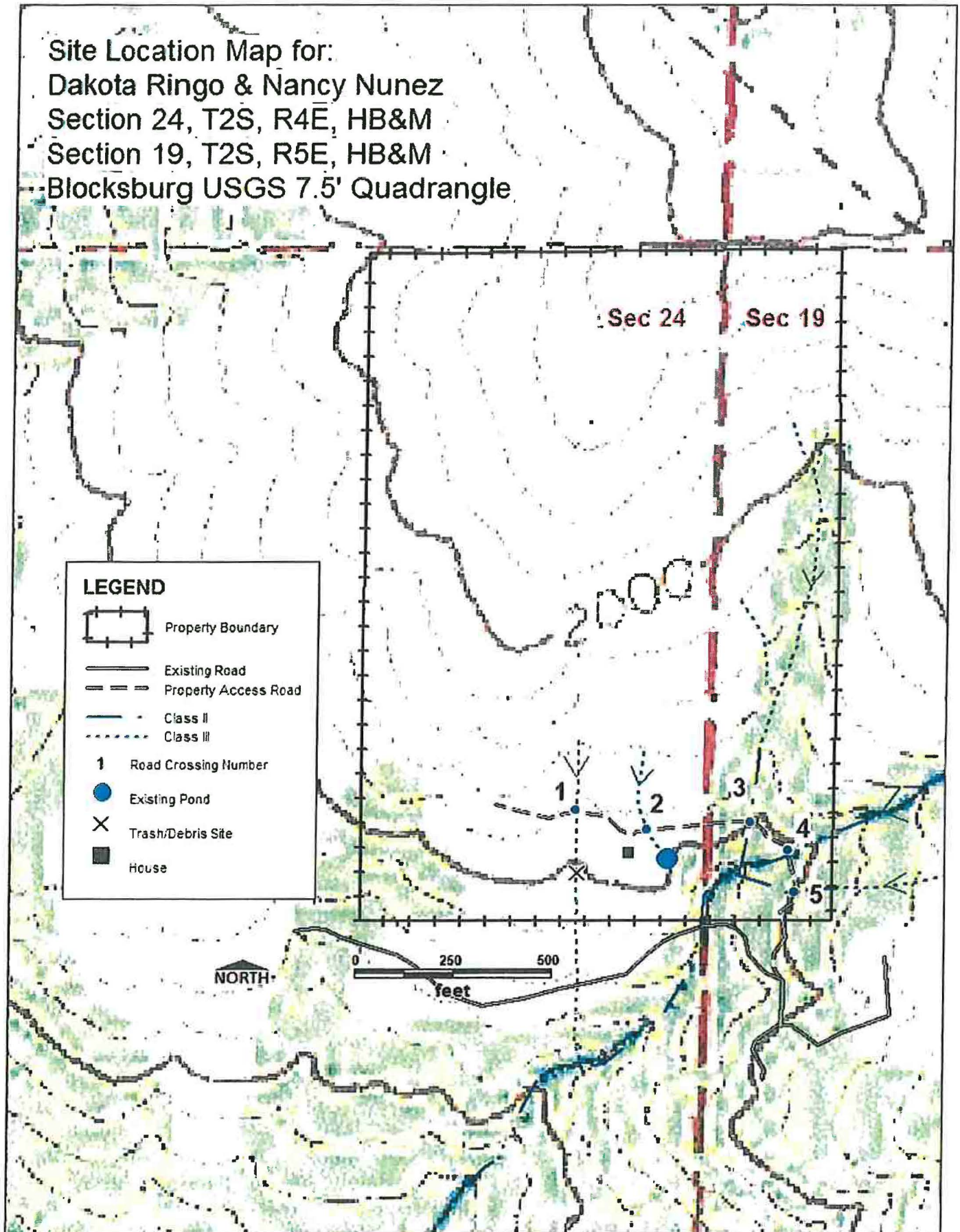
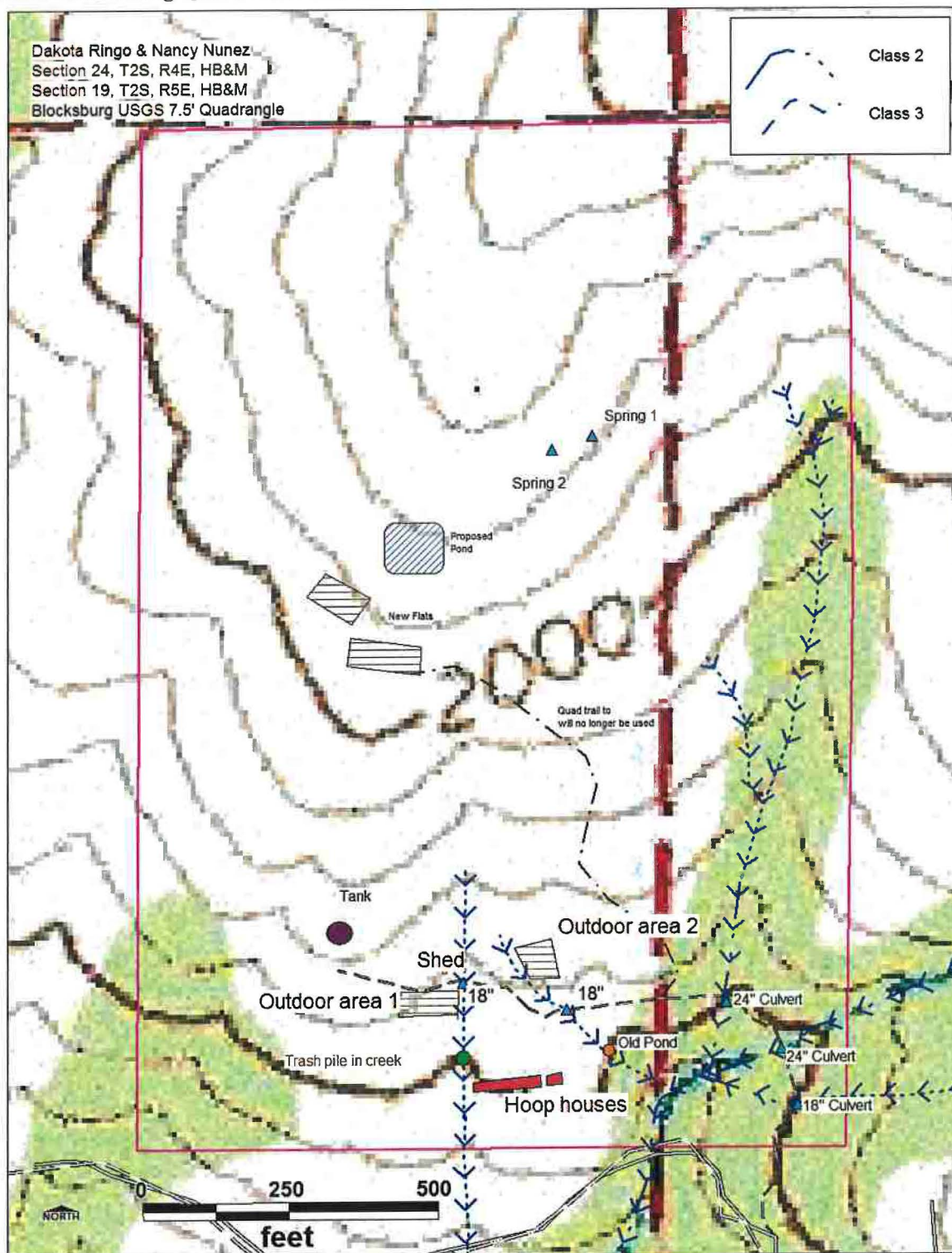


Figure 1. 217-391-015 Parcel Map.
USGS Blocksburg Quad, T2S,R4E, Sec 24 & T2S,R5E, Sec 19 HB&M



Site Assessment

This 48 acre property meets the Tier 2 standards laid out in the order, due to size and proximity to a Class III watercourse. The combined cultivation area is 16,205 square feet. This includes 115' x 20' and 25' x 20' greenhouses, and two outdoor growing sites. Outdoor grow site one is 110' x 83', and outdoor grow site two is 95' x 45'. Collectively the two outdoor areas contain about 100 pots. Slopes in the cultivation areas range from 15 to 23 percent. The plants for the outdoor sites are started in the greenhouses (hoop houses) and then transferred to large (approx. 5 feet in diameter) grow pots. The larger hoop house is used for a light dep operation in the beginning of the season and then replanted for a second harvest in mid-summer. Power used for grow lights is provided by Honda 2000 generator. A portion of the large hoop house is within 50 feet of a class III stream. The nearest smart pots on the 110' x 83' (western-most) site are approximately 50 to 75 feet from a Class III. The smart pots to the east are within 50 feet of a different class III which follows into an in stream settling pond, which is dry by July. The landowner is planning to move the entire operation to the ridge spur, which would not have any proximity issues to watercourses.

Water for cultivation is gravity fed from springs to a 50,000 gallon water tank. The specification of the spring have been submitted to the Water Rights Division of the Regional Water Quality Control Board on June 14, 2016 with a request for determination of whether this spring is surface water requiring a riparian right. Plants are currently watered by hand using a hose but the landowner plans to install drip irrigation this summer. Plants are fertilized using organic grow and bloom teas. Fertilizer is mixed in tank and then applied by a five gallon bucket. Each plant receives around 6 gallons every two weeks. Plants are being watered at agronomic rates as to not create excess water or nutrient percolation beyond the root zone.

The property has a house, and small storage shed. The shed is used for storage of fertilizer. No pesticides or fungicides are used. Soils are reused each year. The property also has one notable trash pile slated for cleanup.

The road to the house is well established and has been rocked in the past. There are five watercourses crossings on the road, with the primary channel noted as being spring fed on the USGS topographic map (Figure 1). The culverts draining these channels are old and undersized for a 100-year event. The 24 inch culverts need 36 inch pipes, and the 18 inch culvert needs a 24 inch pipe. Erosion issues with this property would be associated with these three main stream crossings, albeit the total erosion potential at these crossings is relatively low. The road itself has a good crown, appropriate dips, it has been rocked in the past, culverts were placed at or near grade, some crossings lack disconnect dips. Inlets of the crossings need to be cleaned and cleared and monitored during rain events until upgrades are in place. The 18 inch cross drains (XD) on the map are adequate. However, the XD to the settling pond is old and rusted and should be replaced with an 18 inch pipe.

Current Conditions

Watercourses

Please refer to Figure 1. The parcel lies between 1800 and 2200 feet in elevation. The peak ridge elevations above the parcel are about 2400. The elevation of Basin Creek, about 1 mile downslope, is 600 feet. The average slope on the parcel is approximately 30 percent.

There are four water courses on the property. In the eastern portion of the parcel, there are three Class II drainages. The other perennial headwater sources of water on the property are springs/seeps and pockets of wet areas that generally have no distinguishing topography to associate with it. In the southern portion of the property there are two Class III drainages.

There is an existing pond located in the south eastern portion of the parcel. The pond is older probably created over 20 years ago. The pond is small (30' x 15' x 3'). The impoundment structure appears stable and vegetated, showing no signs of movement in the berm. The pond is unlined and generally dry by the end of June. During times of high flows, water exits the pond through a created outlet and ditch and flows to a class II watercourse below. The path of the water is well established.

Finally, in the southwest portion of the parcel is a seepy, wet area that appears connected to the class III channel. A small (6'x 8') storage shed was built in this wet area.

Roads

Roads on the property are used year round and contain a medium to high amount of native rock, providing surface stability and resistance to surface erosion. Additionally they have been rocked in the past. The road has some moderate grades (5-15%), but there are a few short road pitches that exceed that grade. Drainage features (rolling dips and outslowing) have been incorporated in some of the road design. The portion of the road between culvert 2 and the parking area should be re-rocked to prevent runoff into the class III channel. There is a steep quad trail that leads up to a horse pasture. The quad trail will be decommissioned later this year when a new permitted road is constructed to the upper portion of the property.

Watercourse Crossings

There are five existing pipes on the road. Please refer to Figure 1. Crossing 1 is an 18" pipe and is functioning and sized correctly. The remaining four (2-5) are mostly functioning but are undersized and scheduled for replacement in 2017. Crossing 2 is an existing 12" pipe on a Class III. Crossing 3 is an existing 24" pipe on a Class II. This crossing lacks disconnect dips. Crossing 4 is an existing 24" pipe on a Class II. This crossing is not set to grade and lacks a rocked dip. Crossing 5 is an existing 18" pipe on a Class II. The culverts draining these channels are old and undersized for a 100-year event. Inlets of the crossings need to be cleaned and cleared and monitored during rain events until upgrades are in place.

Landings and Flats

A landing directly below the residence contains the two hoop houses. The western portion of this flat and a portion of the hoop house is within the 50 foot buffer of the Class III creek. Outdoor area one is located on a 23% slope. The area for each 5 foot diameter pot was flattened with hand tools. Many of these pots are located within the 50 foot buffer of the Class III creek. Outdoor area two is located on a 15% slope, again the area for each pot was flattened with hand tools. A portion of the eastern most row is with 50 feet of a Class III creek.

General Property Conditions

There are no spoils piles on the property. Water from a spring is being used to water the cultivation areas. Whether it is surface water is being determined by the Water Rights Division. Regardless of this determination the landowner is in the process of building a 590,000 gallon storage pond. Fertilizer used

is stored in a properly maintained shed. There is currently a 50,000 gallon water tank being used for storage. This tank was installed by the previous land owner without a permit from the county. No pesticides, fungicides, or herbicides are used. There is less than 20 gallons of gas stored on site for the generator. The gas cans are contained within a properly maintained shed. There is one notable trash pile (30 ft long, 8ft wide, and approximately 3 ft deep) located within a Class III channel. The landowner already removed as much of the pile by hand as possible. The rest will be removed by an excavator (see corrective actions below). Trash cans are properly maintained secured with well-fitting lids and taken to the dump regularly.

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

The Storage building is used for storing supplies and fertilizer. Fertilizers stored on site include dry mixes for grow and bloom tea. Fertilizer is mixed in a tank and applied by 5 gallon bucket. Fertilization is cycled into the watering schedule, so each plant receives 6 gallons of fertilizer water mix every 14 days depending on growth needs.

Water Use

The total area of cultivation is 16,205 square feet or 0.37 acres. The spring water source on this property is gravity fed to a 50,000 gallon tank. The landowner estimates that he uses 215,700 gallons of water for the full cannabis cultivation season (March and October). Water use during the dry season (May 15 to October 31) was estimated using the following calculations. Each of the 100 full term outdoor plants are given 20 gallons of water 3 times a week (100 plants x 20 gallons x 12 days a month x 5.5 months = 132,000 gallons). The 155 light dep plants get 2 gallons every day (155 plants x 2 gallons x 30 days x 2.5 months = 23,250 gallons). The 105 re-plants in the hoop houses get 2 gallons a day (105 plants x 2 gallons x 30 days x 4 months = 25,200 gallons). **Total water use between May 15 and October 31 is 180,450 gallons** (32,000+ 23,250+ 25,200= 80,450)

Plants are currently watered by hand using a hose but the landowner plans to install drip irrigation this summer. Plants are being watered at agronomic rates as to not create excess water or nutrient percolation beyond the root zone.

Corrective Actions

Corrective actions locations are shown in figure 2 .

- 1) The small storage shed was built in wetland area. This shed including the concrete slab will be removed and relocated out of the wetland. The area of wetland that was disturbed will be replanted with native vegetation (see appendix C for planting plans).
- 2) The trash pile located in the Class III channel will be removed and disposed of at a proper disposal site. The landowner had already done all the possible hand removal. An excavator will be used to remove the remaining debris which consists of trash dirt and rock. The removed material will be hauled off site and disposed of at a legal dump. The disturbed area outside of the channel will then be revegetated and covered in straw. (see appendix C for planting and erosion control plan) A CDFW 1600 permit application has been submitted for this work. Appendix D from the Cannabis Order (Order No. 2015-0023) has been submitted to the North Coast Water Board.

- 3) For the small existing pond in the class III channel the impoundment structure appears stable and vegetated, showing no signs of movement in the berm. The pond is unlined and generally dry by the end of June. During times of high flows, water exits the pond through a created outlet and ditch and flows to a class III watercourse below. The path of the water is well established. The land owner will rock line the outlet of the pond and short segment of the ditch for channel reinforcement. This will insure outflowing water does not erode the berm in the future, and that sediment delivery is minimized. A CDFW 1600 permit application has been submitted for this work. Appendix D from the Cannabis Order (Order No. 2015-0023) has been submitted to the North Coast Water Board.
- 4) All three cultivation areas (outdoor area 1, 2 and the hoop house) infringe on the 50 foot buffer of Class III water courses. The landowner proposes to move the entire operation up the hill to a new site that will not be within any stream buffers. The landowner had applied for a county permit to put in a new road (leading to the new site) as well as two new flats one for two 20' x 95' hoop houses and one that will be 50' by 120' for outdoor plants (Appendix D). At the end of this season (October/ November) the soil pots in both outdoor area 1 and 2 will be removed. The soil will be moved up to the new cultivation site where it will be piled surrounded by straw wattle or silt fence and covered. If the new site is not completed in time the soil will be piled in an area that is not within 50 feet of any of the class III creeks or wetlands or 100 feet of any of the Class II creeks. It will be surrounded by straw wattle or silt fence and covered. The areas where the pots were will be re-seeded with grass seed and covered with straw.
- 5) The hoop house is also scheduled to be moved up to the new cultivation site. The hoop house within 50 feet of the Class III creek will be removed this fall. The area that was disturbed by the creation of the flat that is within 50 feet of the creek will be re-vegetated and covered with weed free straw (see appendix C for planting and erosion control plan).
- 6) Water is from a spring being used to water the cultivation areas. Whether it is surface water is currently being determined by the Water Rights Division. If the water rights board determines that it is surface water the landowner will apply for a Riparian Right, and if water from the spring will be used to top off the pond during the wet season an appropriate permit will be applied for from the Water Board. Regardless of this determination the landowner is in the process of building a 590,000 gallon storage pond (Appendix D). The pond will be filled by rain water and topped off with water from the spring during the wet season (Nov 1 till May 14) if necessary. This pond along with the 50,000 gallon tank will mean that 640,000 gallons of water will be stored during the wet season to be used between May 15 and October 31. The site is currently using around 180,000 gallons during the dry season. Adequate storage is being created and no spring water will need to be used between May 15 and October 31 once the pond is in place.
- 7) There are four water course crossings on the property that need corrective action. Pipe size calculations are attached. Road work will be completed in the summer months when crossings are dry. Road work will be done by a Licensed Operator. A CDFW 1600 permit application has been submitted for this work. Additionally Appendix D from the Cannabis Order (Order No. 2015-0023) has been submitted to the North Coast Water Board. Design schematics for: rolling dips, armored fills, proper culvert installation along with standard conditions for roads and crossings can be found in Appendix B. For the culvert pipe sizes, a program in Excel (originally designed by Redwood National Park called CulvQ) was used to run the calculations. The input variables for determining the pipe size include the watershed catchment acres above the pipe, and the headwall height (in inches) from the bottom of the culvert to the top of the road. Additional inputs included using the Rational Method

for calculations, a K-Value (0.35 was used), mean annual rainfall for the specific location, and selections for a 100-year event with the 10-minute rainfall intensity in inches per hour. The results of these calculations, in addition to professional judgement from field evidence such as actual channel size, scour, current pipe condition, and any other specific site characteristics, were factors in determining prioritization of any needed upgrades.

- a. Crossing 2 is an existing 12" pipe on a Class III to be replaced with an 18" pipe. The road climbs steeply from crossing 2 up to the parking area. This steep portion of the road should be re-rocked with clean rock.
 - b. Crossing 3 is an existing 24" pipe on a Class II to be replaced with a 36" pipe. This crossing needs disconnect dips on either side of the crossing to prevent rod runoff from entering the creek. Additionally this culvert needs to have its inlet cleared of vegetation. This can be done with hand tools (loppers)
 - c. Crossing 4 is an existing 24" pipe on a Class II to be replaced with a 36" pipe. The pipe needs to be set to grade. The dip over the stream crossing needs to be rocked. Crossing 4 has a partially clogged inlet which caused stream flow to over-top the road in the winter of 2015. It is proposed to remove the accumulated sediment from the culvert inlet using an excavator prior to the next winter season of 2016-2017. Rock and soil will be hauled off and disposed outside of riparian areas.
 - d. Crossing 5 is an existing 18" pipe on a Class II to be replaced with a 24" pipe.
- 8) The 50,000 gallon water tank requires a permit. The landowner will apply for a permit for the tank from the county in the summer/ fall of 2016.

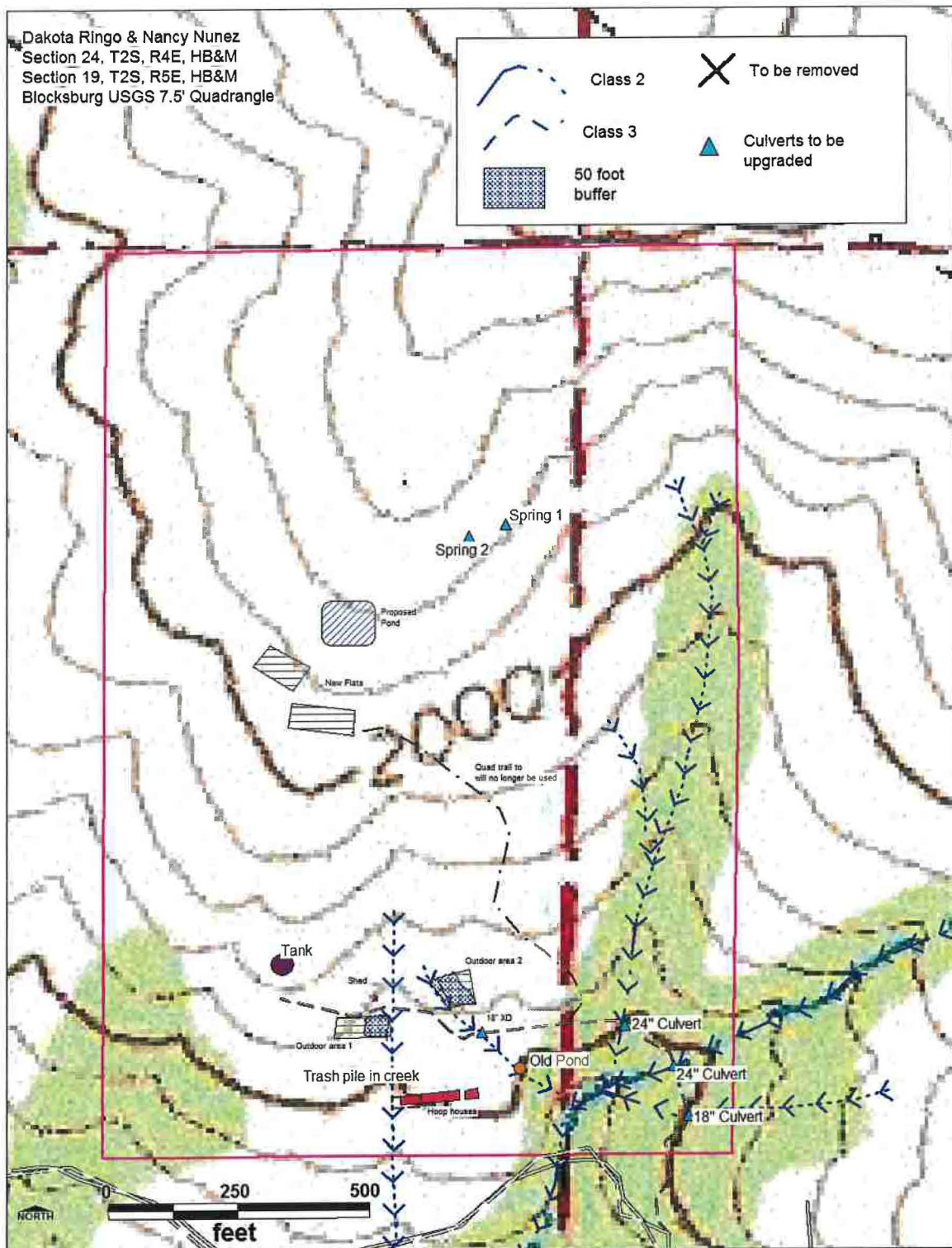
Table 1. Features that need improvement. See Appendix B for Associated Standard Conditions (A.S.C.)
Note the road crossing points (RC) start from west.

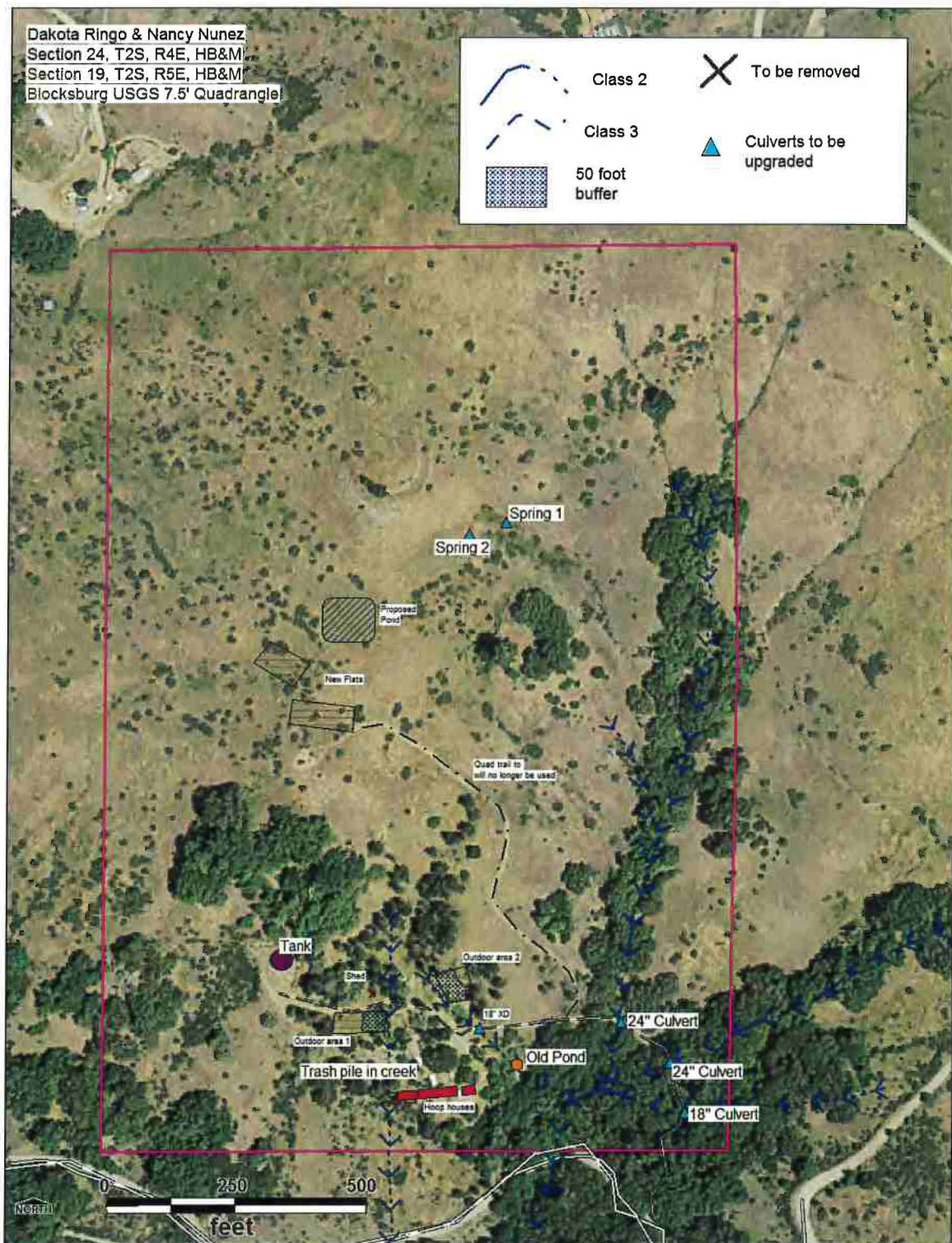
Unique Map Points	Map Point Description	A.S.C.	Temporary BMP	Permanent BMP	Priority for Action	Time Schedule for completion of Permanent BMP	Completion Date
Storage Shed	Small shed built in wet area	3.a 3.b	NA	Remove shed from wetland. Re-vegetate disturbed area	2	11/15/16	
Trash Pile	Trash Pile in Class III	11.b 11.c	NA	Remove trash soil and rock. Revegetate disturbed area outside of channel.	2	11/15/16	
Old Pond	Outlet of old pond in Class III channel	5.f	NA	Line outlet and ditch with clean rock	2	11/15/16	
Outdoor Area 1 and 2	Pots within 50 feet of Class III channels	3.a	Water with drip to prevent over watering and run off	Pots will be removed at end of season. Disturbed area will be reseeded and covered with straw.	2	11/15/16	
Hoop House 1	Hoop house and flat within 50 feet of Class III	3.a	Water with drip to prevent over watering and run off	Hoop house will be removed at end of season. Disturbed area within 50 feet of channel will be re-vegetated.	2	11/15/16	

Unique Map Points	Map Point Description	A.S.C.	Temporary BMP	Permanent BMP	Priority for Action	Time Schedule for completion of Permanent BMP	Completion Date
New pond	Water storage to meet water needs between May 15 and Oct. 31	5.a	Water conservation methods: drip irrigation	A 590,000 gallon pond will be created to store water for dry season	2	12/31/16	
RC2 (12" pipe)	Old, undersized	2.b	Monitor Inlet	Install 18" culvert	4	11/15/21	
RC3 (24" pipe)	Old, undersized, lacks disconnect dips	2.b	Clear & Monitor Inlet	Install 36" culvert	4	11/15/21	
RC4 (24" pipe)	Old, undersized, clogged inlet, needs dip rocked	2.b	Clear & Monitor Inlet	Install 36" culvert	2 and 4	Clear inlet 11/15/16 Replace pipe 11/15/21	
RC5 (18" pipe)	Old, undersized	2.b	Monitor Inlet	Install 24" pipe	4	11/15/21	
Water Tank	50,000 gallon tank lacks a county permit	5.a	NA	Apply for and receive county permit	3	8/1/2017	

Priority timeframes: 1 is high priority with treatment being planned to occur immediately; 2 is a high priority for treatment to occur prior to the start of the winter period (Nov. 15); 3 is a moderate priority for treatment to occur within a year, or prior to the winter of the second season of operations; 4 is a lower priority with treatment being planned within the shortest time possible, but no later than the expiration of this Order (five years).

Figure 2 corrective actions





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

Design drawings for road crossings can be found in Appendix B. Appendix D shows plans for the proposed septic, road, pond, and flats.

Monitoring element to ensure that BMPs are being implemented and to evaluate their effectiveness

Corrective Actions

The landowner or the water board will conduct a monitoring visit to the site following the completion of items 1- 6 in November of 2016. The purpose of this visit will be to ensure the work was done correctly and meets the standard conditions of the order. Photos will be taken of each feature. Records will be kept on-site, and submitted to the RWQCB. Completion of item 7 will be documented by the landowner and submitted to RWQCB upon completion of the pond. Upon completion of item 8 the landowner or the water board will conduct a monitoring visit to ensure the work was done correctly and meets the standard conditions of the order. Photos will be taken of each feature. Records will be kept on-site, and submitted to the RWQCB. The landowner will submit a copy of the permit for the water tank to the RWQCB by August 2017.

Annual Monitoring

Monitoring for this site will follow the revised Appendix C from the Order No. 2015-0023. Annual monitoring will be done each year. At a minimum it will be done prior to October 15th, by December 15th, and immediately following a precipitation event with 3 inches of accumulation in 24hr period. During each monitoring session the following items will be inspected: all water course crossings (1-5 ensure culvert inlets are clear and disconnect dips are installed / functioning, all roads to ensure surfaces are outsloped properly and the steep area to parking places is adequately rocked. Cultivation flats will be inspected to ensure proper outsloping so water is not pooling on the flat, and water is being shed properly. Soil pile(s) to ensure they are properly contained with straw wattle or silt fence around the base and that the pile is covered. The porta potty (while it is one site) will be pumped at the end of the season, and inspected to ensure it is stable and secure. This monitoring may be done by the land owner. Photos will be taken at each monitoring point. These photos along with the notes taken during the monitoring will be kept on-site. The monitoring forms and photos will be submitted by the land owner to the RWQCB.

During the growing season the landowner will monitor the following items at least monthly: Tanks and water lines to ensure there are no leaks, cultivation area during or immediately after watering to ensure irrigation water is soaking into the surface and not running off. The cultivation area to ensure that all fertilizers are properly contained in the storage shed, that all trash and debris is properly contained and secured. The land owner will keep a record of the dates this monitoring was completed, if any corrective action was necessary, and what actions were taken.

Annual monitoring reports will be submitted annually by March 31st of each year to the water board. The report will include the reporting from in appendix C.

Name of legally responsible person (LRP): Dakota Ringo and Nancy Nunez

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

Signature: *Neg. C.*

Date: 8-1-16

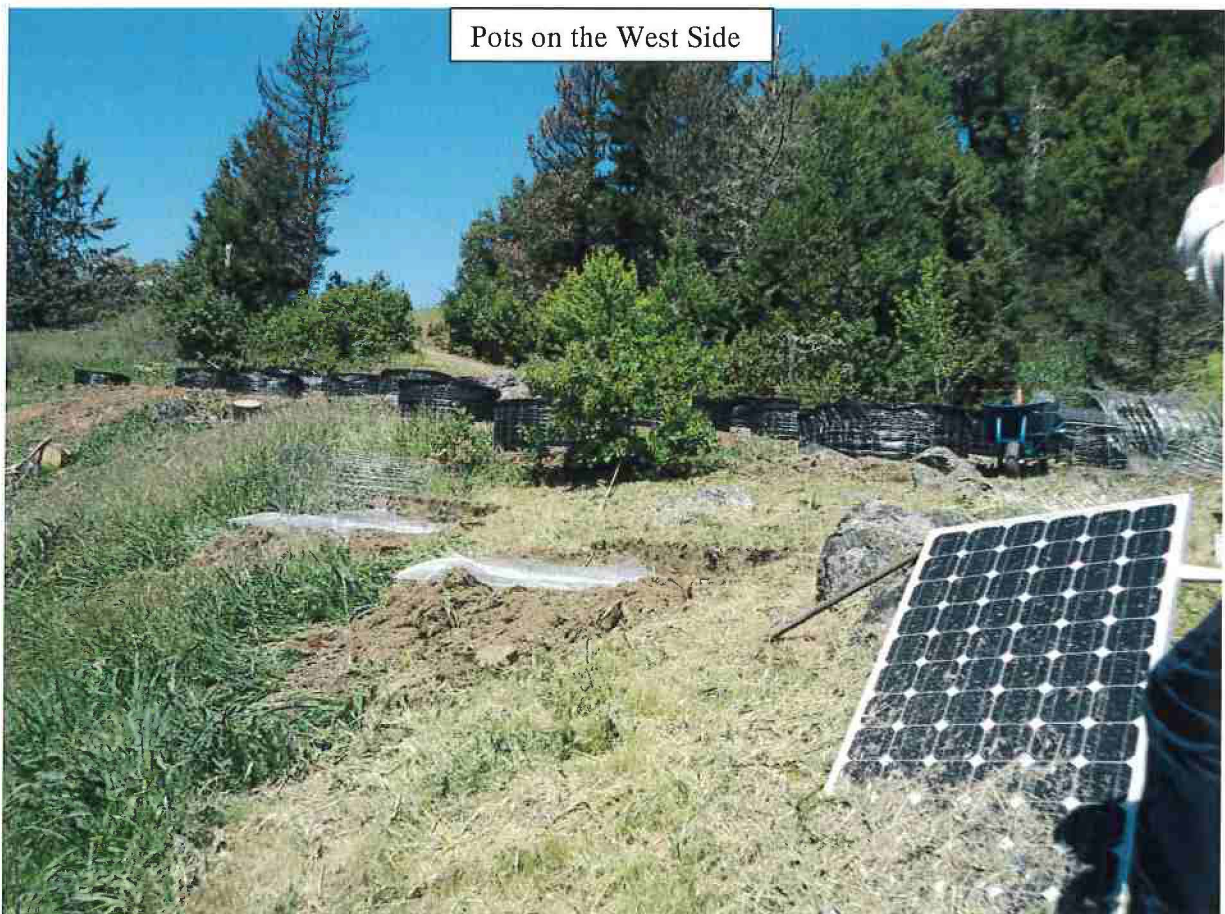
WRPP prepared by: Natural Resources Management Corp. (NRM) on Date: July 27, 2016

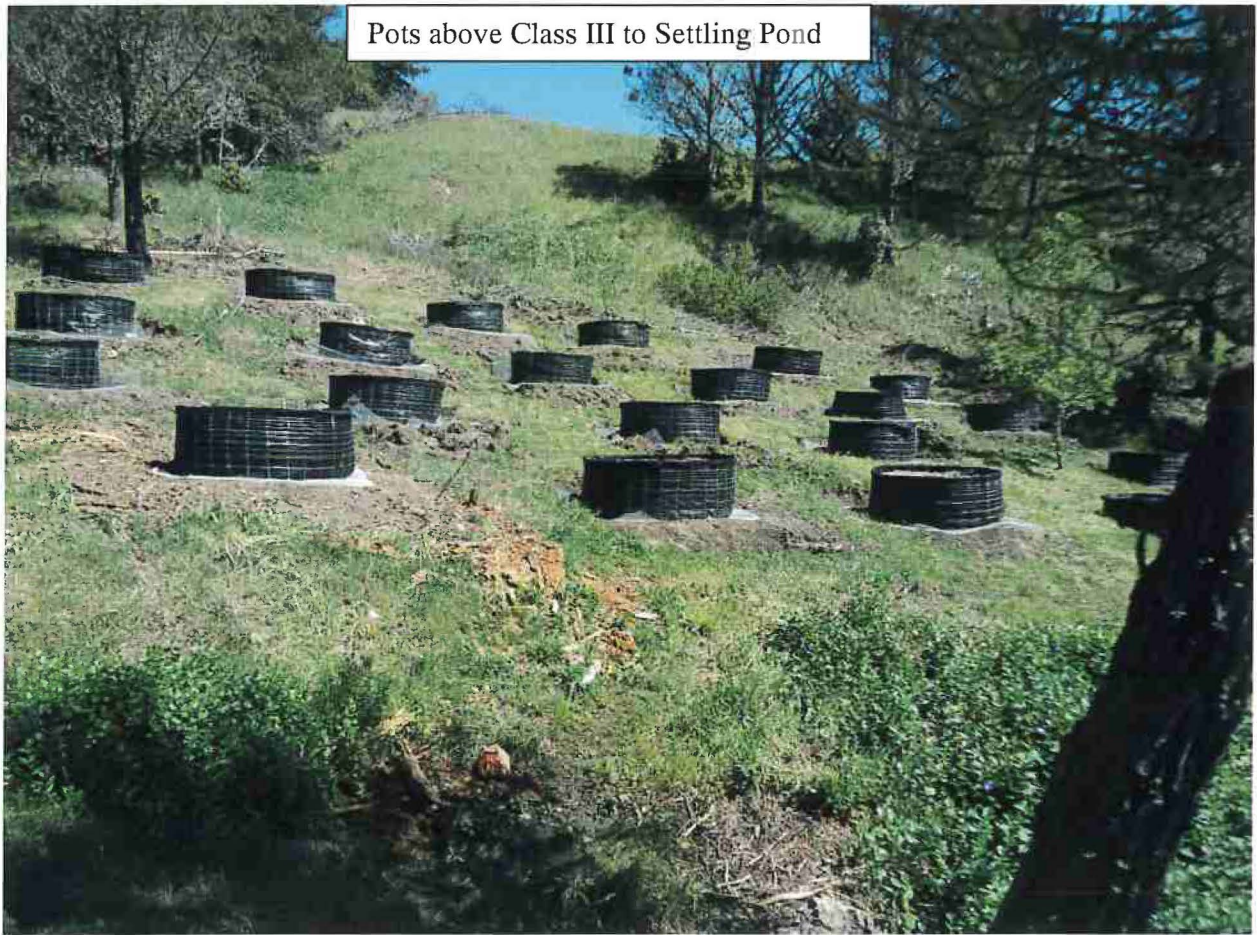
Signature: *P. Nunez*

Date: July 27, 2016

Appendix A. Photo Documentation.

Photos taken on April 28, 2016

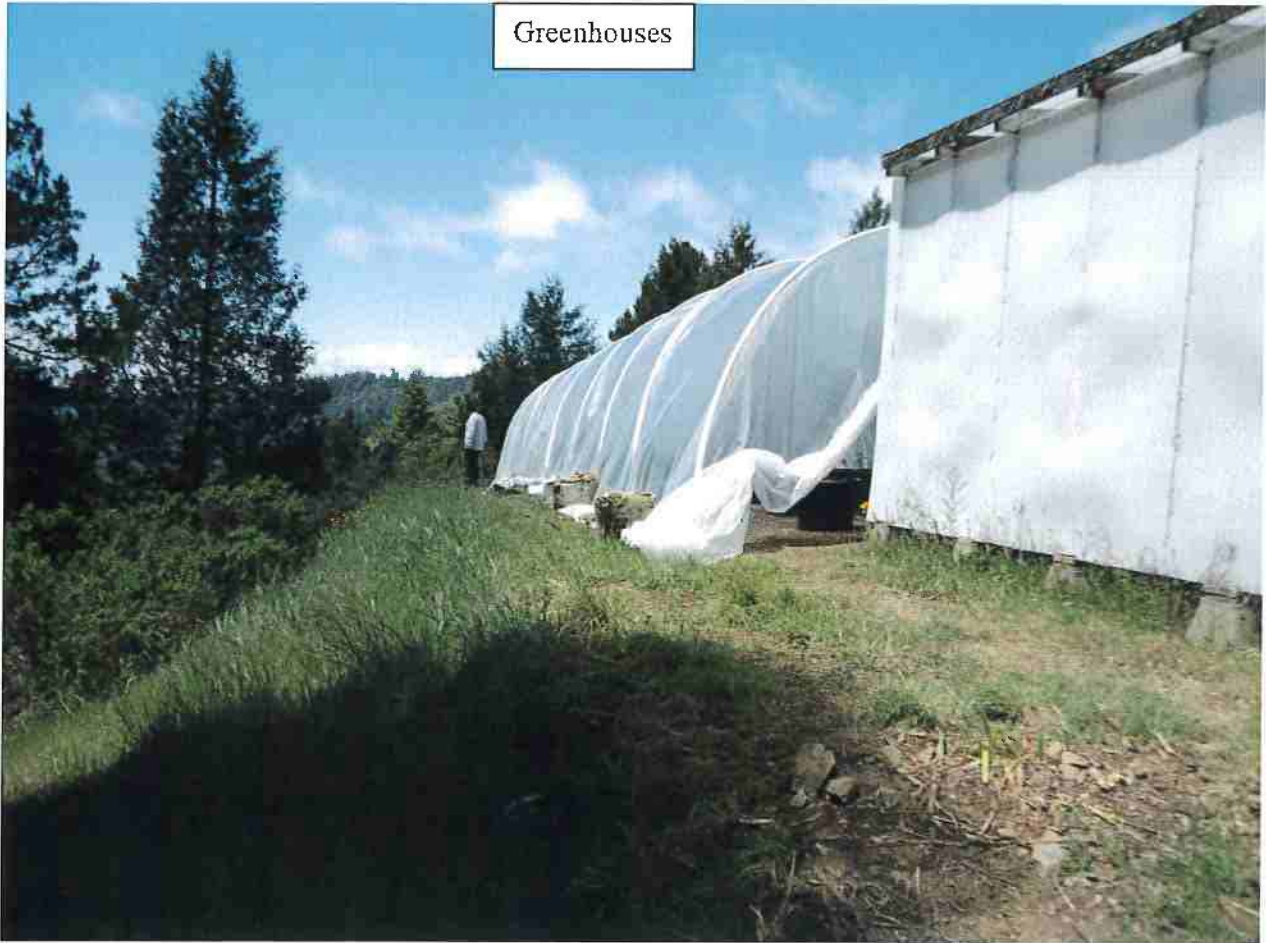




Class III to Settling Pond (dry by July)

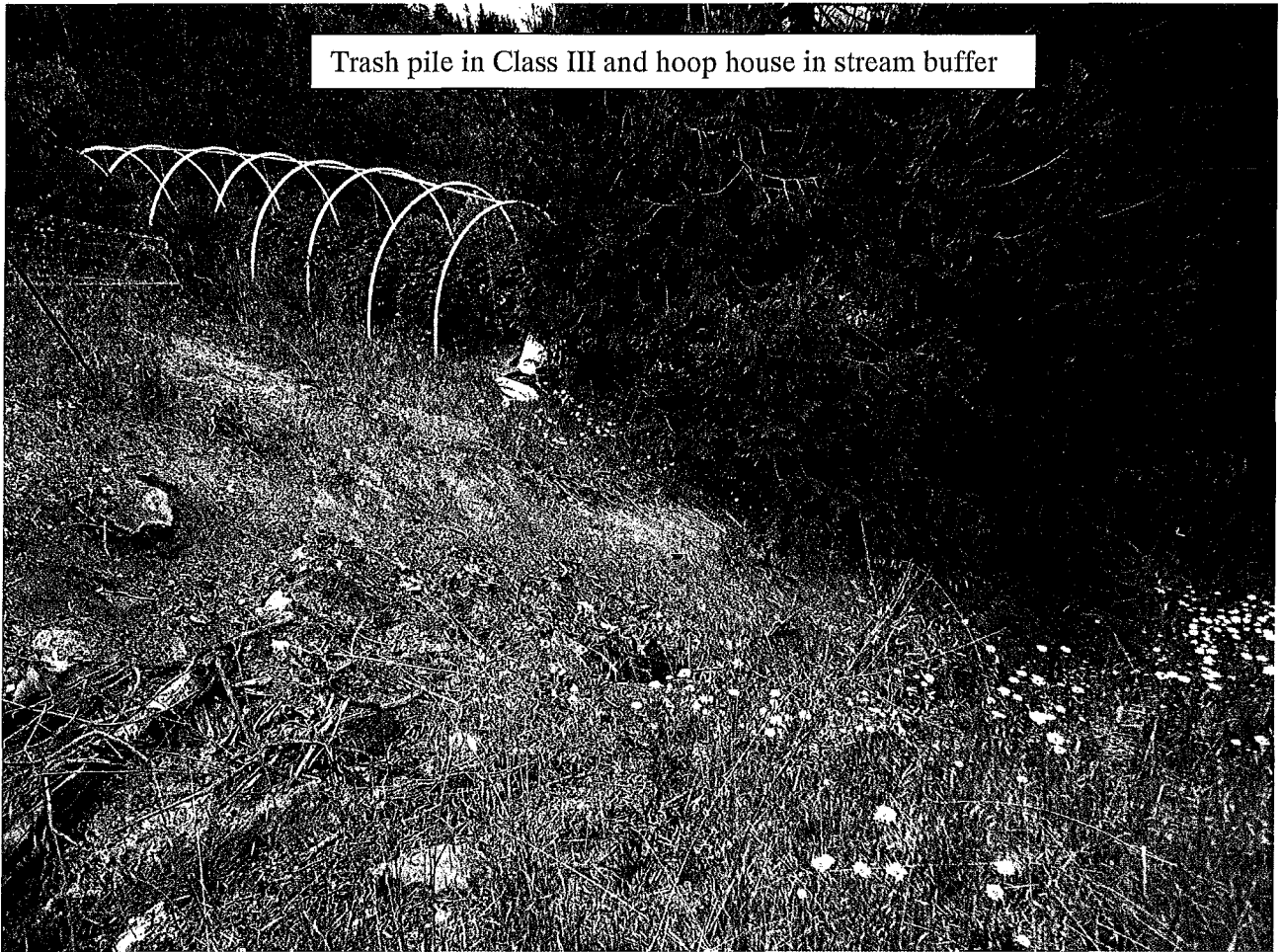


Greenhouses









Appendix B. Road Design Schematics & Associated Standard Conditions

Design Drawings for Watercourse Crossings

Best Management Practices (BMPs) / Road Improvement Design Schematics

Excerpts from: **Handbook for Forest, Ranch, and Rural Roads**, by Weaver, Weppner, and Hagans, 2014

Includes schematics for:

- Rolling Dips
- Armored Fills
- Proper Culvert Installation

Downloadable copy obtained from the Mendocino County RCD:

http://mcrcd.org/wp-content/uploads/Handbook_for_Forest_Ranch&Rural_Roads.pdf

Rolling Dips: Copy of pages 64 – 67.

Waterbars should be reserved for unsurfaced seasonal roads that are to have little traffic and/or no wet season use.

Rolling dips are usually used on outsloped roads to drain road surface runoff to the outside of the road, but may be built on either insloped, crowned or outsloped roads to drain runoff in either direction. However, keep in mind the goal of effective road drainage is to disperse

rather than collect and concentrate road runoff. Drainage structures that drain to the inside of the road will likely require a greater number of ditch relief culverts to prevent ditch erosion and/or the formation of hillslope gullies.

Rolling dip design—In general, broad rolling-dips are usually built perpendicular to the road alignment, with a cross slope of 3 to 5 percent greater than the grade of the road.

FIGURE 33A.

Rolling dip constructed on a rock surfaced rural road. The rolling dip represents a change-in-grade along the road alignment and acts to discharge water that has collected on, or is flowing down, the road surface. This road was recently converted from a high maintenance, insloped, ditched road to a low maintenance, outsloped road with rolling dips.



FIGURE 33B.

This side view of an outsloped road shows that the rolling dip does not have to be deep or abrupt to reverse road grade and effectively drain the road surface. This outsloped forest road has rolling dips that allow all traffic types to travel the route without changing speed.



TABLE 21. Table of rolling dip dimensions¹

Road grade (%)	Upslope approach ² (distance from up-road start of rolling dip to trough) (ft)	Reverse grade ² (distance from trough to crest) (ft)	Depth below average road grade at discharge end of trough ² (ft)	Depth below average road grade at upslope end of trough ² (ft)
<6	55	15-20	0.9	0.3
8	65	15-20	1.0	0.2
10	75	15-20	1.1	0.1
12	85	20-25	1.2	0.1
>12	100	20-25	1.3	0.1

¹USDA-808 (1981)²See also Figure 36

The cross grade slope ensures proper drainage to the outside of the dip. If the outslope in the axis of the rolling dip is insufficient, water will not drain, sediment will be deposited, and puddles and potholes will form. The morphology of the dip results in an up-and-down or slight rolling movement when driven. Some rolling dips are built at a 30 to 45 degree angle to the road alignment, but if the road is to receive commercial truck and trailer traffic (e.g., log trucks or cattle trailers) this angle can cause a significant rocking and twisting action to heavy truck loads and trailers that may not be acceptable.

Rolling dips are built with a long, shallow approach on their up-road side and a more abrupt rise or reverse grade on their down-road side (Figure 34, Table 21). Dips should be constructed deep enough into the road subgrade so that traffic and subsequent road grading will not obliterate them. Their length and depth should provide the needed drainage, but not be a driving hazard (Figure 35).

Rolling dips can be broken down into three types, depending on the existing road gradient and conditions of the outboard edge of the road. Figure 36 provides the general design characteristics of the three rolling dip types.

- A Type 1 rolling dip is the standard rolling dip design for roads that do not have a through cut or large berm that would prevent the dip

from draining onto the adjacent outboard fill slope. Type 1 rolling dips are built on roads with road gradients less than 12–14%, and with or without a small outboard berm that can be easily removed. If an outboard berm is present make sure to remove the berm through the entire length of the dip.

- Type 2 rolling dips are designed for roads with gradients less than 12–14% within a small through cut, or that have a large (i.e. tall and/or wide) berm on the outboard edge of the road. This type of dip requires “breaching” or excavating the outboard through cut or large berm through the axis of the dip. The width of the breach is dependent on the road conditions (e.g., width of berm, road steepness, and road subgrade materials).
- Type 3 rolling dips are suggested for roads with gradients that exceed 12–14% where road steepness prevents the construction of a rolling dip with a reverse grade. Instead of building a dip with a reverse grade, a Type 3 rolling dip is constructed by building an aggressive 6–8% outslope from the inboard to the outboard edge of road to ensure that runoff travels obliquely across the road and exits the road within the rolling outslope. This outslope is developed by ripping the roadbed and pushing road fill from the outboard half to the inner half of the road.

HANDBOOK FOR FOREST, RANCH AND RURAL ROADS

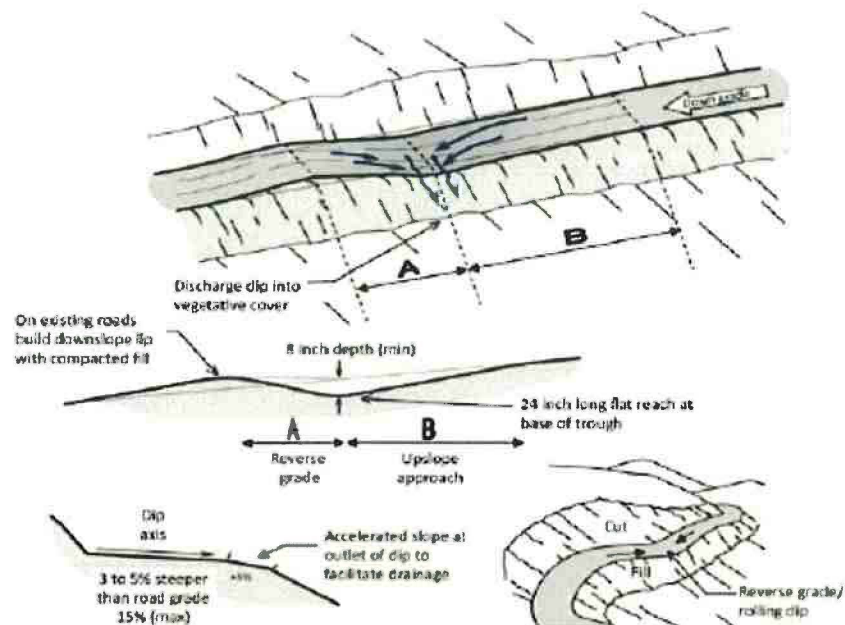
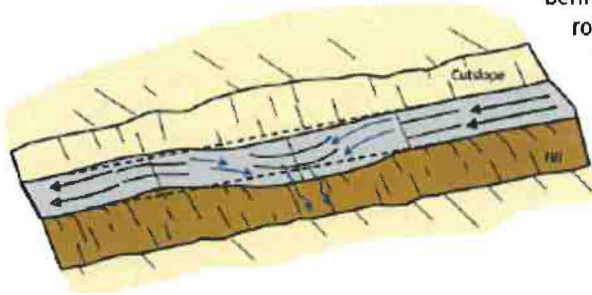


FIGURE 34. A classic Type I rolling dip, where the excavated up-road approach (B) to the rolling dip is several percent steeper than the approaching road and extends for 60 to 80 feet to the dip axis. The lower side of the structure reverses grade (A) over approximately 15 feet or more, and then falls down to rejoin the original road grade. The dip must be deep enough that it is not obliterated by normal grading, but not so deep that it is difficult to negotiate or a hazard to normal traffic. The outward cross-slope of the dip axis should be 3% to 5% greater than the up-road grade (B) so it will drain properly. The dip axis should be out-sloped sufficiently to be self-cleaning, without triggering excessive downcutting or sediment deposition in the dip axis (Modified from: Best, 2013).

FIGURE 35. This outsloped forest road is used by commercial logging trucks and was constructed with frequent rolling dips to promote road surface drainage. The dips were built as a part of planned road construction for use by truck and trailer traffic. Note that the cut-banks are rocky, dry and stable, and there is no inside ditch.

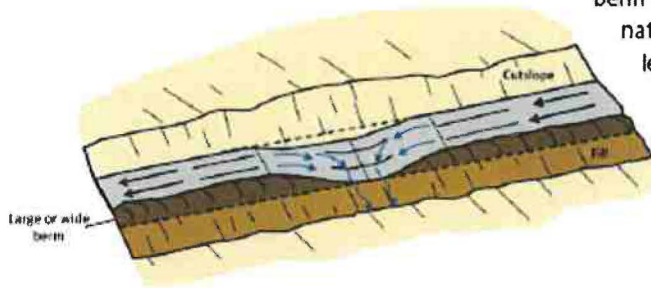


Type 1 Rolling Dip
(Standard)



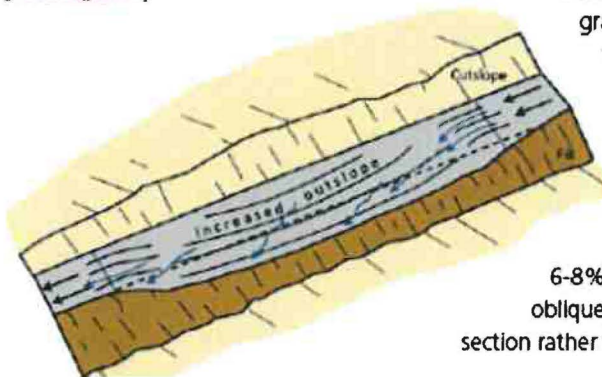
Type 1 rolling dips are used where road grades are less than about 12-14% and road runoff is not confined by a large through cut or berm. The axis of the dip should be perpendicular to the road alignment and sloped at 3-4% across the road tread. Steep roads will have longer and more abrupt dip dimensions to develop reverse grade through the dip axis. The road tread and/or the dip outlet can be rocked to protect against erosion, if needed.

Type 2 Rolling Dip
(Through-cut or thick berm road reaches)



Type 2 rolling dips are constructed on roads up to 12-14% grade where there is a through cut up to 3 feet tall, or a wide or tall berm that otherwise blocks road drainage. The berm or native through cut material should be removed for the length of the dip, or at least through the axis of the dip, to the extent needed to provide for uninterrupted drainage onto the adjacent slope. The berm and slope material can be excavated and endhauled, or the material can be sidecast onto native slopes up to 45%, provided it will not enter a stream.

Type 3 Rolling Dip
(Steep road grade)



Type 3 rolling dips are utilized where road grades are steeper than about 12% and it is not feasible to develop a reverse grade that will also allow passage of the design vehicle (steep road grades require more abrupt grade reversals that some vehicles may not be able to traverse without bottoming out).

Instead of relying on the dip's grade reversal to turn runoff off the roadbed, the road is built with an exaggerated outslope of 6-8% across the dip axis. Road runoff is deflected obliquely across the dip axis and is shed off the outsloped section rather than continuing down the steep road grade.

Armored fills (Copy of page 153)

Armored fills—Generally, an armored fill crossing is intended for low-volume traffic areas, such as ranches, seasonal logging roads, utility access routes, open space districts, and parklands. Armored fills are a good design for ephemeral and intermittent streams when the majority of traffic will be crossing during low flow or dry conditions. They should not be built in perennial streams or in fish-bearing streams. When designed and properly built, armored fill crossings are a good option for a low maintenance, remote access routes. If rock armor is locally available they will be less expensive to install than culverts and bridges, and they require less frequent inspection and maintenance.



FIGURE 120. *This armored fill crossing of a steep, ephemeral stream was constructed to provide a low maintenance crossing. The crossing has been deeply dipped to reduce the volume of road fill and to eliminate the potential for stream diversion. The fill slope has been heavily armored through the axis of the crossing to contain flood flows and prevent down-cutting. Armored fills cannot be used on fish bearing streams.*

Proper Culvert Installation (pages 187-189)

Stream crossing culverts should be placed at the base of the fill, and at the grade of the original streambed. In non-fish streams the culvert should be inset slightly into the natural streambed so that water drops several inches as it enters the pipe. Culvert inlets set too low can plug with debris and cause a headcut to migrate upstream, and those set too high can

allow water to undercut the culvert at the inlet (Figure 155). Culverts that are installed at a gradient lower than the natural stream channel experience erosion at the downstream fill face unless an anchored full round downspout is installed. Similarly, culverts installed with a lower gradient than the natural stream channel typically experience increased sediment deposition and ponding at the inlet which increases the risk of inlet plugging and stream crossing

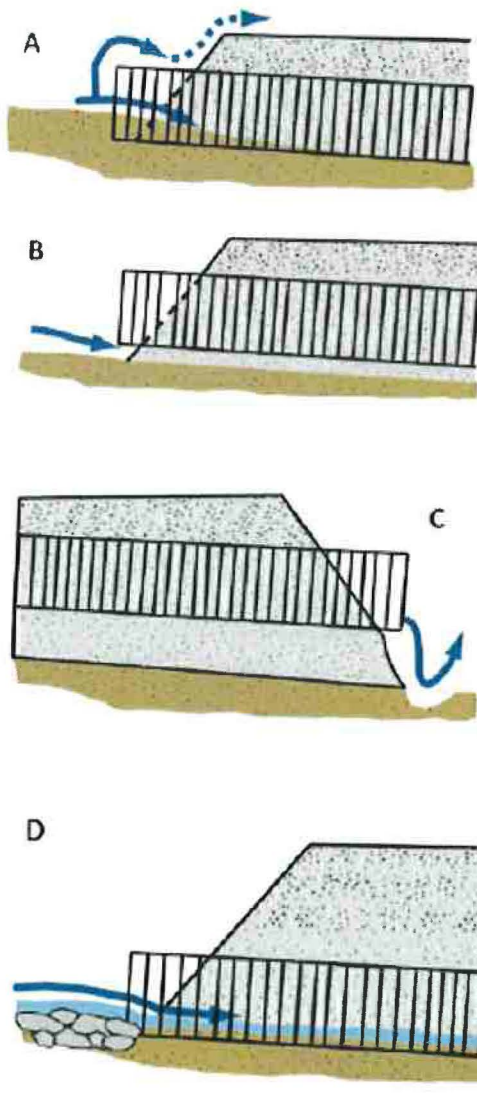


FIGURE 155. Proper culvert installation involves correct culvert orientation, setting the pipe slightly below the bed of the original stream, and backfilling and compacting the fill as it is placed over the culvert. Installing the inlet too low in the stream (A) can lead to culvert plugging, yet if set 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).

failure. Culverts set at channel grade have a greater ability to pass sediment and wood.

The culvert bed may be composed of either compacted rock-free soil, or gravel (Figure 156). If gravel is used for the bed, filter fabric will be needed to separate the gravel from the soil to minimize the potential for soil piping. Bedding beneath the culvert should provide for even distribution of the load over the length of the pipe. **Nearly every culvert will sag due to soil compaction after it is buried. To allow for this, all culverts should be installed with an "up camber" or slight hump in the bed centered under the middle of the pipe.** The amount of camber should be between 1.5 to 3 inches per 10 feet of culvert pipe length. Natural settling and compaction which occurs after backfilling will then allow the pipe to settle into a straight profile.

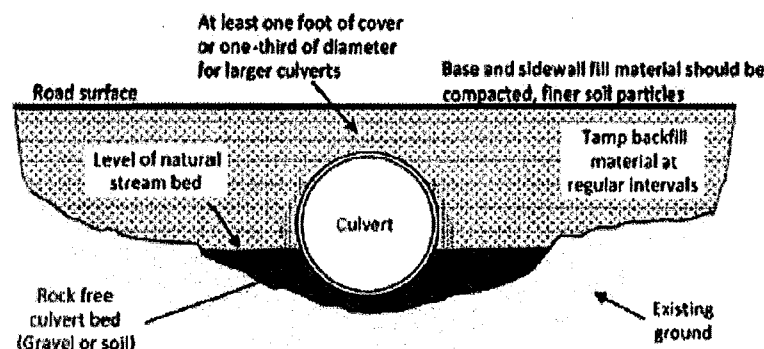
Backfilling can begin once the culvert is in-place in its bed. Backfill material should be free of rocks, limbs or other debris that could dent the pipe or allow water to seep around the pipe. One end of the culvert should be covered, and then the other end. Once the ends are secured, the center is covered. Careful pouring or sifting of backfill material over the top of the pipe using a backhoe or excavator bucket will allow finer particles to flow around and under the culvert sides. Larger particles will roll to the outside. The fine soil particles will

compact more easily and provide a good seal against leaks along the length of the pipe.

The backfill material should be tamped and compacted throughout the entire installation process. The base and sidewall material should be compacted before the pipe is placed in its bed. A minimum amount of fill material should be used for the bed of the culvert to reduce seepage into and along the fill. Backfill material should then be compacted in approximately 0.5–1 foot lifts until at least 1/3 of the diameter of the culvert has been covered (Figure 156). Leaking will be prevented if compaction is done under optimum soil moisture conditions. A vibrating, gas-powered hand-compactor (rammer) can be used to provide compaction alongside the culvert as backfilling is occurring. Once sufficient depth has been reached, rolling compactors and heavy equipment can be used to bring the fill to grade.

Once backfilling has been completed over the top of the pipe, the inlet and outlet of the culvert should be armored. A metal, concrete, sandbag or rock head-wall can be constructed to prevent inlet erosion. Where it is available, rock armor is routinely used to armor the inlet and outlet areas of newly installed culverts (Figure 157). On the inlet side, it protects against erosion during flood events and high water. On the outlet side of the fill rock armor is placed around and slightly above

FIGURE 156. Rock-free fill is backfilled over the culvert in layers and compacted under the pipe and around the sidewall. Soil compaction along the haunches (lower corners) of the culvert provide confining strength to the pipe and reduce deformation, especially for non-round culvert shapes (Modified from: FEMA, 2009).



the projecting culvert pipe to protect the new fill from splash erosion at the culvert outlet and to trap any sediment that is eroded from the new, downstream fill slope until it can be stabilized by vegetation. If the stream is live, flow through the culvert should be observed to determine if and where additional rock armor is needed. As a precaution against sedimentation in the stream, a slash windrow can be constructed at the base of the road fill around and adjacent to the culvert outlet so that soil is not sidecast into the stream channel or onto the inlet during final filling and grading of

the roadbed. Rock armor placed around the culvert outlet can also serve this purpose.

Final filling of the stream crossing can now be performed. Layers of fill are pushed over the crossing until the final, design road grade is achieved. Fill should be placed over the top of the culvert to a depth of at least 1 foot, for 18" to 36" culverts, or a minimum of 1/3 to 1/2 the culvert diameter for larger pipes. **If adequate cover cannot be achieved over a round culvert, then an arch culvert, an oval culvert, or a pipe-arch should be installed**

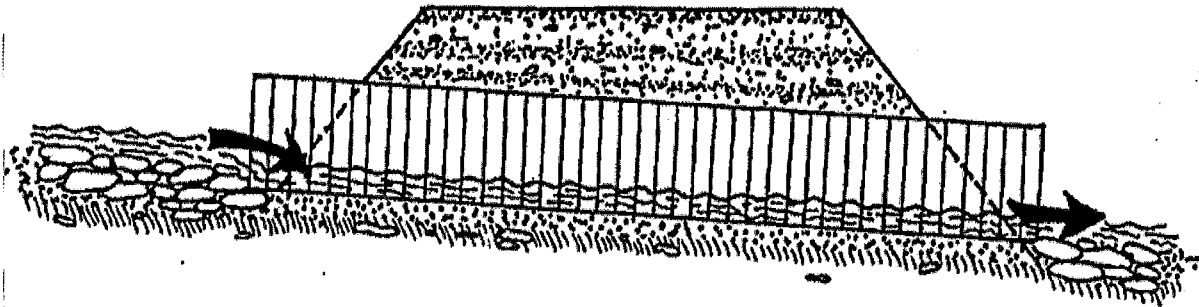


FIGURE 157A. Culvert installation in a shallow fill on a steep, boulder bedded Class II (non-fish bearing) stream replaced a severely undersized pipe (Figure 157a). The new six foot diameter culvert is set slightly into the original streambed and the inlet is armored to prevent erosion. The aggraded channel above the inlet (foreground) has been excavated and disturbed bare soil areas have been mulched and seeded. The roadbed dips into and out of the stream crossing with a critical dip placed just down-road of the left hinge line.



FIGURE 157B. After the first wet season (Figure 157b) the channel bed has self-armored and established a stable cross section leading to the inlet. Bare soil areas are covered with grass.

TYPICAL WATERCOURSE CROSSING CULVERT INSTALLATION



The culvert should be aligned with the natural stream channel, and set slightly below the original stream grade. Armoring of inlet and/or outlet will be assessed on an individual basis

Road Related Best Management Practices (BMPs).

Road Work – All roads associated with this WQ enrollment are existing, and no road construction or reconstruction is required. An assessment of road surface and drainage conditions for all road segments within the property was performed by NRM. The property does not have any Class I or Class II watercourse crossings, nor any bridges.

General: At the end of each year of use and prior to October 15, all drainage structures (rolling dips, disconnect dips, and/or critical dips) will be inspected and reconstructed as necessary to be in functioning order. Road side berms will be breached and the road surface will be shaped, crowned or out sloped, to establish good surface drainage.

Each road approach to a watercourse crossing shall be treated to create and maintain a stable operating surface, and to avoid the generation of fines during use, as described below. The road approach encompasses either of the following areas, whichever is less:

- the area from the watercourse channel to the nearest drainage facility, but not less than 50 feet; or
- the area from the watercourse channel to the first high point on the road where road drainage flows away from the watercourse.

Road surfaces on the following shall consist of high-quality, durable, compacted rock or paving:

- permanent roads,
- seasonal roads crossing Class I watercourses,

Ditches exhibiting down cutting along the following shall be lined with high quality, durable rock:

- permanent roads,
- seasonal roads crossing Class I watercourses,
- roads used from October 15 to June 1.

Ditches along the following shall be treated to prevent scour:

- seasonal roads used during the current year,
- seasonal roads used from October 15 to June 1.

Bare soil on associated fill slopes, shoulders and cuts shall be treated to minimize erosion. Sediment discharge from unstable or eroding cutbanks, fillslopes and landing fills will be prevented by pulling, buttressing, or other means and by installing and maintaining effective erosion control materials.

Existing culverts on the property shall have the inlets and outlets cleaned of debris and vegetation annually.

Erosion control materials shall be applied in sufficient quantity prior to the onset of measurable precipitation with re-application as needed to avoid any visible increase in surface erosion or turbidity in Class I, II or III receiving watercourses.

Prior to October 15 of each year of use, all road watercourse crossings on the property shall have or will receive a critical dip, the approaches to the crossing shall be hydrologically disconnected with dips or pipes, and the road surface between the disconnects shall receive treatment by mulching or rocking.

Other BMPs for roads

Except for maintenance needs that arise from October 15 to June 1, all work described below shall be completed before October 15 in the year that work begins:

- 1) Road surfaces shall be outsloped with rolling dips, wherever feasible.
- 2) All road segments shall be hydrologically disconnected, to the extent feasible, from watercourses by site specific application of the following: outsloping, rocking, installation of rolling dips, cross drains, and/or waterbars. All of these features shall drain to stable sediment filter strips.
- 3) Crossings and associated fills shall be removed or reconstructed where there is evidence of failure potential or sediment delivery to Class I, Class II, or Class III watercourses and lakes.
- 4) Culverts on Class I, Class II, or Class III watercourses shall be replaced or removed if they are crushed, perforated, undermined (flow is piping through fill), separated, sized

inadequately to carry water from the hundred-year storm event, located in unstable fill, or positioned such that they erode fill.

- A) Replaced culverts shall be installed at or as close to the original stream grade and slope as feasible.
 - B) Permanent culverts shall be designed to pass 100-year floods.
 - C) Watercourse crossings and associated fills and approaches shall be constructed or maintained to prevent diversion of stream overflow down the road and armored to minimize fill erosion should the drainage structure become obstructed or when precipitation is sufficient to generate overland flow off the road surface.
- 5) The surface of each road approach to a watercourse crossing shall be treated to create and maintain a stable operating surface, and to avoid the generation of fines during use in accordance with subsection A through F below.
- A) Road surfaces on the following shall consist of high-quality, durable, compacted rock or paving:
 - (i) permanent roads,
 - (ii) seasonal roads crossing Class I watercourses, or tributary to Class I watercourses,
 - (iii) roads used from October 15 to June 1.
 - B) Road surfaces on the following shall be treated as described in (A) with rock, seed and straw mulch, or seed and stabilized straw:
 - (i) all seasonal roads used in the current year,
 - (ii) all seasonal roads used from October 15 to June 1,
 - C) Approaches to temporary crossings on permanent roads shall be rocked as needed after crossing removal to avoid rutting or pumping fines during use.
 - D) Ditches exhibiting downcutting along the following shall be lined with high quality, durable rock:
 - (i) permanent roads,
 - (ii) seasonal roads crossing Class I watercourses, or watercourses tributary to Class I watercourses,
 - (iii) roads used from October 15 to June 1.
 - E) Ditches along the following shall be treated to prevent scour:
 - (i) seasonal roads used in the current year,
 - (ii) seasonal roads used from October 15 to June 1.
 - F) Bare soil on associated fill slopes, shoulders and cuts shall be treated to minimize erosion.

- 6) Sediment discharge from unstable or eroding cutbanks, fill slopes, crossing and landing fills will be prevented by pulling, buttressing, or other means, followed by installing and maintaining effective erosion control measures and materials.
- 7) Bridges (including associated fill, rip-rap, and abutments) and bridge approaches showing evidence of failure potential or sediment delivery to Class I, Class II, or Class III watercourses and lakes shall be repaired, replaced, or removed.
- 8) Erosion control materials shall be applied in sufficient quantity prior to the onset of measurable precipitation with re-application as needed to avoid any visible increase in surface erosion or turbidity in Class I, Class II or Class III receiving watercourses.
- 9) All roads in Class I WLPZs shall exhibit a rocked or paved stable operating surface. The surface shall consist of high quality, durable, compacted rock, or paving. The road surface and base shall be maintained to avoid generation of fines during use.
- 10) Use of unpaved roads shall cease when:
 - A) precipitation is sufficient to generate overland flow off the road surface,
 - B) use of any portion of the road results in rutting of the road surface, or
 - C) a stable operating surface cannot be maintained.
- 11) Use of unpaved roads may be resumed only when there is a stable road surface.
- 12) Road and activity area construction or reconstruction shall cease when conditions prevent a stable operating surface.
- 13) Road or activity area construction or reconstruction may resume only after soil conditions allow a stable operating surface to be developed.
- 14) Discharge sites below the outlets of drainage facilities on all roads on the property shall be inspected by the landowner for evidence of sediment delivery to Class I, Class II, or Class III watercourses and lakes as well as evidence of gully formation or enlargement at least twice annually; once between June 1 and October 15, and at least once after October 15 following the first storm event producing bankfull stage discharges. If evidence of sediment delivery or gully development is present, additional cross drains, waterbars, rolling dips or other erosion control measures shall be installed to reduce the discharge volume to the site.

Associated Standard Conditions

I. As described in the Order, dischargers will fall within one of three tiers.

Discharger shall be in the tier that covers the most impactful part of the operations (i.e., different sections of a property cannot be divided among the tiers). **All dischargers**, regardless of Tier are subject to the standard conditions in section **I.A**, MRP section **I.D.**, and General Terms, Provisions and Prohibitions.

Tier 2 Dischargers are also subject to section **I.B. (a Water Resources Protection Plan)**, and Tier 3 Dischargers are subject to sections **I.A.**, **I.B.**(if cultivating cannabis), and **I.C.**

A. Standard Conditions, Applicable to All Dischargers

1. Site maintenance, erosion control and drainage features

- a. Roads shall be maintained as appropriate (with adequate surfacing and drainage features) to avoid developing surface ruts, gullies, or surface erosion that results in sediment delivery to surface waters.
- b. Roads, driveways, trails, and other defined corridors for foot or vehicle traffic of any kind shall have adequate ditch relief drains or rolling dips and/or other measures to prevent or minimize erosion along the flow paths and at their respective outlets.
- c. Roads and other features shall be maintained so that surface runoff drains away from potentially unstable slopes or earthen fills. Where road runoff cannot be drained away from an unstable feature, an engineered structure or system shall be installed to ensure that surface flows will not cause slope failure.
- d. Roads, clearings, fill prisms, and terraced areas (cleared/developed areas with the potential for sediment erosion and transport) shall be maintained so that they are hydrologically disconnected, as feasible, from surface waters, including wetlands, ephemeral, intermittent and perennial streams. 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).
- e. Ditch relief drains, rolling dip outlets, and road pad or terrace surfaces shall be maintained to promote infiltration/dispersal of outflows and have no apparent erosion or evidence of soil transport to receiving waters.
- f. Stockpiled construction materials are stored in a location and manner so as to prevent their transport to receiving waters.

2. Stream Crossing Maintenance

- a. Culverts and stream crossings shall be sized to pass the expected 100- year peak streamflow.
- b. Culverts and stream crossings shall be designed and maintained to address debris associated with the expected 100-year peak streamflow.
- c. Culverts and stream crossings shall allow passage of all life stages of fish on fish-bearing or restorable streams, and allow passage of aquatic organisms on perennial or intermittent streams.

- d. Stream crossings shall be maintained so as to prevent or minimize erosion from exposed surfaces adjacent to, and in the channel and on the banks.
- e. Culverts shall align with the stream grade and natural stream channel at the inlet and outlet where feasible. 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.
- 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. If infeasible to install a critical dip, an alternative solution may be chosen.

3. Riparian and Wetland Protection and Management

- a. For Tier 1 Dischargers, cultivation areas or associated facilities shall not be located within 200 feet of surface waters. While 200 foot buffers are preferred for Tier 2 sites, at minimum, cultivation areas and associated facilities shall not be located or occur within 100 feet of any Class I or II watercourse or within 50 feet of any Class III watercourse or wetlands. The Regional Water Board or its Executive Officer may apply additional or alternative conditions on enrollment, including site-specific riparian buffers and other BMPs beyond those identified in water resource protection plans to ensure water quality protection. 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.
- c. Buffers shall be of sufficient width to filter wastes from runoff discharging from production lands and associated facilities to all wetlands, streams, drainage ditches, or other conveyances.
- d. Riparian and wetland areas shall be protected in a manner that maintains their essential functions, including temperature and microclimate control, filtration of sediment and other pollutants, nutrient cycling, woody debris recruitment, groundwater recharge, streambank stabilization, and flood peak attenuation and flood water storage.

4. Spoils Management

- a. Spoils shall not be stored or placed in or where they can enter any surface water. 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.
- b. Spoils shall be adequately contained or stabilized to prevent sediment delivery to surface waters.
- c. Spoils generated through development or maintenance of roads, driveways, earthen fill pads, or other cleared or filled areas shall not be sidecast in any location where they can enter or be transported to surface waters.

5. Water Storage and Use

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

- b. Water conservation measures shall be implemented. Examples include use of rainwater catchment systems or watering plants with a drip irrigation system rather than with a hose or sprinkler system.
- c. For Tier 2 Dischargers, if possible, develop off-stream storage facilities to minimize surface water diversion during low flow periods.
- d. Water is applied using no more than agronomic rates. "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.
- f. Water storage features, such as ponds, tanks, and other vessels shall be selected, sited, designed, and maintained so as to insure integrity and to prevent release into waters of the state in the event of a containment failure.

6. Irrigation Runoff

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

In the event that irrigation runoff occurs, measures shall be in place to treat/control/contain the runoff to minimize the pollutant loads in the discharge. Irrigation runoff shall be managed so that any entrained constituents, such as fertilizers, fine sediment and suspended organic particles, and other oxygen consuming materials are not discharged to nearby watercourses. Management practices include, but are not limited to, modifications to irrigation systems that reuse tailwater by constructing offstream 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.

7. Fertilizers and Soil Amendments

- a. Fertilizers, potting soils, compost, and other soils and soil amendments shall be stored in locations and in a manner in which they cannot enter or be transported into surface waters and such that nutrients or other pollutants cannot be leached into groundwater.
- b. Fertilizers and soil amendments shall be applied and used per packaging instructions and/or at proper agronomic rates (see footnote on previous page).
- c. Cultivation areas shall be maintained so as to prevent nutrients from leaving the site during the growing season and post-harvest.

8. Pesticides/Herbicides

At the present time, there are no pesticides or herbicides registered specifically for use directly on cannabis and the use of pesticides on cannabis plants has not been reviewed for safety, human health effects, or environmental impacts. Under California law, the only pesticide products not illegal to use on cannabis are those that contain an active ingredient that is exempt from residue tolerance requirements and either registered and labeled for a broad enough use to include use on

cannabis or exempt from registration requirements as a minimum risk pesticide under FIFRA section 25(b) and California Code of Regulations, title 3, section 6147. For the purpose of compliance with conditions of this Order, any uses of pesticide products shall be consistent with product labelling and any products on the site shall be placed, used, and stored in a manner that ensures that they will not enter or be released into surface or ground waters.

9. Petroleum products and other chemicals

- a. Petroleum products and other liquid chemicals, including but not limited to diesel, biodiesel, gasoline, and oils shall be stored so as to prevent their spillage, discharge, or seepage into receiving waters. Storage tanks and containers must be of suitable material and construction to be compatible with the substance(s) stored and conditions of storage such as pressure and temperature.
- b. Above ground storage tanks and containers shall be provided with a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation.
- c. Dischargers shall ensure that diked areas are sufficiently impervious to contain discharged chemicals.
- d. Discharger(s) shall implement spill prevention, control, and countermeasures (SPCC) and have appropriate cleanup materials available onsite.
- e. Underground storage tanks 110 gallons and larger shall be registered with the appropriate County Health Department and comply with State and local requirements for leak detection, spill overflow, corrosion protection, and insurance coverage.

10. Cultivation-related wastes

Cultivation-related wastes including, but not limited to, empty soil/soil amendment/fertilizer/pesticide bags and containers, empty plant pots or containers, dead or harvested plant waste, and spent growth medium shall, for as long as they remain on the site, be stored 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. Plant waste may also be composted, subject to the same restrictions cited for cultivation-related waste storage.

11. Refuse and human waste

- a. Disposal of domestic sewage shall meet applicable County health standards, local agency management plans and ordinances, and/or the Regional Water Board's Onsite Wastewater Treatment System (OWTS) policy, and shall not represent a threat to surface water or groundwater.
- b. Refuse and garbage shall be stored in a location and manner that prevents its discharge to receiving waters and prevents any leachate or contact water from entering or percolating to receiving waters.
- c. Garbage and refuse shall be disposed of at an appropriate waste disposal location.

12. Remediation/Cleanup/Restoration

Remediation/cleanup/restoration activities may include, but are not limited to, removal of fill from watercourses, stream restoration, riparian vegetation planting and maintenance, soil stabilization, erosion control, upgrading stream crossings, road outcropping and rolling dip installation where safe and suitable, installing ditch relief culverts and overside drains, removing berms, stabilizing unstable areas, reshaping cutbanks, and rockering 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 C. Planting Plan

Re-Vegetation plan For Trash Pile Removal

Above the bank break native trees or shrubs will be planted on 5 foot centers in the disturbed area along each bank (see figure 1 below for planting and erosion control locations). A mix of trees and shrubs shall be used. A total of 12 plants will be planted. Plants should be installed in December 2016/ January 2017. A total of 0.004 acres of the riparian zone will be revegetated.

Species planted may include: Incense cedar (*Calocedrus decurrens*), Douglas fir (*Pseudotsuga menziesii*), big leaf maple (*Acer macrophyllum*), bay laurel (*Umbellularia californica*), Coyote brush (*Baccharis pilularis*), or buckeye (*Aesculus californica*).

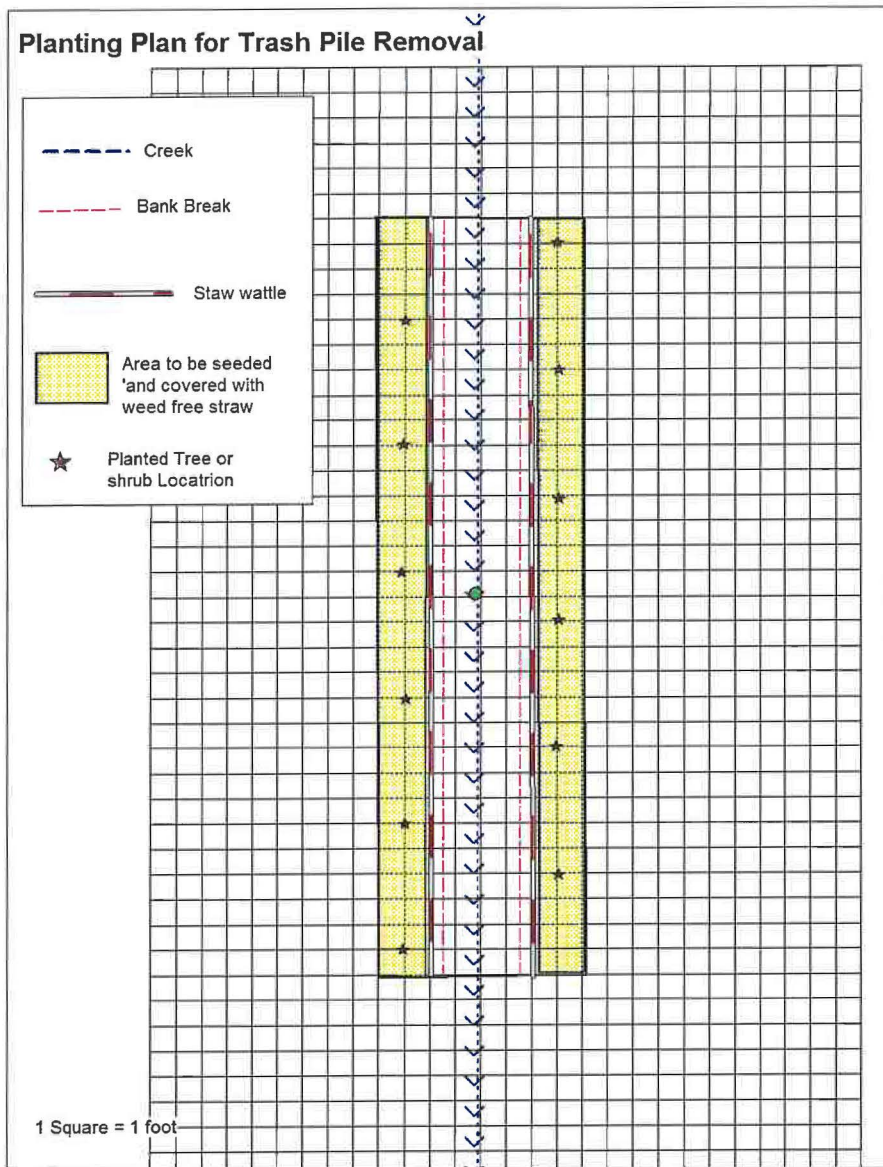


Figure 1. Planting and erosion control locations for Trash Pile Removal

Storage shed Relocation

The 6 foot by 8 foot storage shed including the cement slab foundation will be removed from the wet area. After its removal its footprint will be re-planted with native herbaceous wetland plants. Plants will be installed on two foot centers. A total of 20 plants will be planted. Plants should be installed in December 2016/ January 2017. A total of 0.001 acres will be revegetated. Figure 2 shows planting locations.

Species planted may include: common rush (*Juncus effuses*), Spreading rush (*Juncus patens*), Naked sedge (*Carex nudata*), Small fruited bulrush (*Scirpus microcarpus*), or Slough sedge (*Carex obnupta*)

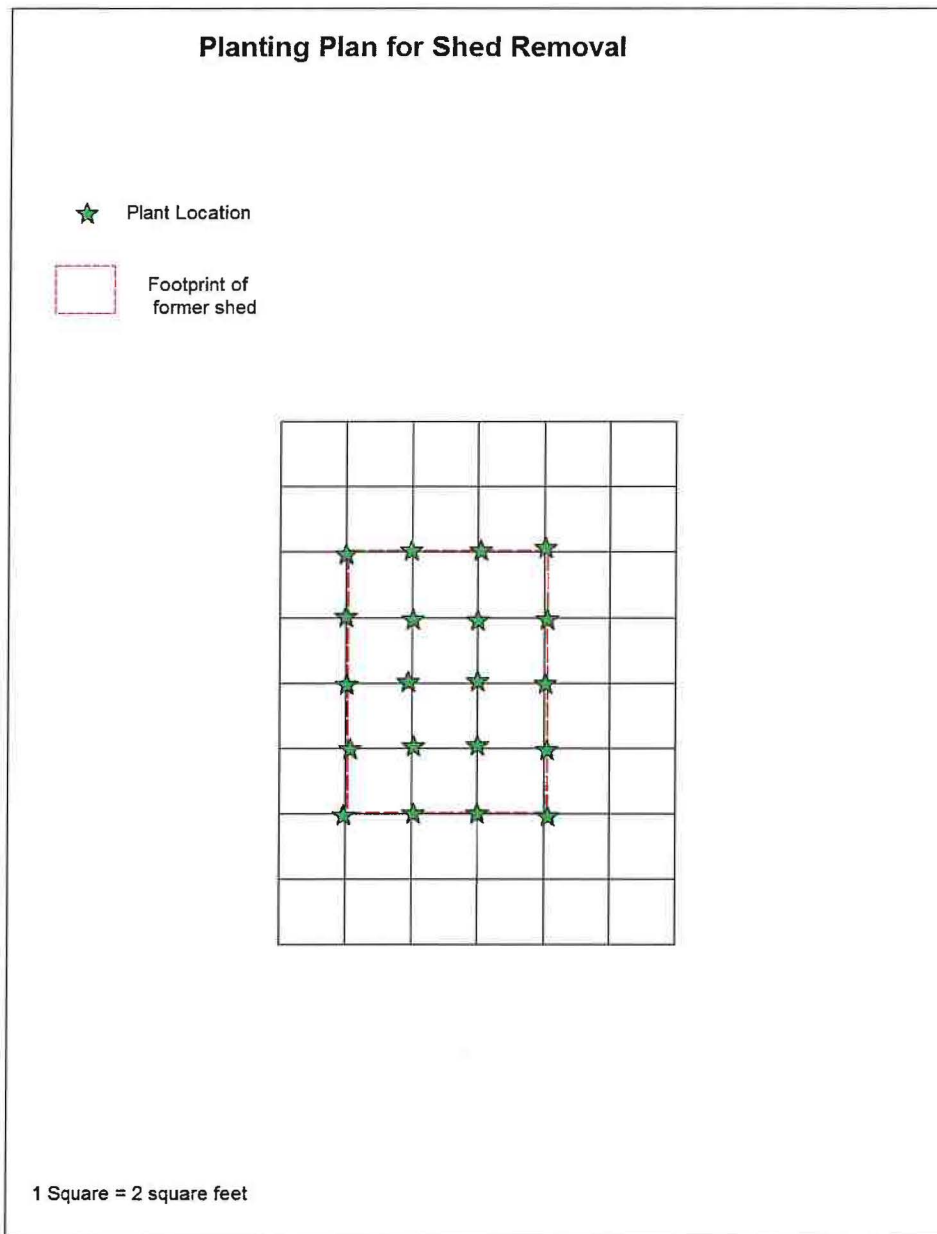


Figure 2. Planting Plan for Shed Removal

Revegetation of Riparian Zone Following Hoop House Removal

The portion of the hoop house within 50 feet of the class three channels will be removed. The edge of the flat is showing some erosion. It will be pulled back and stabilized. The exposed soil on the fill slope will be covered with weed free straw. The entire fifty feet of riparian zone will be re-planted with native trees or shrubs. Above the bank break native trees or shrubs will be planted on 10 foot centers in the disturbed buffer area (see figure 3 below for planting and erosion control locations). A mix of trees and shrubs shall be used. A total of 21 plants will be planted. Plants should be installed in December 2016/ January 2017. A total of 0.026 acres of the riparian zone will be revegetated.

Species planted may include: Incense cedar (*Calocedrus decurrens*), Douglas fir (*Pseudotsuga menziesii*), big leaf maple (*Acer macrophyllum*), bay laurel (*Umbellularia californica*), Coyote brush (*Baccharis pilularis*), or buckeye (*Aesculus californica*).

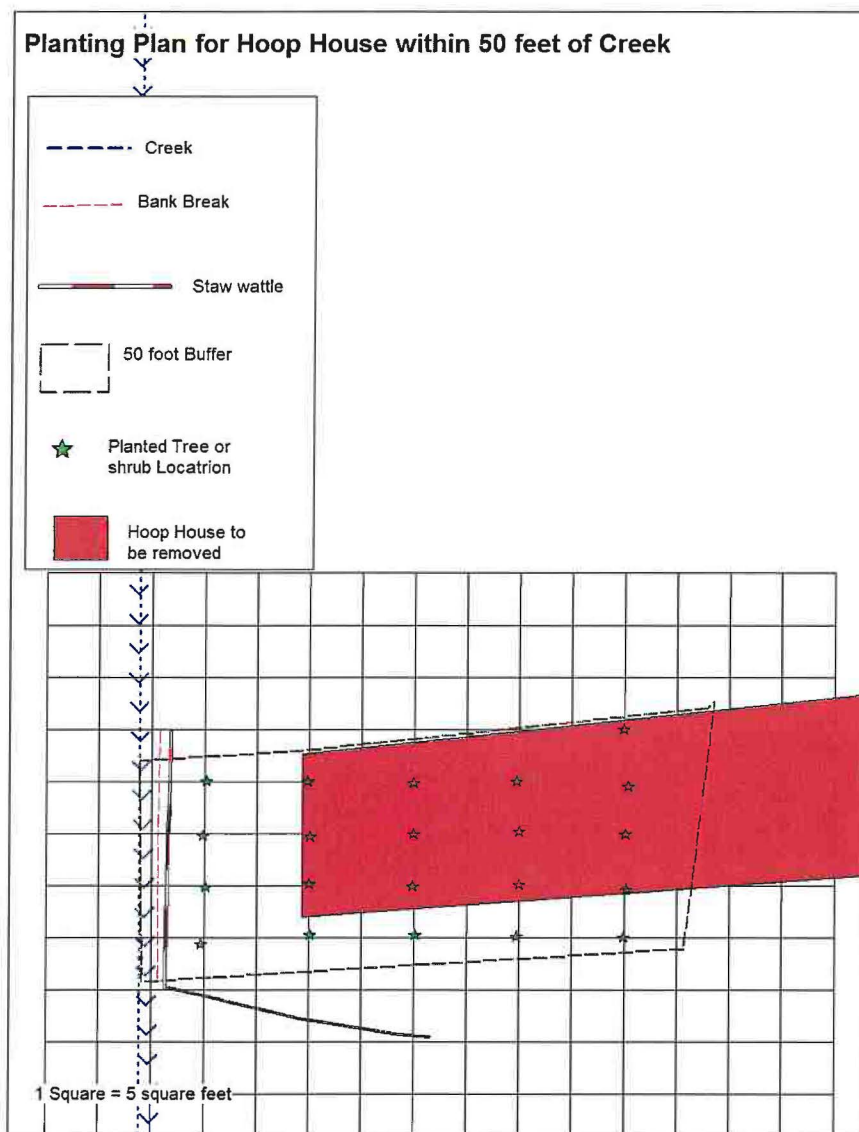


Figure 3. Planting location and erosion control for hoop house removal

Pot Removal from Outdoor Areas

The areas where the pots are sitting in outdoor areas 1 and 2 will be revegetated. Following the removal of the pots the disturbed area will be seeded with grass seed and covered with weed free straw.

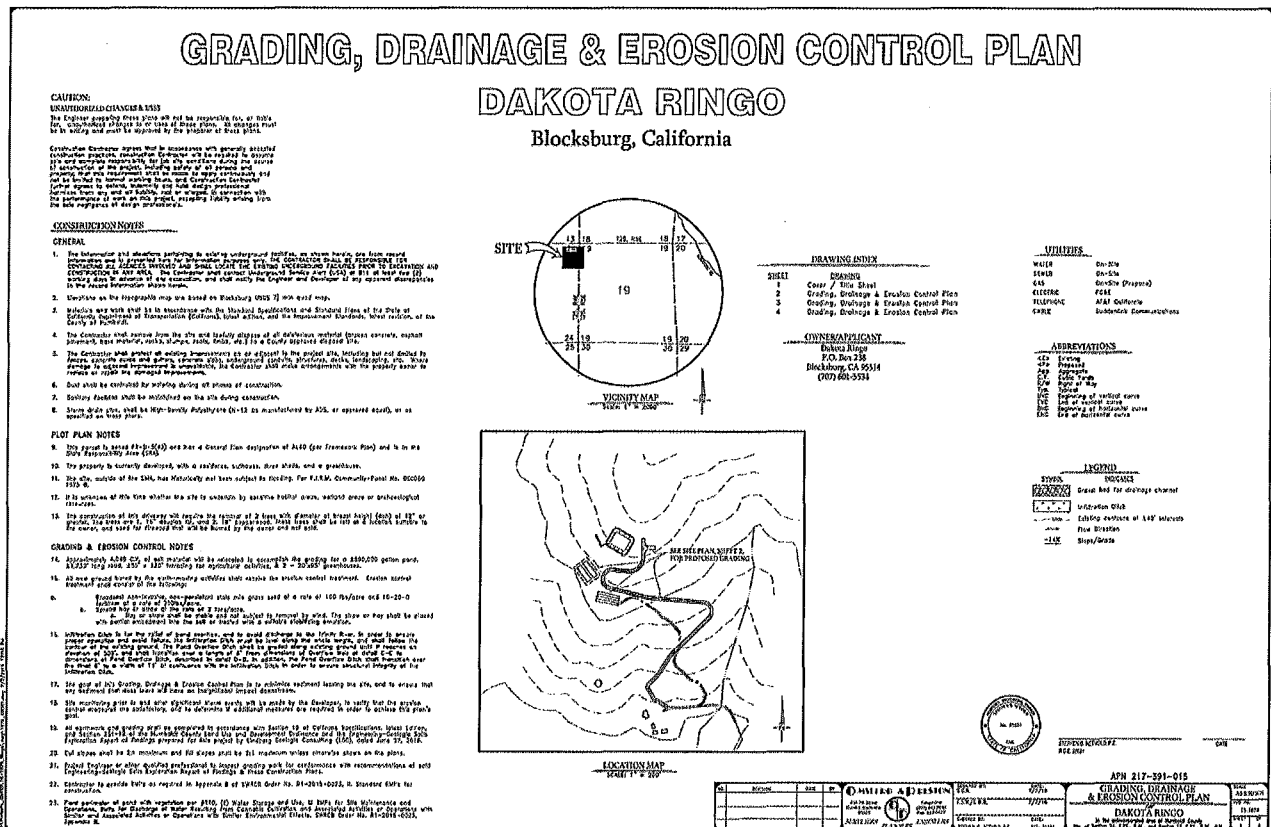
Planting Methods

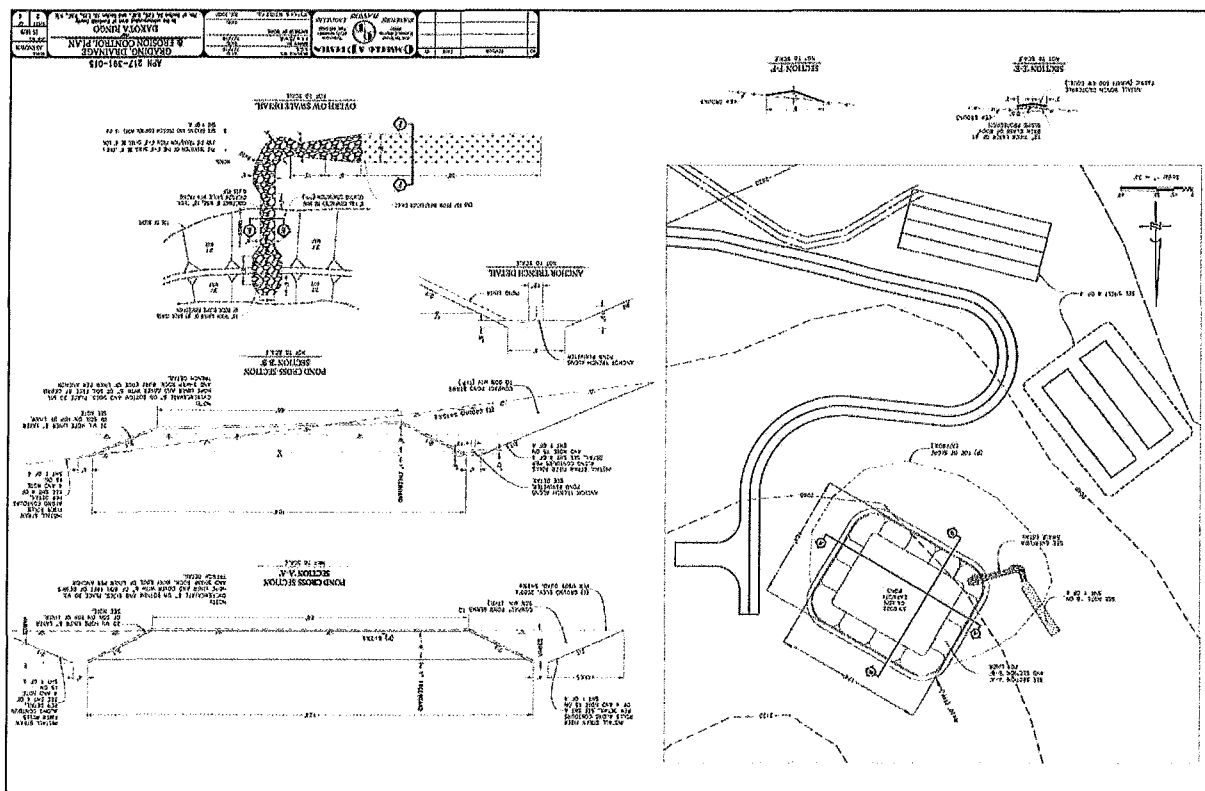
All potted plants used will be healthy and disease free. Plants that are wilted or root-bound will not be used, and will be replaced with healthy stock. Protective plant covers will be placed around each plant and staked into the ground after planting. Potted plants will be transplanted in the following manner:

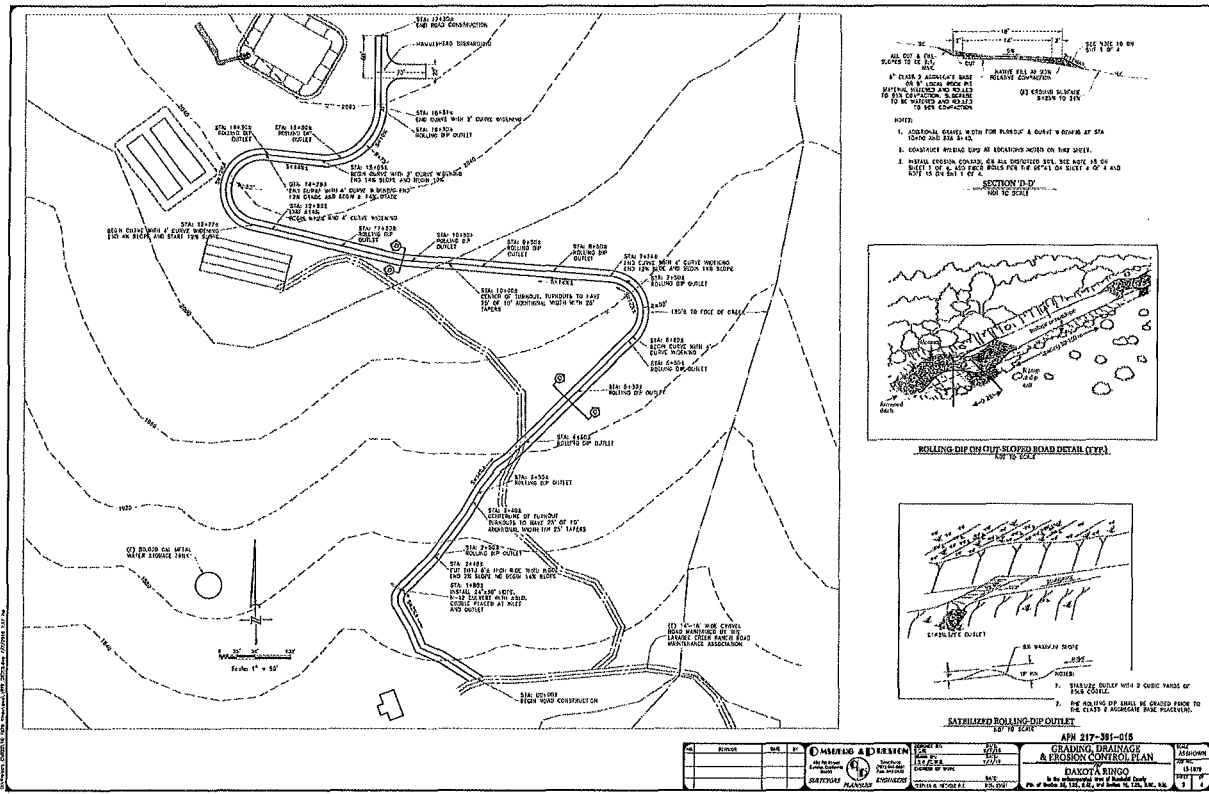
1. Excavate a hole twice the diameter and one and a half times the depth of the plant's container.
2. Scarify the sides of the hole to loosen the soil.
3. Backfill the hole with loose soil until it is about the same depth as the container.
4. Place plant into the hole and backfill with soil until it is level with the root ball.
5. Construct a 4 inch high, approximately 30 inch diameter basin around the plant with the extra soil.
6. Place 3 inches of weed-free mulch or shredder bark around the plant.
7. Stake a protective plant cover over the plant.
8. Irrigate the plant.

The landowner will check on the plantings periodically through the fall of 2017 and water them as needed, as well as clear grasses or other competing vegetation from around the base of the plant. As these are small projects located within the landowners back yard, we don't believe a monitoring plan, success criteria, or reporting is necessary.

Appendix D- designs for new cultivation area, pond, and septic







Appendix D for Ringo and Nunez APN 217-391-015

Version 2

Submitted to:

*California Regional Water Quality Control Board -
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, California 95403*

Prepared by:

*Prairie Moore and Sandra Brown
Natural Resources Management Corporation
1434 3rd Street
Eureka, CA 95501*

July 21, 2016



Site Address and Latitude / Longitude

143 Sylvan Glade, Blocksburg, CA, 95514

Latitude: 40.281, Longitude: 123.669

Property Owner & Project Proponent Name, Address, and Contact Information

Dakota Ringo and Nancy Nunez

143 Sylvan Glade, Blocksburg, CA, 95514

Phone: 707-601-7705

Licensed professional consultant and contractor Name, Address, and Contact information

Consultant: Prairie Moore, Natural Resources Management Corporation,

1434 3rd street, Eureka CA 95501

Contractor: Property owner will complete all projects.

Detailed Project Description

Three projects are included. All Projects are scheduled to be completed this fall prior to November 15th while the channels are dry.

Project 1: Trash and debris removal from stream bed. A trash pile was placed in a class III ephemeral watercourse by a previous property owner. The current land owner has removed as much of the trash as possible by hand. What remains is a pile of trash and debris mixed with soil approximately 30 ft long, 8ft wide, and 3 ft deep. Slopes in the project area are less than 50%. The remaining debris pile will be removed with an excavator and hauled off site for proper disposal. Following the removal with the excavator hand tools may be used to remove any remaining trash and debris. The banks of the channel will then be covered with weed-free straw and planted with native shrubs (see erosion control section and planting plan for details). See map for location.



Project 1 Trash Pile in Creek

Project 2: Rock Pond Outlet. A pond was created in a different class III ephemeral channel prior to 2007 (probably at least 20 years ago). The pond itself is small (30'X15'X3'). Slopes in the project area are less than 25%. The impoundment structure appears stable and vegetated, showing no signs of movement in the berm. The pond is unlined and generally dry by the end of June. During times of high flows, water exits the pond through a created outlet and ditch and flows to a class II watercourse below. The path of the water is well established. The land owner would like to rock line the outlet of the pond and short segment of the ditch for channel reinforcement. This will insure outflowing water does not erode the berm in the future, and that sediment delivery is minimized. See map for location.



Spill way to be rock

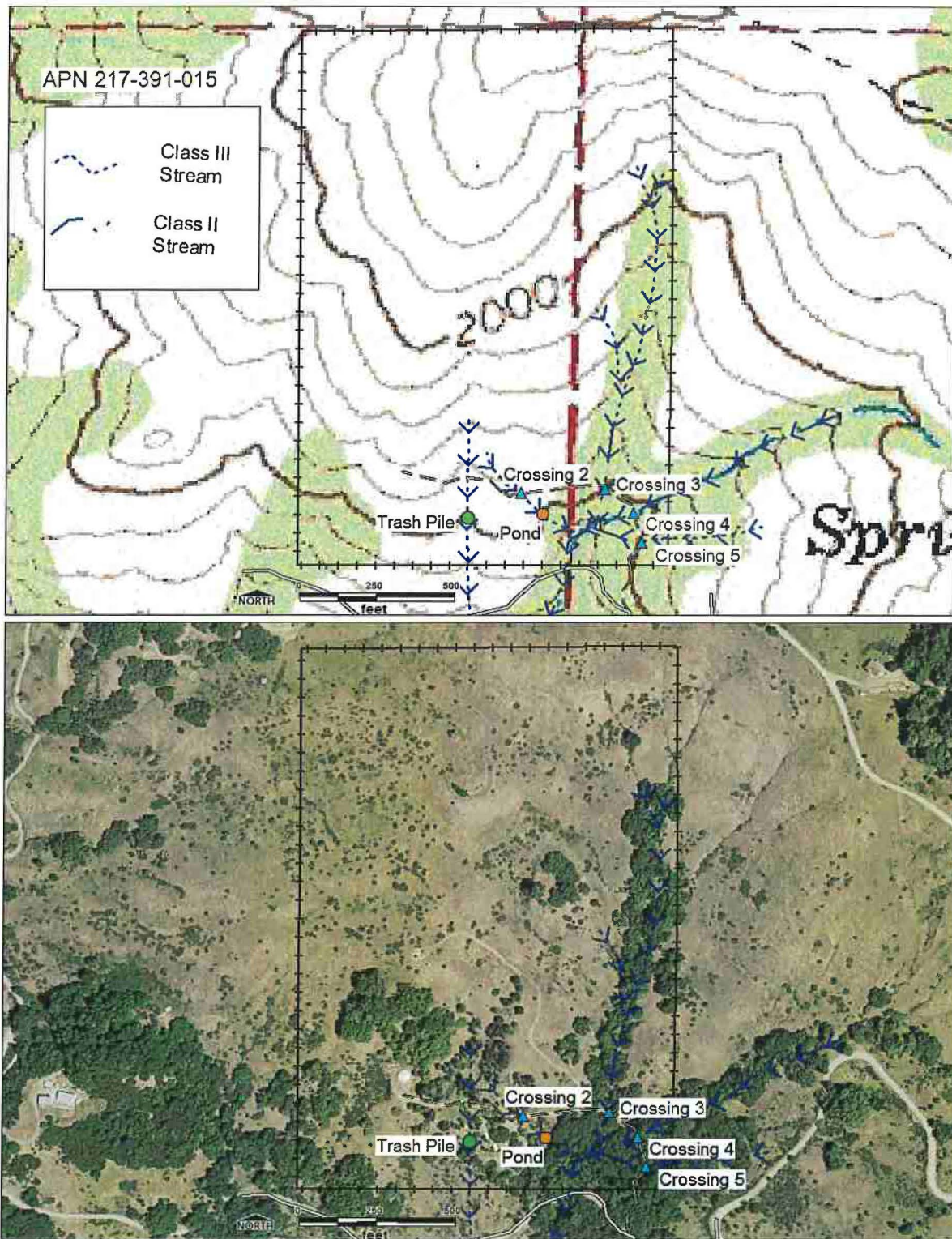
Project 3: The driveway on the property has 5 watercourse crossings. Crossing 1 is functioning and sized correctly. The remaining four (2-5) are mostly functioning but are undersized and scheduled for replacement by 2020 under the landowners Water Resource Protection Plan with the NCRWQCB (see cumulative effects below). Crossing 4 is an existing 24" pipe on a Class II intermittent stream. Crossing 4 has a partially clogged inlet which caused stream flow to over-top the road in the winter of 2015. The cause of the clog appears to be large woody debris that built up around the inlet. The woody debris then caught sediment. It is proposed to remove the accumulated sediment and woody debris from the culvert inlet using an excavator prior to the next winter season of 2016-2017. Rock and soil will be hauled off and disposed at least 100 feet from any streams. It will be stabilized preferably spread out and re-vegetated with noninvasive grass seed. This will be done in a manner that will prevent discharge to surface waters.

Cumulative Effects

Disturbance within stream beds on the property over the last five years has been minimal. It is unknown exactly when the trash pile (project 1) was placed in the creek but likely it has been there the past five years. Additional disturbance was caused by installing growing areas within the 50 foot buffer of two Class III creeks on the property in 2015. This included the clearing of herbaceous vegetation and minimal dirt moving (done with hand tools) to make flat pads for garden pots.

Looking forward five years driveway water course crossings 2-5 are mostly functioning but are undersized and scheduled for replacement by 2020 under the landowners Water Resource Protection Plan with the NCRWQCB. This will include digging up the four existing culverts and replacing them. Additional road work will be done in the crossing areas to disconnect the crossing from the stream channels. Currently these crossings are as follows: Crossing 2 is an existing 12" pipe on a Class III, Crossing 3 is an existing 24" pipe on a Class II, Crossing 4 is an existing 24" pipe on a Class II, and Crossing 5 is an existing 18" pipe on a Class II.

Site Map Showing Locations of Proposed Work



Project 1 Removal of Trash Pile form Creek

Proposed Schedule

This Project will take between two and four days to complete. This project will be done during dry periods between May 1 to October 15. If it is necessary to complete the project between October 16 November 15 the Winter Operating plan below will be followed.

Construction BMP's

- All work will be completed during the summer and fall months when the project area is dry.
- An excavator will be used to remove the trash soil and rock.
- Work shall be performed from the top of the creek banks.
- Equipment will be clean and free of invasive species
- Equipment will be well maintained and free of oil and fuel leaks. Equipment will not be stored in riparian areas. Drip pans will be placed under parked equipment.
- All removed material will be hauled off site for proper disposal

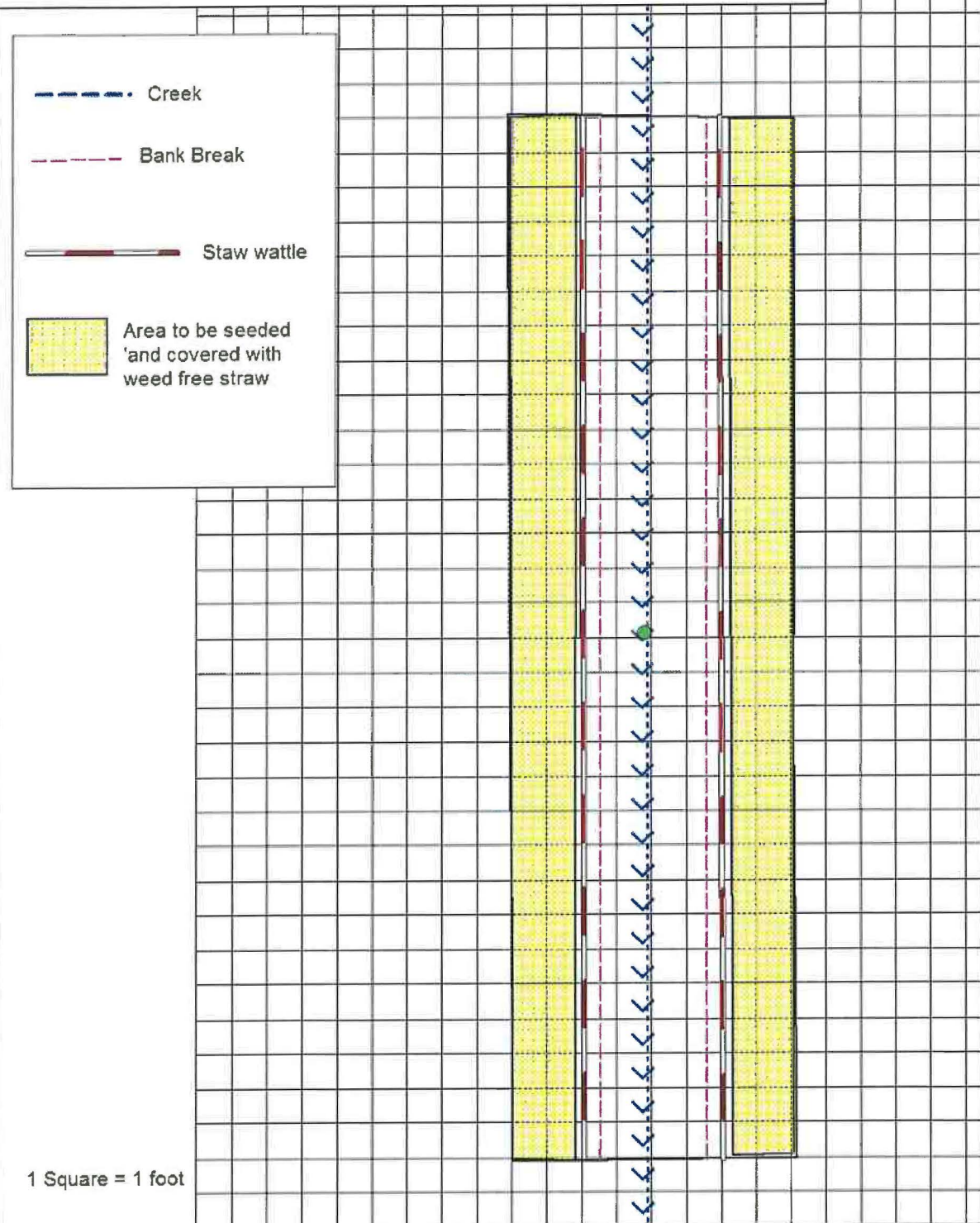
Erosion Control BMP's

- After removal of the trash pile straw wattle will be placed at bank break on both side of the stream to prevent runoff. Slopes in the project area are between 25% and 50%. Therefore Wattle should be placed at a minim of 15 feet apart in the disturbed area. As the project area is less than 10 feet wide a straw wattle placed at bank break on both side of the stream should be sufficient. If however, greater than 15 foot width of the riparian zone is disturbed on either side of the stream during the trash removal additional wattle will be placed.
- The area above bank break will be planted with shrubs and trees (see planting plan below)
- The entire disturbed area above bank break will be seeded with noninvasive grass seed (example barley grass), and covered with weed free straw prior to winter rains. Straw will be anchored with a tackifier
- Erosion control materials shall be, at stored on-site at all times while work is taking place
- Upon work completion, all exposed soil present in and around the
- cleanup/restoration sites shall be stabilized within 7 days of the completion of work. Until stabilization is complete the forecast will be checked daily and A 2-day (48-hour) forecast of rain 50% of greater shall be the trigger immediate completion of stabilization activities.

Winter Operating Plan

- If work will be completed between October 16th and November 15th the rain forecast will be checked prior to starting work. The project will only be started in a five day window with no forecasted rain. The forecast will be checked daily while work is taking place. A 2-day (48-hour) forecast of rain of 50% or greater shall be the trigger for temporary cessation of project activities and winterization/erosion protection of the work site. Straw with be spread of bare soils and secured to the ground.
- Erosion control works completed up-to-date and daily. Straw wattle will kept in place and checked daily.
- If an un-forecasted rain event takes place work will immediately cease and erosion control protections will be put into place.

Erosion and Sediment Control for Trash Pile Removal



Project 2 Rock Pond Outlet

Proposed Schedule

This project will take between two and four days to complete. This project will be done during dry periods between May 1 to October 15. If it is necessary to complete the project between October 16 November 15 the Winter Operating plan blow will be followed.

Construction BMP's

- All work will be completed during the summer and fall months when the project area is dry.
- Pond outlet will be lined with clean drain rock.
- An excavator will be used to place rock along the side and bottom of the outlet channel.
- Work shall be performed from the top of the creek banks.
- Equipment will be clean and free of invasive species
- Equipment will be well maintained and free of oil and fuel leaks. Equipment will not be stored in riparian areas. Drip pans will be placed under parked equipment.

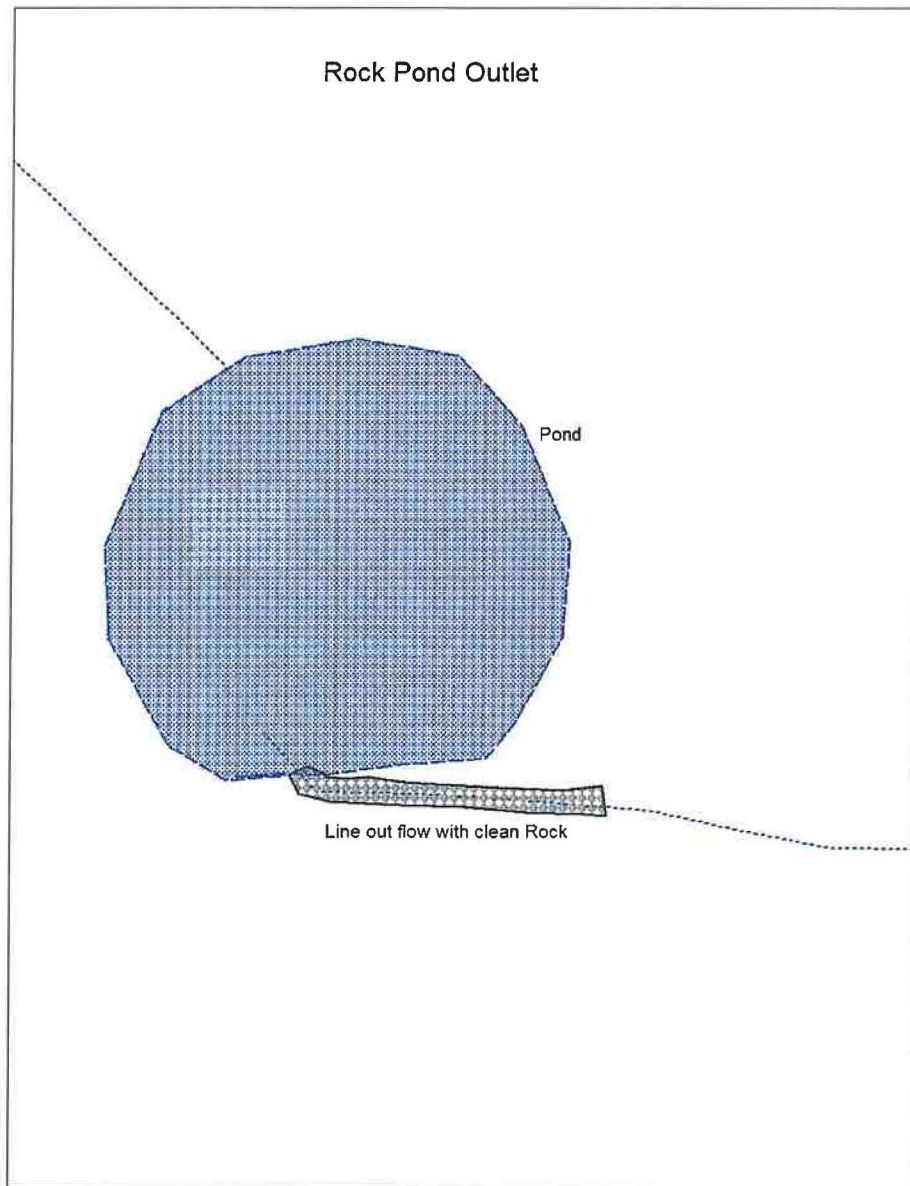
Erosion Control BMP's

- If any areas are de-vegetated during the rocking process by equipment usage etc. these areas will be seeded with noninvasive grass seed (example barley grass), and covered with weed free straw prior to winter rains. Straw will be anchored with a tackifier.
- Erosion materials will be onsite and ready for immediate use. Erosion materials will be onsite and ready for immediate use.

Winter Operating Plan

- If work will be completed between October 16th and November 15th the rain forecast will be checked prior to starting work. The project will only be started in a 5 day window with no forecasted rain. The forecast will be checked daily while work is taking place. A 2-day (48-hour) forecast of rain of 50% or greater shall be the trigger for temporary cessation of project activities and winterization/erosion protection of the work site. Straw will be spread of bare soils and secured to the ground.
- If an un-forecasted rain event takes place work will immediately cease and erosion control protections will be put into place.

- Erosion materials will be onsite and ready for immediate use.



Project 3: Remove Sediment blocking Culvert Inlet

Proposed Schedule

Project 3: This project will take between one day to complete. This project will be done during dry periods between May 1 to October 15. If it is necessary to complete the project between October 16 November 15 the Winter Operating plan blow will be followed.

Construction BMP's

- All work will be completed during the summer and fall months when the project area is dry.

- An excavator will be used to remove debris clogging crossing 4 in the summer/ fall of 2016. Removed debris will be disposed of outside of riparian areas where it will not reenter any stream.
- Work shall be performed from the top of the creek banks.
- Equipment will be clean and free of invasive species
- Equipment will be well maintained and free of oil and fuel leaks. Equipment will not be stored in riparian areas. Drip pans will be placed under parked equipment.

Erosion Control BMP's

- If any areas outside of the road prism are de-vegetated during the project by equipment usage etc. these areas will be seeded with noninvasive grass seed (example barley grass), and covered with weed free straw prior to winter rains. Straw will be anchored with a tackifier.
- Erosion materials will be onsite and ready for immediate use. Erosion materials will be onsite and ready for immediate use.

Winter Operating Plan

- If work will be completed between October 16th and November 15th the rain forecast will be checked prior to starting work. The project will only be started in a three day window with no forecasted rain. The forecast will be checked daily while work is taking place. A 2-day (48-hour) forecast of rain of 50% or greater shall be the trigger for temporary cessation of project activities and winterization/erosion protection of the work site. Straw will be spread of bare soils and secured to the ground.
- If an un-forecasted rain event takes place work will immediately cease and erosion control protections will be put into place.

DREDGE AND FILL INFORMATION (The following must be completed for each action where dredging activities, fill material or other activities (e.g. excavation) will result in disturbance and/or discharge to a wetland or other waterbody. Add rows for multiple types of disturbance within the same waterbody type. Attach additional pages as necessary. Provide maps showing the location of project and of all impacts with the corresponding impacts in the format below. Provide all temporary and permanent impacts to waters of the U.S. and waters of the State.)

TYPE OF WATERBODY (i.e. stream, wetland, ephemeral drainage)	FILL and/or EXCAVATION VOLUME AND TYPE (CUBIC YARDS)	FILL and/or EXCAVATION SURFACE AREA (SQUARE FEET OR ACRE)	FILL and/or EXCAVATION LENGTH (LINEAR FEET)	DREDGE VOLUME (CUBIC YARDS)	TYPE OF IMPACT (Temporary or Permanent)
Waters of the U.S					
<input type="checkbox"/> Wetland					
<input checked="" type="checkbox"/> Streambed (OHWM and below)	7 cubic yards rock rip rap on pond outlet channel	280 sq ft 100sqft 25 sq ft	30 ft 25 ft 10 ft	24 cubic yards trash and debris 5 cubic yards sediment removed from culvert inlet	Temporary Permanent Temporary
<input type="checkbox"/> Lake/Reservoir					
<input type="checkbox"/> Ocean/Estuary/Bay					
<input type="checkbox"/> Other					
Sub-total Waters of the U.S.	7 cubic yards	405 sq ft	65 ft	29 cubic yards	
Waters of the State					
<input type="checkbox"/> Riparian					
<input type="checkbox"/> Stream channel/bank (Above OHWM)					
<input type="checkbox"/> Vernal Pool					
<input type="checkbox"/> Spring/Seep/Headwaters					
<input type="checkbox"/> Other					
Sub-total Waters of the State					
Total Waters of U.S. and State	7 cubic yards	405 sq ft	65 ft	29 cubic yards	

Project purpose and Final Goal

The purpose of removing the trash from the creek channel (project 1) is to prevent discharge of trash and debris into the water way. The goal is to remove all trash and debris and revegetate the riparian zone in the project area. The purpose of rocking the pond outlet (project 2) is to stabilize the outlet and prevent sediment discharge into the creek. The goal is to line the outlet with rock to stabilizing it and preventing sediment transport. The goal of removing the sediment and debris blocking the culvert is to maintain the culvert in a functioning state.

Receiving Waters

Basin Creek and the Eel River. No endangered fish species are present in the immediate project areas. However, Coho salmon and steelhead trout are likely to be present downstream of the project area (Basin Creek and Eel River).

Other Relevant Permits

A CDFW 1600 permit has been applied for all three projects

Project 1 NWP 19 Minor Dredging

Project 2: NWP 13 bank stabilization

Project 3: NWP 19 Minor Dredging

Mitigation Proposal

Only project 1 requires a re-vegetation plan. Above the bank break native trees or shrubs will be planted on 5 foot centers in the disturbed area along each bank (see figure below for planting locations). A mix of trees and shrubs shall be used. A total of 12 plants will be planted. Plants should be installed in December 2016/ January 2017. A total of 0.004 acres of the riparian zone will be revegetated.

Planting Methods

All potted plants used will be healthy and disease free. Plants that are wilted or root-bound will not be used, and will be replaced with healthy stock. Protective plant covers will be placed around each plant and staked into the ground after planting. Potted plants will be transplanted in the following manner:

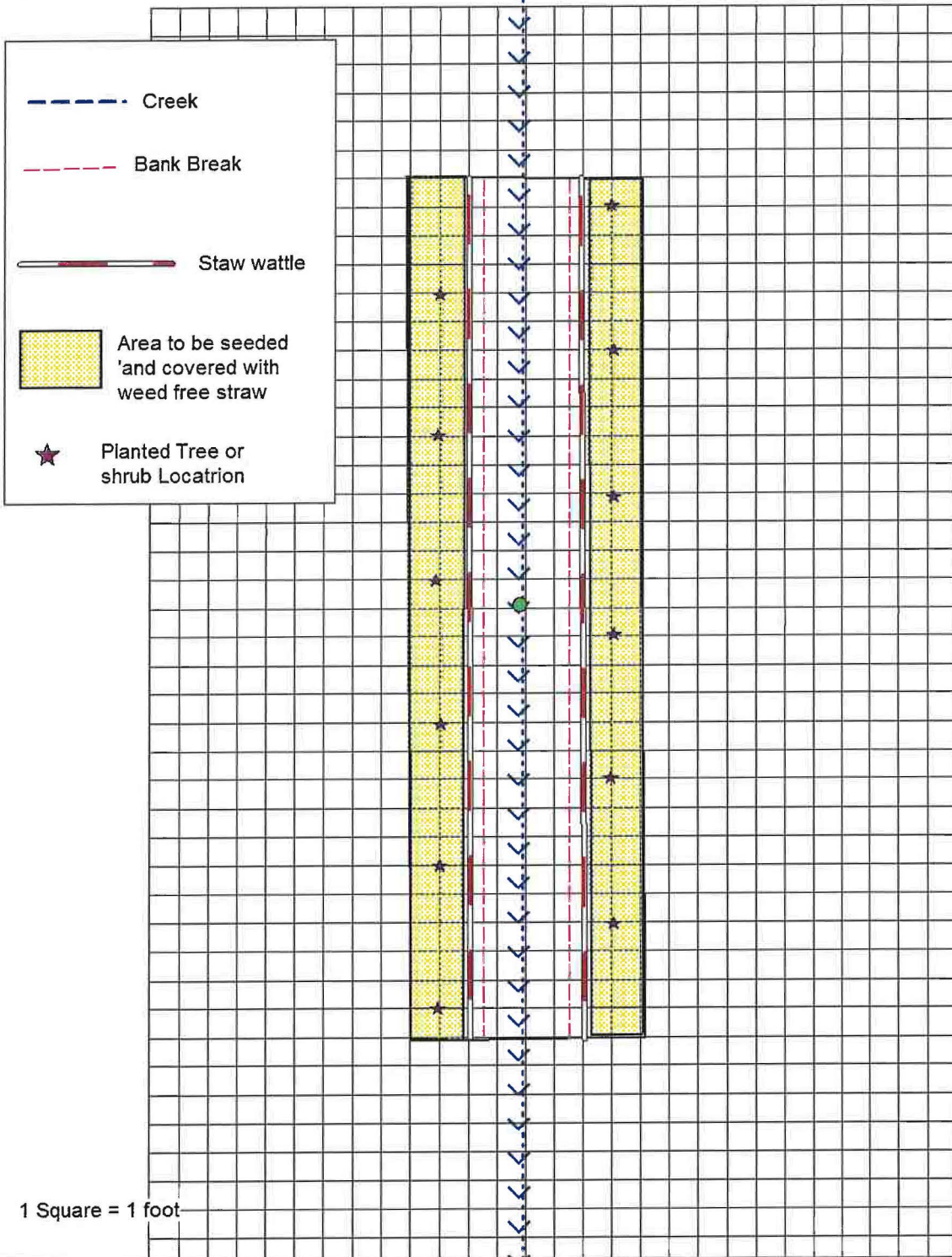
1. Excavate a hole twice the diameter and one and a half times the depth of the plant's container.
2. Scarify the sides of the hole to loosen the soil.
3. Backfill the hole with loose soil until it is about the same depth as the container.
4. Place plant into the hole and backfill with soil until it is level with the root ball.
5. Construct a 4 inch high, approximately 30 inch diameter basin around the plant with the extra soil.
6. Place 3 inches of weed-free mulch or shredder bark around the plant.
7. Stake a protective plant cover over the plant.
8. Irrigate the plant.

Species planted may include: Incense cedar (*Calocedrus decurrens*), Douglas fir (*Pseudotsuga menziesii*), big leaf maple (*Acer macrophyllum*), bay laurel (*Umbellularia californica*), Coyote brush (*Baccharis pilularis*), or buckeye (*Aesculus californica*).

The landowner will check on the plantings periodically through the fall of 2017 and water them as needed if they are showing signs of water stress, as well as clear grasses or other competing vegetation from around the base of the plant. Plants will only be watered for the first summer.

Plantings will be monitored for 3 years. Monitoring will be conducted in the late summer early fall of 2017, 2018, and 2019. The planting design is dense with trees and shrubs on five foot centers. This was done purposely expecting that there would be some mortality. Therefore we do not expect or desire 100 percent survival. The site will be considered successful if by 2019, 60% of the planted plants are surviving, or if cover in the projects areas is 70% or greater. Cover will be measured with a transect down the re-vegetated area on each side of the stream. At 8 ft intervals each transect cover will be assessed in a meter squared plot classes cover is the proportion of the plot area intercepted by the canopy of the species. The following cover classes will be used: (1) <1%, (2) 1%<x<5%, (3) 5%<x<25%, (4) 25%<x<75%, (5) 76%<x<94%, (6) >95%. The midpoints of these ranges will be used for analyses.. A final monitoring report will be submitted to the water board by December 31, 2019. If success criteria are not met by 2019 replanting will be considered, the area will continue to be monitored as necessary to ensure area meets success criteria.

Planting Plan for Trash Pile Removal



Option 1 - Proponent Provided Mitigation Information

Waterbody Type	Acres / Linear Feet Established		Acres / Linear Feet Restored		Acres / Linear Feet Enhanced		Acres / Linear Feet Preserved	
Wetland								
Stream								
Riparian						30 ft		
Vernal Pool								
Lake								
Other								

Option 2 - Mitigation Bank Credits

Waterbody Type	Acres / Linear Feet Established		Acres / Linear Feet Restored		Acres / Linear Feet Enhanced		Acres / Linear Feet Preserved	
Wetland								
Stream								
Riparian								
Vernal Pool								
Lake								
Other								

Mitigation Site Name:

Name of Mitigation Site Operator: