



Item C-5 Lucy Gulch, LLC PLN-11459-CUP

Water Resource Protection Plan (WRPP)

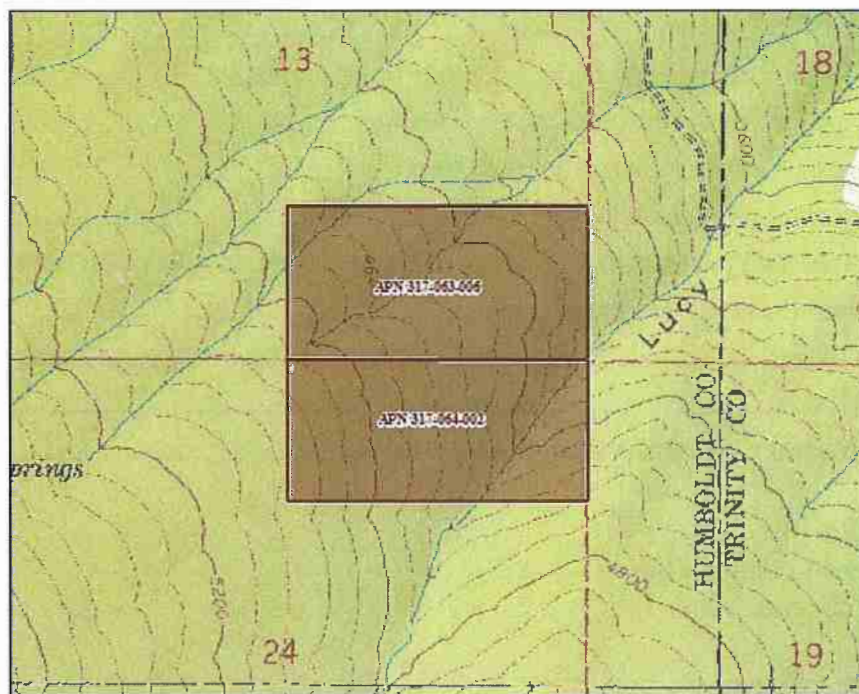
for

APN 317-063-006 and 317-064-002

Located at

2150 Kerlin Creek L Road
Hyampom, California

December, 2018



Prepared for:

WDID #1B161728CHUM
PWA ID #180102120503-5480
2150 Kerlin Creek L Road
Hyampom, California

Prepared by:

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TABLE OF CONTENTS

1.0 PROJECT SUMMARY	3
2.0 CERTIFICATIONS, LIMITATIONS AND CONDITIONS.....	3
3.0 INTRODUCTION	7
4.0 STANDARD CONDITIONS CHECKLIST FOR APN 317-063-006 AND 317-064-002 AS OF 8/20/20187	
4.1 STANDARD CONDITION #1. SITE MAINTENANCE, EROSION CONTROL AND DRAINAGE FEATURES.....	10
4.2 STANDARD CONDITION #2. STREAM CROSSING MAINTENANCE.....	13
4.3 STANDARD CONDITION #3. RIPARIAN AND WETLAND PROTECTION AND MANAGEMENT	15
4.4 STANDARD CONDITION #4. SPOILS MANAGEMENT	16
4.5 STANDARD CONDITION #5. WATER STORAGE AND USE.....	17
4.6 STANDARD CONDITION #6. IRRIGATION RUNOFF	21
4.7 STANDARD CONDITION #7. FERTILIZERS AND SOIL AMENDMENTS	22
4.8 STANDARD CONDITION #8. PESTICIDES/HERBICIDES	23
4.9 STANDARD CONDITION #9. PETROLEUM PRODUCTS AND OTHER CHEMICALS	24
4.10 STANDARD CONDITION #10. CULTIVATION-RELATED WASTES	26
4.11 STANDARD CONDITION #11. REFUSE AND HUMAN WASTE	27
4.12 STANDARD CONDITION #12. REMEDIATION/CLEANUP/RESTORATION	28
5.0 PRIORITIZED CORRECTIVE ACTIONS AND SCHEDULE TO REACH FULL COMPLIANCE.....	29
6.0 MONITORING AND INSPECTION PLAN	33
7.0 WATER USE PLAN	34
8.0 LIST OF CHEMICALS.....	36
9.0 LANDOWNER/LESSEE CERTIFICATION/SIGNATURES.....	37

LIST OF FIGURES

Figure 1. General Location Map
Figure 2A and 2B. Site Map

LIST OF TABLES

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

LIST OF APPENDICES

Appendix A. Best Management Practices (BMPs) – NCRWQCB
Appendix B. Monitoring Plan and Photo Logs
Appendix C. Photo Documentation of Monitoring Points and 2015 Fire Loss
Appendix D1, D2, D3. Water Use Plan and Log Forms
Appendix E. Fertilizer and Amendment Use Plan and Log Forms
Appendix F. Pesticide, Herbicide, and Fungicide Use Plan and Log Forms
Appendix G. Hazardous Materials Storage Guidelines
Appendix H. Typical Drawings
Appendix I. Lake or Streambed Alteration Agreement Notification #1600-2017-0515-R1

**Water Resource Protection Plan (WRPP)
APN 317-063-006 and 317-064-002
2150 Kerlin Creek L Road
Hyampom, California**

1.0 PROJECT SUMMARY

This report documents Pacific Watershed Associate's (PWA)¹ Water Resource Protection Plan (WRPP) for APN 317-063-006 and 317-064-002 located at 2150 Kerlin Creek L Road, Hyampom, California as shown on Figure 1. This property is located in Humboldt County CA, approximately 8 miles west of Hyampom, Trinity County, CA, and hereinafter is referred to as the "Project Site." Based on either site conditions and/or total cultivation area, this Project Site falls within **Tier 2** of the North Coast Regional Water Quality Control Board's (NCRWQCB) Order No. 2015-0023, Waiver of Waste Discharge and General Water Quality Certification for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or Operations with Similar Environmental Effects ("Order"). Properties that fall into Tier 2 of the Order are required to develop a WRPP. Therefore, as required, this WRPP has been developed for you based on site inspections made by PWA on your property. PWA's recommendations for any remediation or corrective actions are a result of water quality requirements under the Order, including Best Management Practices (BMPs) designed to meet those requirements (Appendix A). This WRPP documents the findings of a site visit conducted on August 20, 2018 by PWA Senior Geologist Kathy Moley and Fisheries Biologist/Aquatic Ecologist Margo Moorhouse.

2.0 CERTIFICATIONS, LIMITATIONS AND CONDITIONS

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

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

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

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

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

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

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

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

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

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

beyond our control, such as those arising from changes in legislation or regulations, or the broadening of knowledge which may invalidate or alter any of our findings or recommended actions.

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

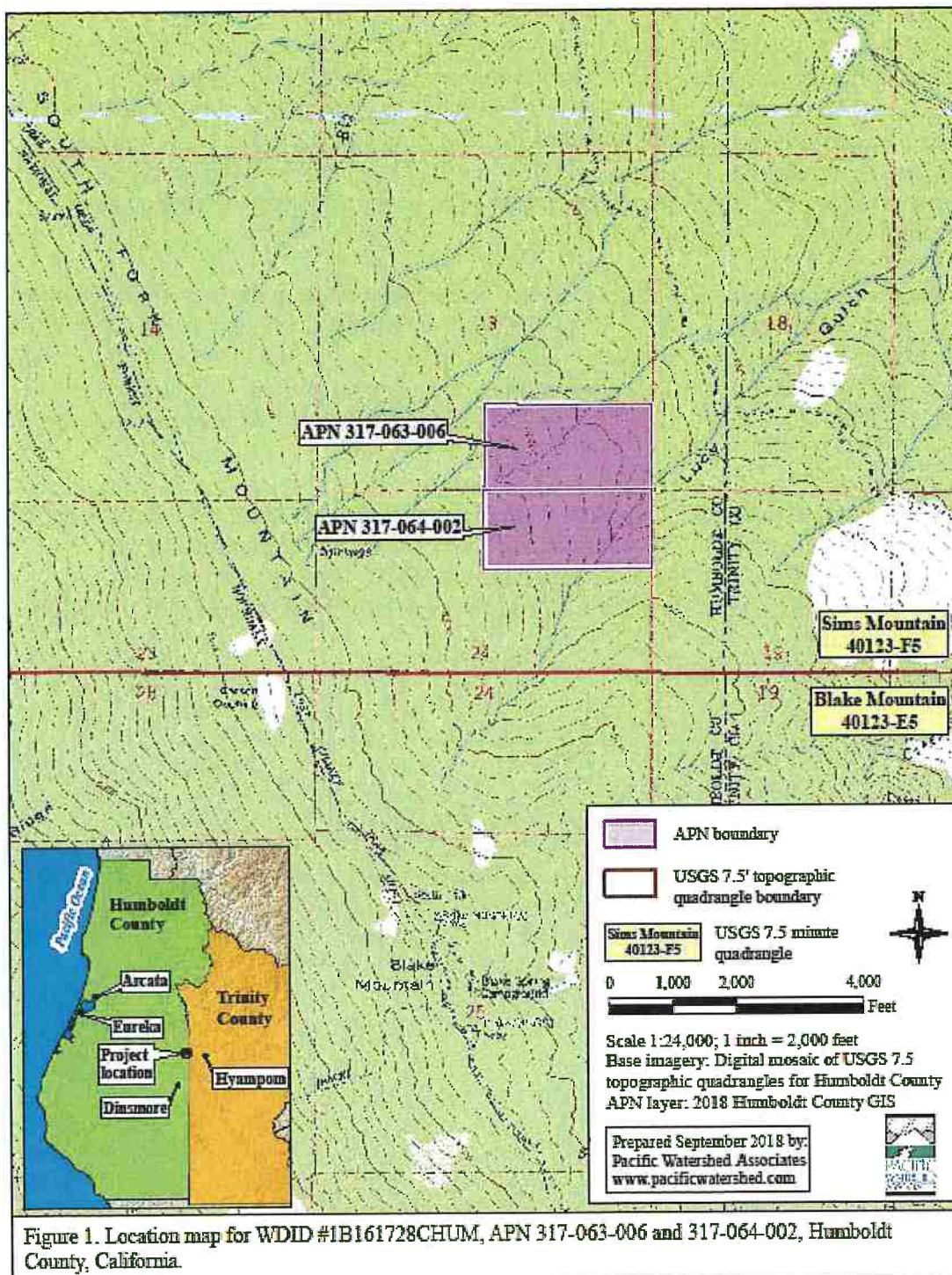
PWA's services consist of professional opinions and recommendations made in accordance with generally accepted principles and practices. No warranty, expressed or implied, or merchantability or fitness, is made or intended in connection with our work, by the proposal for consulting or other services,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

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

Prepared by:



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3.0 INTRODUCTION

This Water Resources Protection Plan (WRPP) summarizes the results of Pacific Watershed Associate's (PWA) site visit and subsequent analysis and documentation of site conditions on APN 317-063-006 and 317-064-002 located off of Kerlin Creek Road, Hyampom, California, as shown on Figure 1 and hereinafter referred to as the "Project Site." The WRPP describes and addresses the required elements and compliance with the 12 Standard Conditions established by the North Coast Regional Water Quality Control Board's (NCRWQCB) Order No. 2015-0023 to protect water quality from cannabis cultivation and related activities (Order). PWA has identified certain areas where the Project Site does not fully meet all 12 of the Standard Conditions of the Order. Section 4, below, identifies and discusses each of the 12 Standard Conditions as related to your property with regard to compliance with the NCRWQCB's Order.

The WRPP contains the following required sections:

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

4.0 STANDARD CONDITIONS CHECKLIST FOR APN 317-063-006 and 317-064-002 as of 8/20/2018

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

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

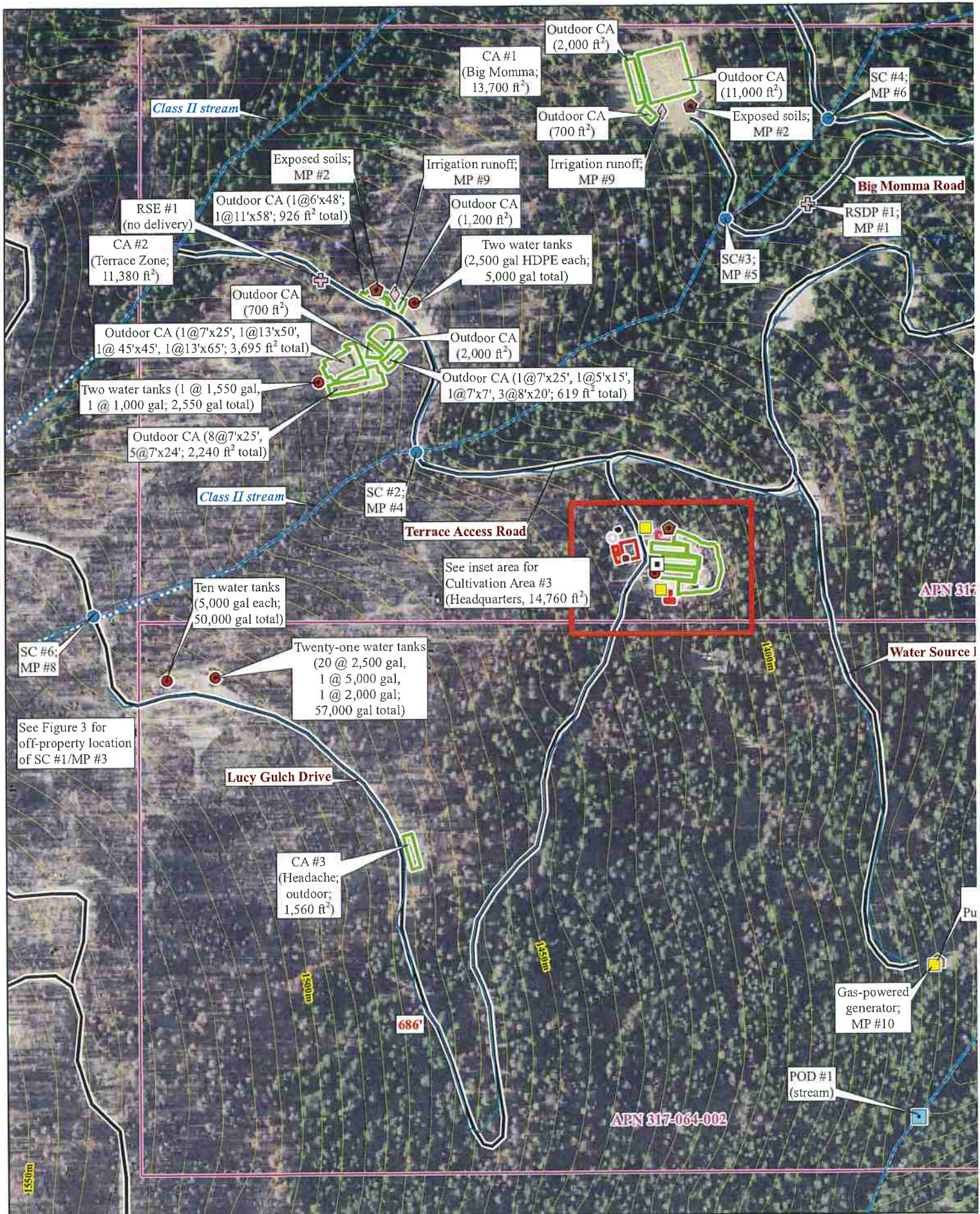


Figure 2. Site map for WDID #1B161728CHUM, APN 317-063-006 and 317-064-002, Humboldt County, California

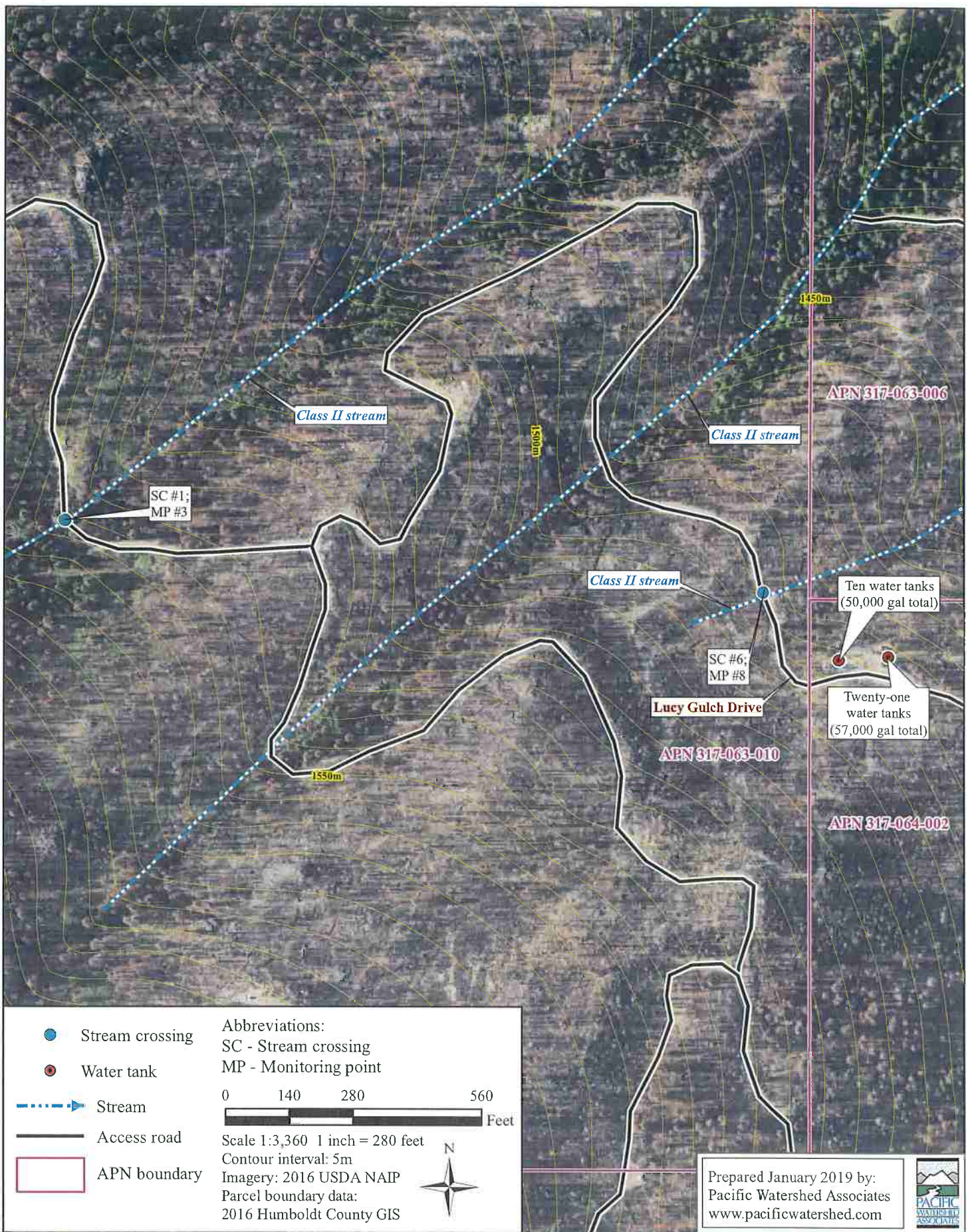


Figure 3. Location of SC #1/MP #3, WDID #1B161728CHUM, APN 317-063-006 and 317-064-002, Humboldt County, California.

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

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

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

Meets condition? No

Observations/Comments: The approximate two (2) miles of the main roads traveled during PWA's site inspection appeared to be constructed on relatively stable slopes and include a native road surface with some rock. The roads showed evidence of minor surface erosion and rilling, most of which likely occurs during periods of rapid snow melt in the spring. These roads are lacking permanent drainage features such as rolling dips and ditch relief culverts to collect and concentrate flow off the road surface. Additionally, berms along the outboard road edge were present most likely as a result of annual maintenance that would further concentrate surface water flow paths along the road surface. Do to the extent of legacy roads from Timber Harvest Activities (conducted in 2013 as per landowner), and the fire roads and trails from the 2015 Johnson and Blake Fires of the Route Complex, a complete Road Evaluation is recommended and warranted for this Project Site.

Photos: #1 and #2

Corrective or remedial actions needed: These main roads that are frequently traveled should be reshaped and/or have more permanent drainage structures installed to disperse surface runoff and minimize erosion; unused legacy roads and trails should be decommissioned. PWA recommends a comprehensive property wide Road Evaluation be performed to evaluate the road/skid and trail network throughout the two parcels. This would result in a complete analysis culminating in specific treatment by location, the treatments will be prioritized along with timelines for performing the work. Please see Standard Condition 4.1 - General Comments and Recommendations regarding winterizing all roads, quad and walking trails, and historic skid/fire roads used throughout the property.

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

Meets condition? No

Observations: Along the Big Momma Access Road and downslope from Stream Crossing #3 (SC #3), an attempt to drain cut-bank seeps was evidenced by a partially installed french drain including a flexible black perforated pipe placed within the inboard ditch (IBD). The perf pipe terminated in the IBD and was not connected to a

ditch relief culvert (DRC), or other cross road drainage feature. The seeps were active at the time of inspection, infiltrating into and dissipated by the IBD; there was no evidence of present discharge to the Class II watercourse below. However, during the wet season or periods of snow melt, the seeps and associated IBD appear to flow over the road with the potential to deliver to the Class II Watercourse below. See Standard Condition 4.1a observations and comments, above.

Photos: #3 and #4; Monitoring Point #1

Corrective or remedial actions needed: See Standard Condition 4.1 - General Comments and Recommendations regarding winterizing all roads, quad and walking trails, and historic skid/fire roads used throughout the property.

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

Meets condition? No

Observations: See Standard Condition 4.1b above.

Photos: No

Corrective or remedial actions needed: See Standard Condition 4.1 - General Comments and Recommendations regarding winterizing all roads, quad and walking trails, and historic skid/fire roads used throughout the property.

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

Meets condition? No

Observations: See Standard Condition 4.1b and 4.1c observations and comments, above.

Photos: No

Corrective or remedial actions needed: See Standard Condition 4.1 - General Comments and Recommendations regarding winterizing all roads, quad and walking trails, and historic skid/fire roads and graded pads used throughout the property.

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

Meets condition? No

Observations/Comments: See Standard Condition 4.1b and 4.1c observations and comments, above.

Photos: No

Corrective or remedial actions needed: See Standard Condition 4.1 - General Comments and Recommendations regarding winterizing all roads, quad and walking trails, and historic skid/fire roads and graded pads used throughout the property.

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

Meets condition? No

Observations/Comments: Spent soil piles without covering or containment were observed near the cultivation areas. These soil piles include moisture and nutrient retaining vermiculite. Vermiculite which when dehydrated, easily becomes airborne and is transported away from the stock pile location. When mobilized, this nutrient rich material can settle out in random locations and with the winter rains and spring snow melt be transported into receiving waters.

Photos: #5-#7; Monitoring Point #2

Corrective or remedial actions needed: Between plantings and in the dry summer months, cover stock piled soil with tarps or store in an enclosed area or in lidded containers to prevent these nutrient retaining materials from being transported into watercourses and the receiving waters of Lucy Gulch. See corrective or remedial actions for winterization of soils in section 4.7a Fertilizers and Soil Amendments below.

Standard Condition #1. - General comments and recommendations: From the August 20, 2018 PWA site inspection, two (2) miles of the main drive roads were reviewed that showed evidence of road related erosion issues. Effective road drainage features were either lacking or ineffectively spaced and in general, maintenance practices need to be upgraded to current standards to permanently disconnect roads, and minimize if not completely eliminate the need for annual maintenance work. Where these roads parallel the streams to include the cut-bank seep location, hydrologic connectivity is present delivering fine sediment into Lucy Gulch and its tributaries, particularly during the spring snow melt. This project is located on the South Fork Mountain Ridge near ridge-line, and includes elevations ranging from 4,400 feet to just over 4,800 feet (ridge line is approximately 5,100 feet) and winter access (typically December through March) is prevented by several feet of persistent snow. As a result of the limited annual access, PWA recommends monitoring these locations as soon as access is possible in 2019 (and annually as soon as conditions permit), to ensure the prescribed road winterization treatments are functioning to prevent erosion and sediment delivery.

Due to the extent of the existing road and trail network on the Project Site parcels, PWA is recommending a property wide road evaluation be conducted as per the standards *in* "Handbook for Forest, Ranch and Rural Roads," (Weaver, Weppner, and Hagans, 2015). From this evaluation, a site specific treatment plan will be developed to install appropriate road drainage features for the properties elevation, geology, and topography. The intent of this treatment plan will be to minimize if not eliminate seasonal road work and to effectively drain the road network to ensure and maintain hydrological disconnection from the Lucy Gulch watercourses.

For the upcoming 2019 winter PWA recommends all roads, quad and walking trails, and historic skid roads used throughout the property be prepared for the coming rains, snow and late winter/early spring snow melt.

- Clear debris from all culverts and ditch relief culverts, at the inlets and outlet, to ensure they are open to the maximum capacity and reduce the plugging potential.
- Inspect all ditches and drains to ensure they are open and free flowing, and that they terminate onto stable areas or into sediment basins where delivery to the

watercourses of Lucy Gulch are not possible. Cutbank slopes, particularly with seeps that are over steepened and unstable, are prone to sloughing and filling ditches or drains with unconsolidated soils. Where ditches or drains have become entirely filled or partially filled with soil, they need to be cleaned and vegetation trimmed to prevent impeded flows.

- From seasonal maintenance, substantial berms of excess spoil have developed along the outer road shoulder. These berms should be removed or more likely frequently breached to allow dispersal and infiltration of road runoff.
- PWA also recommends installing water bars at 50 to 75 foot spacing intervals along the seasonal roads, quad and foot trails, and legacy skid/fire roads where the potential for sediment delivery to surface waters exists.
- All sidecast and excavated material need to be stored safely away from streams where it cannot enter into a watercourse and in a stable location.
- All bare soil areas disturbed from winterization work, stored in spoil piles and unconsolidated excavated material, or other activities resulting in bare exposed soil need to be mulched with a thick layer of straw (seeding needs to occur in the spring after snow melt).
- See Appendix A for more information on Best management Practices (BMP's). Typical drawings are provided in Appendix H and will provide guidance for proper road drainage feature construction and winterization methods.

Once the roads, quad and foot trails, and legacy skid/fire roads have been winterized, they should be gated and closed until the snows have melted and the roads have dried sufficiently to drive on without causing ruts or break-up the road surface.

4.2 Standard Condition #2. Stream Crossing Maintenance

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

Meets condition? No

Observations/Comments: There are six (6) stream crossings on the Project Site. These crossings have been evaluated and were determined to be undersized for passing an expected 100-year peak flow.

Photos: Photos #8-#12, MP #3-#8

Corrective or remedial actions needed: On June 6th 2018 a Lake or Streambed Alteration Agreement (LSAA) was fully executed with the California Department of Fish and Wildlife (Notification #1600-2018-0515-R1 as attached in Appendix I). Stream crossings 1 through 5 (SC #1 through SC #5) are identified for culvert replacement and upgrading to pass an 100-year flow event, and stream crossing 6 (SC #6) is for a rocked armored ford. As per the LSAA; SC #1 through SC #4 and SC #6 are to be upgraded by October 1st, 2019 and, SC #5 is to be upgraded by October 1st, 2021.

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

Meets condition? No

Observations/Comments: See Standard Condition 4.2a observations and comments, above.

Photos: Photos #8-#12, MP #3-#8

Corrective or remedial actions needed: See corrective actions in 4.2a above.

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

Meets condition? No

Observations/Comments: See Standard Condition 4.2a observations and comments, above.

Photos: Photos #8-#12, MP #3-#8

Corrective or remedial actions needed: See corrective actions in 4.2a above.

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

Meets condition? No

Observations/Comments: See Standard Condition 4.2a observations and comments, above.

Photos: Photos #8-#12, MP #3-#8

Corrective or remedial actions needed: See corrective actions in 4.2a above.

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

Meets condition? No

Observations/Comments: SC #6 is an unarmored ford crossing and therefore, this condition element does not apply to this crossing. See Standard Condition 4.2a observations and comments, above.

Photos: Photos #8-#12, MP #3-#7

Corrective or remedial actions needed: See corrective actions in 4.2a above.

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

Meets condition? No

Observations/Comments: SC #6 is an unarmored ford crossing and therefore, this condition element does not apply to this crossing. See Standard Condition 4.2a observations and comments, above.

Photos: Photos #8-#12, MP #3-#7

Corrective or remedial actions needed: See corrective actions in 4.2a above.

Standard Condition #2. - General comments and recommendations:

Prior to PWA becoming involved with this project site, the landowner is contracted with the California Department of Fish and Wildlife (CDFW) for an LSAA, Notification #1600-2017-0515-R1 (Appendix I). Even though PWA did not collect or

analyze the data, or make the prescriptions from these data ultimately cumulating in the executed LSAA, PWA will coordinate with CDFW Department Staff, and provide oversight, for implementing the prescribed treatments and ensure all work will be constructed as per the standards provided *in* "Handbook for Forest, Ranch and Rural Roads," (Weaver, Weppner, and Hagans, 2015), and the California Salmonid Stream Habitat Restoration Manual, Part X (Weaver et al., 2006).

Additional permits may be required prior to implementation. These may include, but not be limited to: Water Board 401 permit, and any county permit that may be required.

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

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

Meets condition? Yes

Observations/Comments: All cultivation areas and associated facilities are situated on the Project Site more than 200 feet from any watercourse.

Photos: No

Corrective or remedial actions needed: None

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

Meets condition? Yes

Observations/Comments: Buffers are maintained at natural slopes and native vegetation is recovering from the 2015 Johnson and Blake wildland fires. Isolated spots of regeneration and primary succession species are becoming established, at what appears to be a natural rate for the near 100% black-out fire conditions at this elevation and rocky terrain. The landowner appreciates the regenerative vegetative growth and has no intention of altering or disturbing the post fire natural succession occurring on the Project Site.

Photos: #13

Corrective or remedial actions needed: None

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

Meets condition? Yes

Observations/Comments: See Standard Condition 4.3a and 4.3b observations and comments, above.

Photos: No

Corrective or remedial actions needed: None

- d) *Riparian and wetland areas shall be protected in a manner that maintains their essential functions, including temperature and microclimate control, filtration of sediment and other*

pollutants, nutrient cycling, woody debris recruitment, groundwater recharge, streambank stabilization, and flood peak attenuation and flood water storage.

Meets condition? Yes

Observations/Comments: See Standard Condition 4.3a and 4.3b observations and comments, above.

Photos: No

Corrective or remedial actions needed: None

4.4 Standard Condition #4. Spoils Management

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

Meets condition? No

Observations/Comments: Spent soil piles without covering or containment were observed near the cultivation areas. These soil piles include moisture and nutrient retaining vermiculite. Vermiculite which when dehydrated, easily becomes airborne and is transported away from the stock pile location. When mobilized, this nutrient rich material can settle out in locations that with the winter rains and spring snow melt be transported into receiving waters.

Photos: #5-#7; Monitoring Point #2

Corrective or remedial actions needed: Between plantings and even in the dry summer months, cover stock piled soil with tarps or store in an enclosed area or in lidded containers to prevent the transporting of these nutrient retaining materials into watercourses and the receiving waters of Lucy Gulch. All soil/spoil piles need to be removed or tarped in preparation for the winter snow load and spring snow melt events. See corrective or remedial actions for winterization of soils in Standard Conditions 4.1f (above) and, 4.7 and 4.10 below.

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

Meets condition? Yes

Observations/Comments: See Standard Condition 4.4a observations and comments, above.

Photos: No

Corrective or remedial actions needed: See Standard Condition 4.4a observations and comments, above.

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

Meets condition? Yes

Observations/Comments: No spoils generated through development or maintenance of roads with the potential for delivery to surface waters were observed on the Project Site.

Photos: No

Corrective or remedial actions needed: None

4.5 Standard Condition #5. Water Storage and Use

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

Meets condition? No

Observations/Comments: The client diverts water from the upper mainstem of Lucy Gulch (POD) for irrigation and domestic purposes (Figure 2). Lucy Gulch is the primary tributary to Big Creek, which flows into the South Fork of the Trinity River. Current water meter data (2018 is the first year water has been metered) suggests that irrigation rates are approximately 3.4 gallons per ft². From this preliminary water data, with 41,000 ft² in cannabis cultivation and the current 50,000 gallons in rigid tank water storage specific for cannabis irrigation, it appears that the current water storage is not sufficient for the landowner to forbear (not divert) during the dry season. Total water storage in tanks is estimated to be at least 90,000 gallons less than what is needed to practice forbearance during the arid season. The landowner is aware of the irrigation needs for cultivation and is making plans for installing additional rainwater catchment tanks constructed for areas with snow loads. To verify compliance with this Standard Condition, this preliminary Water Budget needs to be refined by analyzing the water meter data once irrigation has ceased to best calculate additional storage needs.

Photos: No

Corrective or remedial actions needed: Preliminary calculations indicate that additional water storage will be needed for the landowner to completely forbear from diverting surface waters during the dry season on this Project Site. A more precise Water Budget can be developed and refined from the complete 2018 water monitoring data set, and to verify the additional water storage needs to ensure forbearance from May 15 to December 14 (as per LSAA; Appendix I) of each year. Water data (quantities diverted, stored and used) for cannabis irrigation is to be reported to the Water Board on or before each March 31 for the preceding calendar year. Additionally, reporting this data is also required as per the executed LSAA (*in* Appendix I: 3. Reporting Measures, page 14) and due to CDFW by December 31. In order to maintain your water rights for the POD on Lucy Gulch, annual water data is due by June 30 for the Statement of Diversion and Use (ID S026784). See Appendix D for water monitoring data forms.

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

Meets condition? Yes

Observations/Comments: Drip irrigation (drip tape and emitters), timers to control irrigation duration and timing (morning or evening) for grow-up and mature cultivars, and controlled hand watering techniques are applied to propagules in the nursery stage prior to planting out. Water shut-off float valves are installed in the water tanks with emergency, empty tanks situated down slope to capture any overflow in the event a float valve malfunctions. Excepting raised beds in the green houses, cultivation is primarily in smart-pots with a few outdoor raised beds contained by native bark-on-

logs. These raised beds have been developed to include an in-ground root development area where soil building amendments have been incorporated into the native parent soils, prior to the bed construction and subsequent planting out. The landowners' intent is to by the year 2020, have the smart-pots eliminated and for all cultivation to be within raised bed structures.

Photos: #14

Corrective or remedial actions needed: Continue with the raised bed development and building a sustainable microbial soil community. While constructing and maintaining the raised beds, ensure amendments and soil do not spill over the edge or through the supporting structures of the beds or line the beds with landscaping fabric.

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

Meets condition? No

Observations/Comments: There is currently 50,000 gallons of water storage on the Project Site. Based on the total size of the cultivation area and existing off-stream water storage, it appears that water storage is not sufficient to eliminate surface water diversions during the dry season. Total water storage is estimated to be at least 90,000 gallons less than what is needed to supply dry season irrigation at current cultivation levels without diverting surface waters (see preliminary water budget analysis in General Comments and Recommendations, below).

Photos: No

Corrective or remedial actions needed: Develop a refined Water Budget from the 2018 water meter data to verify the amount of additional water storage needed on your Project Site, to meet all your water needs during the dry season. The Landowner has also expressed interest in installing rainwater catchment tanks capable of withstanding snow loads and also capture melt water from the accumulated snow, and minimize or eliminate surface water diversions for cannabis irrigation. Evaluate the feasibility, design, location, and any permitting requirements for installing snow load bearing rainwater catchment tanks.

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

Meets condition? No

Observations/Comments: According to the cultivator, liquid fertilizer is delivered as needed via the irrigation system. Overall, water is applied sparingly due to water scarcity, though application was not observed due to the early inspection date. What was observed during the site inspection, was irrigation run-off primarily from the smart pots at all the Cultivation areas, evidenced by non-cannabis related vegetative growth showing greater vigor and color vibrancy than distant vascular species, and either puddling around and amongst the smart pots, or irrigation run-off concentrated into rivulets beyond the active cultivation areas. Less prevalent run-off was evidenced to originate from raised beds, of both construction methods (milled boards and local bark-on-logs). It stands to reason, the irrigation run-off also contains nutrients intended for agricultural crop growth. The areas with over watering evidence were predominantly on the furthest down slope areas of the irrigation delivery systems.

Photos: #15 and #16, MP #9

Corrective or remedial actions needed: To verify conformance with this Standard Condition, test the irrigation system to ensure equal delivery throughout the irrigation pipe runs. A simple volumetric test per-emitter (in a gallon jug) or irrigation tape (coiled in a 5 gallon bucket) at various locations within each cultivation area, will suffice to determine if water delivery is equal throughout the irrigation “block”. A simple centrally located baffling system could not only control water application amounts within shorter runs, but also balance gravitational pressure differentials by increasing the frequency of runs laid at contour. Timers installed in conjunction with the baffle system would further improve the ability to control and adjust as needed, specific irrigation delivery amounts and overall irrigation quantities. Observe and monitor soil moisture so watering, fertilizer and chemical applications are made only when necessary and overwatering and excess infiltration is avoided. This data will help you refine a Water Budget for your operation and determine agronomic watering.

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

Meets condition? No

Observations/Comments: The water used for irrigation on the Project Site is diverted from Lucy Gulch (POD, Figure 2) and is located on the property. An Initial Statement of Diversion and Use (ISDU) was submitted to the SWRCB-DWR for the surface water diversion; this diversion has been assigned the Statement/Application ID S024752.

Photos: No

Corrective or remedial actions needed: Water diversion and water storage requires valid water rights documentation. As opposed to maintaining the Lucy Gulch surface water diversion as your sole water source for agricultural use, continue your research efforts into rainwater catchment tanks structurally able to withstand snow loads. Additionally, explore possible locations for creating a snow and rainwater capture pond to include consulting with an engineering geologist.

Domestic water rights: A Small Domestic Use (SDU) Appropriation application was submitted for the POD and DWR made a request for additional information. This application was eventually rejected due to not having the additional information supplied. This application needs to be revisited and most likely, a new application needs to be submitted.

- Small Domestic Use (SDU) Appropriation Registration

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

Agricultural water rights: PWA recommends that you apply for a Small Irrigation Use (SIU) water right for your cannabis irrigation needs, in order to legally be able to store water as needed to practice forbearance. The SWRCB-DWR released a **Small Irrigation Use Registration (SIUR)** water right for agricultural irrigation and includes commercial cannabis as an agricultural crop. PWA recommends that you apply for this

small irrigation water right as soon as possible, preferably prior to surface water diversion intended for cannabis irrigation needs. This is an online application.

- Small Irrigation Use (SIU) Registration

<https://public2.waterboards.ca.gov/cgo>

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

Meets condition? Yes

Observations/Comments: The water storage tanks utilized on this Project Site are located on stable low gradient surfaces more than 200 feet from any water conveyance system. Water tanks on the Project Site also appeared to be properly maintained and include shut-off float valves, in the event of a water storage structural failure, this stored water would essentially become dispersed within the burned area and does not pose a threat to the distant water courses.

Photos: No

Corrective or remedial actions needed: PWA recommends monitoring the onsite water tanks, and any other water tanks in use by the landowner, to ensure that water diversion plumbing and storage infrastructure is properly sealed, functioning correctly and will not cause discharge or sediment delivery into waters of the state.

Standard Condition #5 - General comments and recommendations: Currently, the only source of water for both irrigation and domestic use is the diversion in Lucy Gulch (POD; Figure 2). There is 50,000 gallons of water storage capacity in rigid water tanks currently on the Project Site. At this time it appears that the water storage capacity contained within this Project Site does not fully satisfy the demand that would be expected from the present cultivation area (41,000 ft²) during the dry season (May 15th through December 31st as per the LSAA Contract). The preliminary Water Budget will be refined once the irrigation season is over and the water use data is complete from the flow meters installed this year. This data will verify the already estimated amount of additional water storage needed to discontinue surface water diversions during low-flow conditions and ensure forbearance for the size and scope of the Project.

The Humboldt Planning and Building Department (HCPBD) suggest that 7 gallons of water is needed for every square foot of cultivation to observe the forbearance period. However, specific to this project site and location, the preliminary water data suggests an estimated 3.4 gallons per square foot (gal/ ft²) has been applied for the 2018 irrigation season (nearly ½ the amount as suggested by HCPBD). This preliminary estimated 3.4 gal/ ft² irrigation rate applied to 41,000 ft² in cultivation area, equates to an estimated 140,000 gallons of water storage needed to practice forbearance, or an additional 90,000 gallons added to the existing 50,000 gallons of storage. Once sufficient off-stream water storage is added, as per the Order and the LSAA, it can then be assumed that water use will not impact downstream water quantity, quality or beneficial uses. PWA recommends developing rainwater catchment water storage facilities, such as the catchment tanks able to withstand snow loads as the landowner is planning to invest in this fall/winter. Another

rainwater storage option would be to explore the feasibility and placement locations for an off-stream rainwater (and snow) catchment pond.

Annual monitoring and documenting water quantities diverted, stored and used every month is required to be compliant and for the annual reporting due to Permitting Agencies. PWA has created simple log sheets to help you monitor your water usage (see Appendix D).

4.6 Standard Condition #6. Irrigation Runoff

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

Meets condition? Yes

Observations/Comments: No evidence of irrigation runoff to nearby watercourses was observed on the Project Site; all cultivation areas and associated facilities are situated on the property more than 200 feet from any watercourse. Because irrigation is limited to drip emitters to irrigate the smart pots and drip tape for irrigating the in-ground planting areas, there is a high degree of control. Irrigation runoff is localized to the areas directly associated with cultivation activities and does not travel far due to the low gradient topography of the cultivation areas, ground cover mulch application and apparent ground porosity, and/or post fire re-vegetation growth buffering the areas. See Standard Condition 4.5d regarding agronomic water and fertilizer rate application.

Photos: No

Corrective or remedial actions needed: PWA recommends monitoring the locations mentioned above and implementing appropriate BMPs as needed to prevent runoff and possible nutrient delivery to surface waters in the event of excessive irrigation or runoff during the winter wet season. See Corrective actions regarding refining the irrigation systems for improved agronomic applications in Standard Condition 4.5d.

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

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

4.7 Standard Condition #7. Fertilizers and Soil Amendments

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

Meets condition? No

Observations/Comments: Fertilizers and amendments are stored indoors, in a shipping container, and are properly covered if stored outdoors when not in immediate use. However, spent potting soil piles without covering or containment were observed near the cultivation areas. These soil piles include moisture and nutrient retaining vermiculite. Vermiculite which when dehydrated, easily becomes airborne and is transported away from the stock pile location. When mobilized, this nutrient rich material can settle out in locations that with the winter rains and spring snow melt be transported into receiving waters. PWA recommends either tarping or removing soil piles (see Standard Conditions 4.1f and 4.4 above and, 4.10 below). Multiple pots and other cultivation-related items that may contain residual fertilizer or nutrients were observed to be stored outdoors and uncovered with the potential for nutrient rich vermiculite being transported to receiving waters.

Photos: #5-#7, MP #2

Corrective or remedial actions needed: PWA recommends potting soils or amendments in beds be tarped within each cultivation area, and smart pots be either tarped or removed and stored inside during the winter to prevent nutrient mobilization over the wet season. Any new fertilizers, potting soils and soil amendments on the Project Site shall continue to be stored indoors, under a roof or tarped during the wet season. Liquid fertilizers, amendments and other chemicals should be stored under cover, off the ground and with adequate secondary containment.

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

Meets condition? Unknown

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

Photos: No

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

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

Meets condition? No

Observations/Comments: See Standard Conditions 4.1f and 4.7a observations and comments, above.

Photos: See Standard Conditions 4.1 and 4.4 Monitoring Points and photos, above.

Corrective or remedial actions needed: To prevent nutrient mobilization, surface runoff, or leaching you should: 1) keep new or spent potting soils and amendments inside or under a roof, 2) remove or tarp any soils or amendments that are kept outside to prevent mobilization or leaching of nutrients, or 3) plant dense cover crops in spent pots, holes and beds to enrich soil and lock up nutrients. If dense cover crops cannot be kept alive, all planted areas should be tarped to protect them from rainfall, snowmelt and subsequent infiltration and leaching of nutrients. Also see 4.1f and 4.4 corrective or remedial actions above, and corrective actions in 4.10 below.

Standard Condition #7 - General comments and recommendations: Fertilizers and soil amendments on the Project Site were observed to be either stored indoors or covered when stored outdoors. According to the client, fertilizers and amendments were applied according to packaging instructions, and usage is diminished or eliminated toward the end of the growing season. PWA recommends you cover or store in closed containers all spent soils during the summer if cover cropping is not reasonable and feasible considering needing to irrigate for survivability. PWA also recommends tarping all in ground cultivation areas and either tarping or removing to covered storage areas all smart pots in preparation for the winter rains and snows.

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

Do not store fertilizers and/or soil amendments with petroleum products. See guidelines for hazardous material storage in Appendix G.

4.8 Standard Condition #8. Pesticides/Herbicides

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

Meets condition? Unknown

Observations/Comments: Pesticides and/or herbicides were not observed on the Project Site at the time of our inspection.

Photos: No

Corrective or remedial actions needed: All pesticides, herbicides and related materials (e.g., fungicides) must be used and applied consistent with product labeling. When present, these chemicals should be stored within enclosed buildings in such a way they cannot enter or be released into surface or ground waters.

To verify conformance with this Standard Condition, you are required to keep records of the type, timing and volume of pesticides, herbicides and related chemicals that are applied your operations. This can be done using a simple log form, such as the one included in Appendix F.

Additionally, for any pesticide use you must comply with any Pesticide Registration Requirements. See Appendix E2 included in the NCRWQCB Order, or on their web site at:

http://www.waterboards.ca.gov/northcoast/board_decisions/adopted_orders/pdf/2015/150728_Appendix_E2_DPR_MJ%20Pesticide%20Handout.pdf

Standard Condition #8 - General comments and recommendations: For the health of the environment and your workers, you are encouraged to utilize organic or biologic controls, rather than highly toxic petro-chemicals, to prevent pest and mildew problems. Several safe alternatives are available.

All pesticides, herbicides and related materials (e.g., fungicides) must be used and applied consistent with product labeling. When present, these chemicals should be stored within enclosed buildings in such a way they cannot enter or be released into surface or ground waters.

Do not store pesticides/herbicides with petroleum products. See guidelines for hazardous material storage in Appendix G.

4.9 Standard Condition #9. Petroleum Products and other Chemicals

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

Meets condition? No

Observations/Comments: PWA observed two small portable generators stored off the ground and under shelter but without secondary containment and one large portable generator on a trailer at the Head Quarters area. One additional generator was located in association with the POD. This generator was off the ground but, lacked cover and secondary containment. There were no spill kits located with these gas powered generators. Fuel cans and other petroleum related products were stored in a designated metal container, with containment and spill kits. Note that when petroleum products

are onsite they will need to be stored under cover, off the ground and in a secondary containment basin (tote, tub, etc.) capable of containing the entire stored volume.

Photos: #17-#20, MP #10

Corrective or remedial actions needed: PWA recommends the landowner provide above ground fuel containers or gas powered equipment adequate secondary containment basins and store them in a safe and secure location out of the elements.

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

Meets condition? No

Observations/Comments: See Standard Condition 4.9a observations and comments, above.

Photos: See Standard Condition 4.9a Monitoring Points and photos, above.

Corrective or remedial actions needed: See Standard Condition 4.9a corrective or remedial actions, above.

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

Meets condition? Yes

Observations/Comments: No diked areas were observed on the Project Site.

Photos: No

Corrective or remedial actions needed: None

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

Meets condition? No

Observations/Comments: At the time of the Project Site inspection no spill prevention cleanup kit was kept onsite with the generators to help clean up small spills.

Photos: #17-#20, MP #10

Corrective or remedial actions needed: None

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

Meets condition? Yes

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

Photos: No

Corrective or remedial actions needed: None

Standard Condition #9 - General comments and recommendations: Place all small generators in adequate secondary containment basins, under cover and with spill kits while at the place of use and, continue keeping them off the ground. Store all generators in the designated metal storage container during the winter and off season periods. Note that when petroleum products are onsite they will need to be stored under cover, off the ground and in a secondary containment basin (tote, tub, etc.). Due to the amount of petroleum

products stored on the Project Site, a Hazardous Materials Business Plan (HMBP) is not required at this time. If the amount of hazardous materials exceeds the amounts listed below at any time during the year a HMBP must be developed for the Project Site.

The State of California requires an owner or operator of a facility to complete and submit a Hazardous Materials Business Plan (HMBP) if the facility handles a hazardous material or mixture containing a hazardous material that has a quantity at any one time during the reporting year equal to or greater than: 55 gallons (liquids), 500 pounds (solids), or 200 cubic feet for compressed gas (propane) used for the cultivation operations. This project Site does not meet that criteria at this time and does not require a HMBP to be developed. If at any time during the year your operations exceed any one of these quantities, you need to prepare and file a HMBP for your operation. Information regarding HMBPs can be found at:

<http://ca-humboldtcounty.civicplus.com/DocumentCenter/Home/View/3224>. This project Site appears to meet that criteria and requires a HMBP be developed.

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

Do not store petroleum products and/or chemicals with fertilizers, soil amendments and/or pesticides/herbicides. See guidelines for hazardous material storage in Appendix G.

4.10 Standard Condition #10. Cultivation-Related Wastes

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

Meets condition? No

Observations/Comments: Potting soil is amended and reused on the Project Site. However, the spent soils were uncovered and allowed to dry out during the summer months. When dry and uncovered, these potentially nutrient rich soils can become mobilized or windblown and thus are distributed at random posing a threat to surface waters and Lucy Gulch. PWA also observed that green waste is composted onsite, distant from surface waters and are reportedly covered during the wet season to prevent leaching of residual nutrients into groundwater.

Photos: #5-#7, MP #2

Corrective or remedial actions needed: Cover all cultivation-related waste material located on the Project Site during the dry season to prevent mobilization and over the wet season to prevent leaching of nutrients into groundwater and potential transport to surface waters. Properly store all future cultivation-related waste material located on the Project Site where there is no threat of delivery to surface waters and dispose of appropriately by either shredding, composting or taking material to an appropriate

waste disposal facility. See Standard Condition 4.1f pertaining to Stockpiled Construction Materials and Standard Condition 4.4 specific to Spoils Management. Also see Standard Condition 4.7, regarding cover crops and cultivation-related pots and other items which may contain residual fertilizers or nutrients.

Standard Condition #10 - General comments and recommendations: We encourage you to chip or shred your plant stalks and compost them after harvest. Any additional cultivation-related waste can be easily contained by keeping soils and garbage greater than 200 feet from drainage areas and on gentle slopes, tarping or otherwise covering soil piles, and/or by placing straw wattles or other containment structures around the perimeter of spoil piles.

4.11 Standard Condition #11. Refuse and Human Waste

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

Meets condition? Yes

Observations/Comments: The Onsite Wastewater Treatment System (OWTS) installed in 2015 was permitted, and then destroyed in the 2015 wildland fire. The replacement OWTS system is currently permitted.

Photos: No

Corrective or remedial actions needed: PWA recommends making a copy of the signed off permit for the current functioning OWTS and to include as documentation proof in this WRPP binder.

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

Meets condition? Yes

Observations/Comments: Garbage and refuse on the Project Site was observed to be stored properly and securely in lidded cans at the time of the Project Site inspection.

Photos: No

Corrective or remedial actions needed: Continue to store all garbage and refuse in lidded cans or other adequate containers in a safe and secure location where the threat to waters of the state does not exist. PWA recommends you continue to dispose of existing garbage and refuse in a timely manner at an approved waste disposal facility.

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

Meets condition? Yes

Observations/Comments: According to the client the garbage and refuse generated onsite is disposed of at an appropriate waste disposal location on a regular basis.

Photos: No

Corrective or remedial actions needed: PWA recommends that the client continue to dispose of existing garbage and refuse in a timely manner and at an approved waste disposal facility and retain receipts of such disposal.

4.12 Standard Condition #12. Remediation/Cleanup/Restoration

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

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

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

Meets condition? Yes

Observations/Comments: See general comments below.

Photos: No

Corrective or remedial actions needed: None

Standard Condition #12 - General comments and recommendations: It is PWA's opinion that the Project Site is currently compliant with this condition. All needed corrective actions are addressed in Standard Conditions 1 through 11.

5.0 PRIORITIZED CORRECTIVE ACTIONS AND SCHEDULE TO REACH FULL COMPLIANCE

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

Standard Condition Requiring Action	Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo #	Date Completed
1 – Site Maintenance, Erosion Control and Drainage Features	1b,c,d e and f Moderately to High	December 2019	There are active cut-bank seeps along the Big Momma Access Road infiltrating into and dissipated by the in-board ditch during the dry season; there was no ditch relief culvert for this ditch and evidence of wet weather delivery across the road to the Class II stream was present. Exposed soil piles were present which were dry and could be blown into surface waters. See Standard Condition 4.1 - General Comments and Recommendations regarding the road network and exposed soils. PWA recommends a property wide comprehensive Road Evaluation be performed.	MP #1 Photos #1 - #4 MP #2 Photos #5 - #7	
2 – Stream Crossing Maintenance	2 High	October 1, 2019 (SC#1-#4, #6) October 1, 2021 (SC#5)	All stream crossings are to be upgraded as per the standards provided in "Handbook for Forest, Ranch and Rural Roads," (Weaver, Weppner, and Hagans, 2015), and the California Salmonid Stream Habitat Restoration Manual, Part X (Weaver et al., 2006). See Standard Condition 4.2 - General Comments and Recommendations regarding the stream crossings and Appendix I, the LSAA contract containing specific requirements for the stream crossing upgrades.	MP #3 - #8 Photos #8 - #12	
4 – Spoils Management	4a Moderately to High	July 31, 2019	- Spent soil piles without covering or containment were observed near the cultivation areas. These soil piles include moisture and nutrient retaining vermiculite. Vermiculite which when dehydrated, easily becomes airborne and is transported away from the stock pile location. When mobilized, this nutrient rich material can settle out in locations that with the winter rains and spring snow melt be transported into receiving waters. - PWA recommends covering stock piled soils with tarps or storing in lidded containers or in an enclosed area between plantings between plantings and during the summer months.	MP #2 Photos #5 - #7	

Standard Condition Requiring Action	Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo #	Date Completed
5 – Water Use	5a	July 31, 2019 and annually	<ul style="list-style-type: none"> - Refine the preliminary Water Budget for the Project Site from the 2018 water meter data and to more accurately determine annual water needs and uses and the required storage volumes needed for forbearance from May 15th – December 14th as per the LSAA (Appendix I). - Under the Order you are required to monitor and record the timing and volume of surface water diversions, water storage and water use using log sheets such as those provided in Appendix D. 	--	
	5b	Annually until complete	<ul style="list-style-type: none"> - Continue constructing raised beds that include an in ground root zone and water retaining natural soil structure to replace and eventually eliminate the use of above ground smart post. 	Photo #14	
	5c	July 31, 2019 and continuing	<ul style="list-style-type: none"> - Rainwater harvesting during the wet season should be evaluated and employed to ensure you completely eliminate surface water diversions during the dry season for irrigation. 	--	
	5c	December 31, 2019 and continuing	<ul style="list-style-type: none"> - Evaluate the feasibility, design, location, and any permitting requirements for installing a rainwater catchment system. 	--	
	5d	July 31, 2019 and continuing	<ul style="list-style-type: none"> - Irrigation run-off was evidenced on site, primarily where smart pots are utilized for full term growth. - To verify conformance with this Standard Condition, test the irrigation system to ensure equal delivery throughout the irrigation pipe runs. - PWA recommends making gravitational adjustments to the drip delivery system and/or installing more timers or flow controlling devices. - PWA encourages the continued development of raised beds and transitioning away from the smart pots. 	MP # 9 Photos #15 and #16	
	5e	July 31, 2019 or before	<ul style="list-style-type: none"> - Re-apply for the Small Domestic Use Appropriation (SDU) for the spring diversion to cover your domestic use requirements such as drinking, bathing, cooking and fire control. - If you plan to continue diversions for cannabis irrigation, PWA recommends that you apply for a Small Irrigation Use (STU) water right for your cannabis irrigation needs. 	--	

Standard Condition Requiring Action	Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo #	Date Completed
5 – Water Use	5e	Report annually by March 31 and by June 30	- Submit annual water use volumes to the State Water Resources Control Board, Division of Water Rights (SWRCB-DWR) by June 30 of each year. - Submit water diversion and water use data to the NCRWQCB annually by March 31 for the previous calendar year.	--	
	5f	July 31, 2019 and continuing	PWA recommends monitoring the onsite water tanks, and any other water tanks in use by the landowner, to ensure that water diversion plumbing and storage infrastructure is properly sealed, functioning correctly and will not cause discharge or sediment delivery into waters of the state.	--	
7 - Fertilizer and Amendment Use	7a	July 31, 2019, and then annually by October 31	- During the summer, Spent soil that is being stored for either incorporating into beds or composting for future use needs to be either tarped or stored in containment to prevent dehydrated matter from being mobilized into the surface water of Lucy Gulch. - In the winter, potting soils or amendments in beds or pots within each cultivation area should be tarped, or removed and stored inside, or have heavy cover crops planted and maintained during the winter to prevent nutrient mobilization over the wet season.	MP #2 Photos #5 - #7	
	7b	July 31, 2019 and continuing	To confirm compliance with this Standard Condition, you must keep detailed records of the type, timing and volume of fertilizers and/or soil amendments you use in your operations. They can be recorded on log sheets such as those provided in Appendix E. - To prevent nutrient mobilization, surface runoff, or leaching you should: 1) keep new or spent potting soils and amendments inside or under a roof, 2) remove or tarp any soils or amendments that are kept outside over the wet season to prevent mobilization or leaching of nutrients, or 3) plant dense cover crops in spent pots, holes and beds to enrich soil and lock up nutrients. - If dense cover crops cannot be kept alive, all planted areas should be tarped to protect them from rainfall, snowmelt and subsequent infiltration and leaching of nutrients. - Also see 4.7a corrective or remedial actions, above.	--	
	7c	July 31, 2019 and then annually by October 31		MP #2 Photos #5 - #7	

Standard Condition Requiring Action	Treatment Priority	Schedule	Summary of Corrective Actions/Recommendations (see more detailed listing of corrective actions in Section 4, above)	Monitoring Point and Photo #	Date Completed
8 – Pesticides and Herbicides	Moderately Low	July 31, 2019 and then continuing	To verify conformance with this Standard Condition, you are required to keep records of the type, timing and volume of pesticides, herbicides and related chemicals that are applied in your operations. This can be done using a simple log form, such as the one included in Appendix F. - During the operational season, place all gas powered generators and associated equipment (water pumps, inverters) in adequate secondary containment basins and store them in a safe and secure location out of the elements. - Store all gas powered generators and associated equipment in the designated metal storage container for the off season during the winter. - Have a spill kit at ready and in conjunction with each generator.	--	
9 – Petroleum Products and Other Chemicals	High	Upon seasonal start-up, 2019 and continuing	- Do not store petroleum products and/or other hazardous chemicals with fertilizers, soil amendments and/or pesticides/herbicides. See guidelines for hazardous material storage in Appendix G.	MP #10 Photos #17 - #20	
10 – Cultivation-Related Waste	High	July 31, 2019 and then annually by October 31	Cover all cultivation-related waste material located on the Project Site in the summer to prevent drying out and being blown into surface waters, and over the wet season to prevent leaching of nutrients into groundwater and potential transport to surface waters. Properly store all future cultivation-related waste material located on the Project Site where there is no threat of delivery to surface waters and dispose of appropriately by either shredding, composting or taking material to an appropriate waste disposal facility.	MP #2 Photos #5 - #7	

6.0 MONITORING AND INSPECTION PLAN

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

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

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

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

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

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

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

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

7.0 WATER USE PLAN

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

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

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

- No surface water diversions occur from May 14th to December 31st as per the LSAA (Appendix I)
- Water diversions are made pursuant to a local plan that is protective of instream beneficial uses.
- Other options that may affect water quality: (e.g., percent of flow present in stream; minimum allowable riffle depth; streamflow gage at bottom of Class I stream; AB2121 equations; CDFW instream flow recommendations; promulgated flow objective in Basin Plan; etc.).

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

Water Storage and Forbearance – The ultimate goal of the applicant is to accumulate enough water storage capacity to forebear the entire period from May 14 to December 31 each year, as per the LSAA (Appendix I). This will ensure the timing of water use is not impacting water quality objectives and beneficial uses.

There is 50,000 gallons of water storage in rigid water tanks currently on the Project Site; these tanks are essentially “replacement tanks” for the 81,000 gallons of water storage lost in the 2015 wildland fires. The Humboldt County Planning and Building Department standardized their water use estimates to be 7 gallons/ft² throughout the cultivation season; for a 41,000 ft² total cultivation area this equates to 287,000 gallons of water storage needed for the entire season and that an additional 237,000 gallons in water storage is needed to forbear. However, data from in-line water meters show the county values to be inflated for this specific site. Thus far, the annual water use estimate is for 3.4 gallons/ft² for a 140,000 gallon annual water budget need for cultivation at this specific site. Even though it is anticipated the overall annual water volume needs will lessen over time as the more ergonomic in-ground/raised bed cultivation bed are developed, adding 90,000 gallons in storage will ensure the ability to forbear for the CDFW prescribed time frame. Until water storage capacity volume is increased to support forbearance, as per the Order and CDFW, it can be assumed current water use will impact downstream water quality, quantity and beneficial uses. Regardless, the preliminary water budget will need to be prepared, and then refined through water monitoring, to verify the amount of additional water storage required to completely observe the forbearance period and not divert surface waters during the dry summer season.

Water Conservation - Water conservation measures currently practiced include the use of a drip irrigation system, timers, surface mulching and transitioning to planting plants in raised beds that include in ground root zones, rather than in the above ground smart pots. PWA encourages continuing to water in early morning or evening to minimize water loss through evaporation and maximize water up-take by the plants. Test and deploy timed or volume limited drip emitters and incorporating water holding amendments and native soil during the initial soil preparation at the start of the season.

Water sources and use — All water (domestic and irrigation) comes from Lucy Gulch, a Class II watercourse flowing through the subject parcels via a surface water diversion (POD). Rainwater harvesting should be evaluated and employed where possible to completely minimize or eliminate surface water diversion during the dry season.

It will be important for you to keep accurate records of your water diversion, storage and use from the water meters installed in 2018. This data will further refine the amount of additional water storage needed for the size of the operation, and so this water data can be reported each year, as required by the NCRWQCB and SWRCB-DWR. The more frequently and accurately water use is recorded, the better you will understand the water uses and needs of your farm, the value of water conservation, and the volume of water storage that is needed for you to forbear (not divert) during the dry summer growing season. Water documentation forms are provided in Appendix D for documenting water quantities diverted, stored and used.

8.0 LIST OF CHEMICALS

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

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

Fertilizers and amendments:

Archipelago Bat Guano	100 lbs
Roots Organics Nitro Bat Guano	100 lbs
Dr. Earth All Purpose	500 lbs
CalMag	30 gal.
Fish Micro Synthesis	10 gal.
Veg/Grow	80 gal.
Kelp/Sea Green	50 gal
Bloom	110 gal.

Petroleum and Other Chemicals:

Gasoline
Motor oil
Propane

Pesticides, Herbicides, and Fungicides:

None

9.0 LANDOWNER/LESSEE CERTIFICATION/SIGNATURES

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

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

Name of Legally Responsible Person (LRP): Misha Delaney Vandal

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

Signature: [Signature] Date: 6/3/18

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

WRPP prepared and finalized on (date): December 2018

Signature: [Signature] Date: 06 March 2018

Appendix A

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

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

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

I. Introduction

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

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

II. Standard BMPs for Construction

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

A. General BMPs to Avoid or Minimize Adverse Impacts

Temporal Limitations on Construction

1. To avoid impacting migrating fish and causing erosion and sedimentation of the stream channel, the project work season shall be from May 1 to October 15. If operations are to be conducted during the winter period from October 15 to May 1, a winter period operating plan must be incorporated into the project work plan. This plan shall include specific measures to be taken in the winter operating period to avoid or substantially lessen erosion and sedimentation into surface waters.
2. A 2-day (48-hour) forecast¹ of rain shall be the trigger for temporary cessation of project activities and winterization/erosion protection of the work site.

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

Limitation on Earthmoving

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

Limitations on Construction Equipment

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

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

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

Revegetation and Removal of Exotic Plants

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

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

Erosion Control

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

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

Miscellaneous

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

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

B. BMPs for Specific Activities

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

The following measures shall be employed:

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

Structure for Water Control and Stream Crossings

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

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

Limitations on Work in Streams and Permanently Ponded Areas

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

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

Temporary Stream Diversion and Dewatering: All Live Streams

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

Protection of Sensitive Species

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

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

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

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

A. Site Maintenance, Erosion Control, Drainage Features

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

73. Road shaping to optimize drainage includes out-sloping and crowning; shaping can minimize reliance on inside ditches. Drainage structures can include rolling dips and water bars within the road surface and ditch-relief culverts to drain inside ditches. Adequate spacing of drainage structures is critical to reduce erosion associated with runoff. Generally speaking, steep slopes require greater frequency of drainage structures. The drainage structures shall be maintained to ensure capture of and capacity for expected flow. The outlets of the structures shall be placed in such a manner as to avoid discharge onto fill, unstable areas, or areas that can enter a watercourse. If site conditions prohibit drainage structures at an adequate interval to avoid erosion, bioengineering techniques² are the preferred solution (e.g. live fascines), but other techniques may also be appropriate including armoring (i.e. rock of adequate size and depth to remain in place under traffic and flow conditions) and velocity dissipaters (e.g. gravel-filled "pillows" in an inside ditch to trap sediment). In the case that inside ditches need maintenance, grade ditches only when and where necessary, since frequent routine mechanical grading can cause erosion of the ditch, undermine banks, and expose the toe of the cutslope to erosion. Do not remove more leaves and vegetation than necessary to keep water moving, as vegetation prevents scour and filters out sediment.
74. Road drainage shall be discharged to a stable location away from a watercourse. Use sediment control devices, such as check dams, sand/gravel bag barriers, and other acceptable techniques, when it is neither practical nor environmentally sound to disperse ditch water immediately before the ditch reaches a stream. Within areas with potential to discharge to a watercourse (i.e. within riparian areas of at least 200 feet of a stream) road surface drainage shall be filtered through vegetation, slash, or other appropriate material or settled into a depression with an outlet with adequate drainage. Caution should always be exercised with catchment basins in the event of failure.
75. Any spoils associated with site maintenance shall be placed in a stable location where it cannot enter a watercourse. Sidecasting shall be minimized and shall be avoided on unstable areas or where it has the potential to enter a watercourse.
76. Do not sidecast when the material can enter the stream directly or indirectly as sediment. Sidecast material can indirectly enter the stream when placed in a position where rain or road runoff can later deliver it to a channel that connects with the stream.
77. Disconnect road drainage from watercourses (drain to hill slopes), install drainage structures at intervals to prevent erosion of the inboard ditch or gull formation at the hill slope outfall, outslope roads.

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

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

B. Stream Crossing Maintenance

81. Proper maintenance of stream crossings is critical to ensure support of beneficial uses of water. Regular inspection and maintenance is necessary to identify, in a timely manner, if problems are occurring. Crossings include rock fords³, armored fills with culverts³, and bridges³.
82. Rock fords are appropriate when temporary and minor moisture or over-land flow is expected, not typically when a bed and bank is present; exceptions may be justified if warranted by site specific conditions. Additionally, rock fords are appropriate if aquatic life is not present. An adequate layer of crushed angular rock shall be maintained at rock fords such that soil compaction is minimized under expected traffic levels.
83. Stream crossings consisting of armored fills with culverts and bridges are appropriate for streams with defined bed and bank². They shall be sized to ensure the 100-year streamflow event can pass unimpeded. Additionally, crossings shall allow migration of aquatic life during all life stages potentially supported by that stream reach; water depth and velocity can inhibit migration of adult and juvenile fish species.
84. Stream crossing design and installation is best accomplished with the assistance of a qualified professional. Site conditions can change over time (e.g. channel filling or incision); consultation with a qualified professional is appropriate to evaluate maintenance or replacement needs and opportunities.
85. Regular inspection of the stream crossing is appropriate to identify changed conditions within the stream channel (e.g., bank erosion, headward incision, and channel filling).
 - If large wood is accumulated upstream or within the crossing that could impede or deflect flow and result in erosion or debris capture, the wood

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

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

- If sediment or debris is accumulated within a culvert and limits flow capacity, the short term solution should generally be to clean out the culvert and place the debris and sediment in a stable location with no potential to discharge into a stream. In some cases a trash rack, post, or other deflection structure at the culvert inlet can reduce plugging.
 - If sediment is accumulated in a culvert without other debris accumulation and limits flow capacity, the long term solution may generally involve changing the culvert's slope, diameter, or embedment in the streambed.
86. The roadway adjacent to and over the crossing is an area of potential discharge. All road surfaces approaching a crossing shall be drained before the crossing, adequately filtered through vegetation or other material, and not discharged to a watercourse. If turbid water is discharged at a stream crossing, additional measures to control erosion at the source(s) or to remove sediment prior to discharge shall be implemented. Road surfaces shall be of rock, pavement, or other material appropriate for type and level of use.
87. If a culvert is used, the approaches and fill slopes shall be properly compacted during installation and shall be stabilized with rock or other appropriate surface protection to minimize surface erosion and slumping to the receiving waters. If possible, the road surface over the culvert shall have a critical-dip to ensure that if the culvert becomes plugged, water can flow over the road surface without washing away the fill prism. If site-specific conditions do not allow for a critical dip, alternatives such as emergency overflow culverts, oversized culverts, flared inlets, and debris racks may be warranted.

C. Riparian and Wetland Protection and Management:

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

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

D. Spoils Management

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

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

E. Water Storage and Use

WATER USE

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

WATER STORAGE

107. If using a water storage tank, do not locate the tank in a flood plain or next to equipment that generates heat. Locate the tank so it is easy to install, access, and maintain.
108. Vertical tanks should be installed according to manufacturer's specifications and placed on firm, compacted soil that is free of rocks/sharp objects and capable of bearing the weight of the tank and its maximum contents. In addition, a sand or pea gravel base with provisions for preventing erosion is highly recommended. Installation sites for tanks 8,000 gallons or more must be on a reinforced concrete pad providing adequate support and enough space to attach a tank restraint system (anchor using the molded-in tie down lugs with moderate tension, being careful not to over-tighten), especially where seismic or large wind forces are present.
109. Horizontal tanks shall be secured with bands and/or hoops to prevent tank movement.
110. Design and construct storage ponds in properly sited locations, off-stream. Plant vegetation along the perimeter of the pond. Construct berms or excess freeboard space around the perimeter of the pond to allow for sheet flow inputs.
111. Provide adequate outlet drainage for overflow of ponds, including low impact designs, to promote dispersal and infiltration of flows.
112. Place proper lining or sealing in ponds to prevent water loss.

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

F. Irrigation Runoff

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

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

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

128. Periodically calibrate pesticide application equipment.
129. Use anti-backflow devices on water supply hoses, and other mixing/loading practices designed to reduce the risk of runoff and spills.
130. Petroleum products shall be stored with a secondary containment system.
131. Throughout the rainy season, any temporary containment facility shall have a permanent cover and side-wind protection, or be covered during non-working days and prior to and during rain events.
132. Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
133. Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to rain events.
134. Have proper storage instructions posted at all times in an open and conspicuous location.
135. Prepare and keep onsite a Spill Prevention, Countermeasures, and Cleanup Plan (SPCC Plan) if applicable⁴.
136. Keep ample supply of appropriate spill clean-up material near storage areas.

H. Cultivation-Related Wastes

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

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

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

I. Refuse and Human Waste

141. Trash containers of sufficient size and number shall be provided and properly serviced to contain the solid waste generated by the project. Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers. Use lined bins or dumpsters to reduce leaking of liquid waste. Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater. Make sure trash container areas are screened or walled to prevent off-site transport of trash. Consider using refuse containers that are bear-proof and/or secure from wildlife. Refuse shall be removed from the site on a frequency that does not result in nuisance conditions, transported in a manner that they remain contained during transport, and the contents shall be disposed of properly at a proper disposal facility.
142. Ensure that human waste disposal systems do not pose a threat to surface or ground water quality or create a nuisance. Onsite treatment systems should follow applicable County ordinances for human waste disposal requirements, consistent with the applicable tier under the State Water Resources Control Board Onsite Waste Treatment System Policy⁵.

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

IV. References

Handbook for Forest, Ranch, & Rural Roads: A Guide for Planning, Designing, Constructing, Reconstructing, Upgrading, Maintaining, and Closing Wildland Roads

http://www.pacificwatershed.com/sites/default/files/handbook_chapter_download_page.pdf

A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds

<http://www.5counties.org/roadmanual.htm>

Construction Site BMP Fact Sheets

<http://www.dot.ca.gov/hq/construc/stormwater/factsheets.htm>

EPA Riparian/Forested Buffer

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

Creating Effective Local Riparian Buffer Ordinances

http://www.rivercenter.uga.edu/publications/pdf/riparian_buffer_guidebook.pdf

How to Install Residential Scale Best Management Practices (BMPs) in the Lake Tahoe Basin

<http://www.tahoebmp.org/Documents/Contractors%20BMP%20Manual.pdf>

Spoil Pile BMPs

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

Sanctuary Forest Water Storage Guide

http://agwaterstewards.org/images/uploads/docs/1213661598_Water_Storage_Guide.pdf

Natural Resources Conservation Service-USDA, "Ponds – Planning, Design, Construction", Agriculture Handbook

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030362.pdf

Division of Safety of Dams size requirements

<http://www.water.ca.gov/damsafety/jurischart/>

Water Tanks: Guidelines for Installation and Use

http://dnn7.snydernet.com/_pdf/_septic/Septic%20Catalog%202010.pdf

BEST MANAGEMENT PRACTICES (BMP's) University of California Cooperative Extension

http://www.waterboards.ca.gov/sandiego/water_issues/programs/wine_country/docs/updates081910/ucce_bmps.pdf

California Stormwater Quality Association

Section 4: Source Control BMPs

<https://www.casqa.org/sites/default/files/BMPHandbooks/sd-12.pdf>

CA DOT Solid Waste Management Plan

<http://www.dot.ca.gov/hq/construc/stormwater/WM-05.pdf>

State Water Resources Control Board Onsite Wastewater Treatment System (OWTS) policy

http://www.waterboards.ca.gov/water_issues/programs/owts/docs/owts_policy.pdf

California Stormwater Quality Association

Section 4: Source Control BMPs

<https://www.casqa.org/sites/default/files/BMPHandbooks/sd-32.pdf>

California Riparian Habitat Restoration Handbook

http://www.conservation.ca.gov/dlrp/watershedportal/InformationResources/Documents/Restoration_Handbook_Final_Dec09.pdf

The Practical Streambank Bioengineering Guide

http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/idpmcpu116.pdf

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Appendix B

Monitoring Plan and Photo Log

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

APPENDIX B: MONITORING PLAN AND PHOTO LOGS

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

For this Project Site, ten (10) Monitoring Points (MP) have been identified. These MPs are related to road drainage, stream crossings, stock piled spent soil, and petroleum storage. MP #1 includes a cut-bank seep area lacking road drainage features and presents direct delivery to the Class II Watercourse below during winter storm events and spring snow melt. MP #2 shows exposed cultivation-related spent soils that may contain residual fertilizers or nutrients stored outdoors with the potential for becoming mobilized and transported to the receiving waters of Lucy Gulch and connected tributaries' to this Class II Watercourse. MP #3 through MP #8 are for the six stream crossings (SC #1 – SC #6) as covered by an LSAA (Appendix I). MP #9 identifies irrigation runoff primarily associated with the above ground smart pots that are being phased out. Finally, MP #10 relates to portable generators lacking a secondary containment basins, spill kits, and adequate cover.

The goal of the monitoring is to ensure the original problems or non-compliant features (e.g., exposed cultivation-related spent soils or petroleum products without secondary containment) have been effectively treated and that environmental problems or threats to water quality do not arise or are adequately mitigated during the year. Consult with PWA if a problem is detected at any of these monitoring locations or elsewhere on the property, or if you would like our assistance in monitoring or developing corrective actions (BMPs) for problems that develop. Please also report to PWA when one or more of the corrective actions in the WRPP have been implemented, and include photos and descriptions of the actions taken.

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

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

- 1) Before and after any significant alteration or upgrade to a given stream crossing, road segment, or other controllable sediment discharge site. Inspection should include photographic documentation, with photo records to be kept on-site.
- 2) Prior to October 15 to evaluate site preparedness for storm events and stormwater runoff.
- 3) Following the accumulation of 3 inches cumulative precipitation (starting September 1st) or by December 15th, whichever is sooner.
- 4) Following any rainfall event with an intensity of 3 inches precipitation in 24 hours. Precipitation data can be obtained from the National Weather Service by entering the site zip code at

<http://www.srh.noaa.gov/forecast>; Pick the nearest or most relevant zip code and then select the 3 day history that will also show precipitation totals.

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	Monitoring Point	Feature	Date	Pre-, during, or post-treatment	Description
1	--	Road surface erosion	9/14/18	Pre-treatment	View of surface erosion and the lack of drainage features on the established roads for the property. No delivery was present.
2	--	Road surface erosion	9/14/18	Post-treatment	View of either a fire related or timber harvest skid road as an example of this transportation network on the property which are currently being used. No delivery was present.
3	MP #1	Road drainage		Pre-treatment	View of the cut-bank seep area and the inboard drain lacking a cross road drainage feature.
4	MP #1	Road drainage	9/14/18	Pre-treatment	View of the outlet for the feature shown in Photo #3 and the Class II watercourse below. Direct delivery potential during the winter and spring snow melt exists.
5	MP #2	Spent soil storage	9/14/18	Pre-treatment	View of cultivation-related spent soil stored in totes for re-use but without cover. The dried soil with vermiculite and soil could include residual nutrients and has the potential for being transported to the local watercourses of Lucy Gulch.
6	MP #2	Spent soil storage	9/14/18	Pre-treatment	View of a cultivation-related spent soil and vermiculite pile with the potential of drying out and transporting residual fertilizer or nutrients into the surface waters of Lucy Gulch.
7	MP #2	Spent soil storage	9/14/18	Pre-treatment	Similar to Photo 5 except here, the cultivation-related spent soil with vermiculite remains in the smart pots and lacks cover. Again, the potential for residual nutrients being transported into the receiving waters of Lucy Gulch exists.
8	MP #4	Stream crossing maintenance	9/14/18	Pre-treatment	View of the inlet for Stream Crossing #2 (SC #2) showing the functional but, undersized culvert addressed in the LSAA for upgrading.
9	MP #5	Stream crossing maintenance	9/14/18	Pre-treatment	Looking downstream at the inlet of SC #4 with additional sandbag wig wall armoring. This undersized culvert is covered in the LSAA for upgrading.

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	Monitoring Point	Feature	Date	Pre-, during, or post-treatment	Description
10	MP #5	Stream crossing maintenance	9/14/18	Pre-treatment	A cross slope view showing the slight plunge at the outlet of SC #3. This crossing is addressed for upgrading in the LSAA.
11	MP #6	Stream crossing maintenance	9/14/18	Pre-treatment	The inlet of SC #6 that includes a 6-inch rust line and is partially collapsed. This crossing is included in the LSAA for upgrading.
12	MP #7	Stream crossing maintenance	9/14/18	Pre-treatment	This stream crossing, SC #5, includes an approximate 4-foot plunge at the outlet and is the largest culvert identified in the LSAA for upgrading.
13	--	Riparian buffers	9/14/18	N/A	View of an ephemeral riparian area where primary succession species are becoming established after the 100% black-out burn from the 2015 Johnson and Blake fires.
14	--	Water conservation measures	9/14/18	N/A	View showing the raised beds constructed with on-site native logs. The bed design includes hand excavating into the native soil and incorporating organic soil building amendments. Drip irrigation is utilized furthering water conservation efforts.
15	MP #9	Irrigation runoff and leachate	9/14/18	Pre-treatment	Even though this area is more than 200 feet from surface water, this irrigation related rivulet indicates over watering which also contains nutrients. These nutrients have the leachate potential to enter into groundwater, or be mobilized in the winter and spring snow melt and delivering to the surface waters of Lucy Gulch.
16	MP #9	Irrigation runoff and leachate	9/14/18	Pre-treatment	View of smart pots and evidence of overwatering. This indicates water is not being applied at agronomic rates. As nutrients are applied through the irrigation system, leachate from over watering could pose a threat to Lucy Gulch through groundwater intrusion or winter runoff.

Photo Log of features of interest and monitoring points before, during, and/or after treatment					
Photo #	Monitoring Point	Feature	Date	Pre-, during, or post-treatment	Description
17	MP #10	Petroleum products	9/14/18	Pre-treatment	View of small portable generators as operated on the project site, stored off the ground and with cover but secondary storage and a spill kit were lacking.
18	MP #10	Petroleum products	9/14/18	Pre-treatment	This portable generator and water pump were maintained in operation off the ground and under cover but a spill kit and secondary containment were absent.
19	MP #10	Petroleum products	9/14/18	Pre-treatment	This portable generator was used to operate the water pump for the water diversion; the stream was >200 ft. away. Secondary containment, a spill kit and a protective cover are needed.
20	MP #10	Petroleum products	9/14/18	Pre-treatment	This self-contained generator was lacking a spill kit.

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

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

Appendix C

Photo Documentation of Monitoring Points

Geologic and Geomorphic Studies ♦ Wildland Hydrology ♦ Civil Engineering ♦ Erosion Control ♦ Soil/Septic Evaluation
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APPENDIX C: PHOTO DOCUMENTATION OF MONITORING POINTS



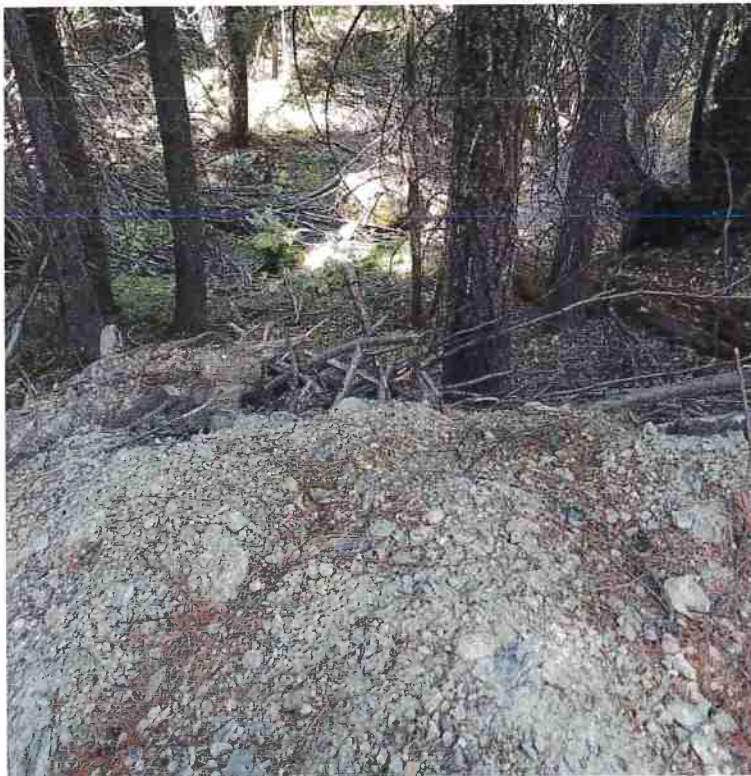
Photo 1



Photo 2



MP #1, Photo 3



MP #1, Photo 4



MP #2, Photo 5



MP #2, Photo 6



MP #2, Photo 7



MP #4, Photo 8



MP #5, Photo 9



MP #5, Photo 10



MP #6, Photo 11



MP #7, Photo 12



Photo 13



Photo 14



MP #9, Photo 15



MP #9; Photo 16



MP #10; Photo 17



MP #10; Photo 18



MP #10; Photo 19



MP #10; Photo 20

Photographic Documentation of 2015 Blake and Johnson Fire's Cultivation Loss



Photo taken by the Landowner while leaving the property under mandatory evacuation orders
in June 2015.

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Photo #1. The fires were hot enough to burn fabric pots (arrows); all pots were super saturated prior to the mandatory evacuation. Photo taken in September 2015.



Photo #2. These fires resulted in 100% black-out burns in most areas, note the scorched cannabis. Photo taken in September 2015.



Photo #3. The black-out burn conditions and subsequent loss is throughout the property. Photo taken in September 2015.



Photo #4. A close-up view of the typical fire damage to the above ground planters despite super saturating the soils. Photo taken in September 2015.



Photo #5. This photograph was taken September 14, 2018 by PWA staff while conducting a site inspection. Three years post fire, the 100% black-out conditions are obvious and primary succession is mostly annuals with a few stump sprouts. This speaks to the fires intensity and magnitude.



Photo #6. This photograph was taken September 14, 2018 by PWA staff while conducting a site inspection. Three years post fire, on conifer survived the fires' black-out burn and chinquapin are stump sprouting as the area begins recovery.

Appendix D

PWA Water Log Sheets

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<div> <div>Water Use by Source</div> <div>- Log Sheet -</div> </div>		WD ID:		PWA ID:		Watershed:							
		Location:		Sheet ___ of ___		Year:							
Water Source (tank, bladder, pond, well, delivered, other)	Water unit (gallons or acre feet)	Amount utilized from storage per month (gallons or acre feet), by type											
		January	February	March	April	May	June	July	August	Sept	October	November	December
Monthly Totals													
Comments: As per NCRWQCB: "Report water volume used, listing each source separately. This may include use of stored water, immediate use of pumped groundwater, diverted surface water, or delivered water. If water is delivered, list delivery date, delivery volume, and name and address of water purveyor"													

Appendix E

PWA Fertilizer-Amendment Log Sheets

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[illegible]

Appendix F

PWA Pesticide-Herbicide Log Sheets Legal Pest Management Practices

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Pesticide and Herbicide Application Log Sheet

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

LEGAL PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWERS IN CALIFORNIA

PESTS OF MARIJUANA IN CALIFORNIA

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

HOW TO INTERPRET THE TABLES

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

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

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

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

PESTS. The tables show the most likely pests in California based on Cranshaw's presentation and McPartland's list and gleaned from California-based web sites and blogs. Some pests that drew attention on several blogs (e.g., hemp russet mite) may be

worse during drought years. Many have cyclic population fluctuations and others are mainstays of general greenhouse cultivation (e.g., whiteflies, thrips, and fungus gnats). We'll add weeds to this compendium when we have more information.

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

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

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

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

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

REFERENCES

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

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

¹ 40 CFR (Code of Federal Regulations)

² under FIFRA section 25(b) and 3 CCR section 6147

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

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

^a 40 CFR (Code of Federal Regulations)

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

¹ Biofungicides

² Bacterial-based insect pathogen

³ Fungal-based insect pathogen

Table 2. PEST MANAGEMENT PRACTICES FOR MARIJUANA GROWN OUTDOORS

PEST	DAMAGE	IPM PRACTICES (monitoring; cultural, physical, mechanical, biological)	PESTICIDES
MITES & INSECTS			
two-spotted spider mites <i>Tetranychus urticae</i>	Suck plant sap; stipple leaves	<ul style="list-style-type: none"> ▪ Keep dust down by hosing off plants (if dust is a problem) ▪ Release predatory mites 	neem oil, horticultural oil, sulfur
hemp russet mites <i>Aculops cannabicola</i>	Suck plant sap; kill leaves and flowers	<ul style="list-style-type: none"> ▪ Release predatory mites 	neem oil, horticultural oil, sulfur
crickets (field & house) <i>Gryllus desertus</i> , <i>G. chinensis</i> , <i>Acheta domesticus</i>	Eat seedlings	<ul style="list-style-type: none"> ▪ Use floating row covers or cones on individual plants 	—
termites	Eat roots	<ul style="list-style-type: none"> ▪ Flood nests 	—
leafhoppers	Suck plant sap; weaken plants	<ul style="list-style-type: none"> ▪ Encourage natural enemies by planting nectar sources 	horticultural oil or insecticidal soaps for nymphs
aphids <i>Phorodon cannabis</i> , <i>Myzus persicae</i> , <i>Aphis fabae</i>	Suck plant sap; weaken plants <i>P. cannabis</i> (bhang aphid) vectors tobacco mosaic virus	<ul style="list-style-type: none"> ▪ Hang up yellow sticky cards (alates) ▪ Hose off plants 	azadirachtin, horticultural oil, insecticidal soaps, <i>Beauveria bassiana</i>
whiteflies <i>Trialeurodes vaporariorum</i> , <i>Bemisia tabaci</i> , <i>B. argentifolii</i>	Suck plant sap; weaken plants	<ul style="list-style-type: none"> ▪ Hang up yellow sticky cards ▪ Reflective plastic mulch 	azadirachtin, horticultural oil, insecticidal soaps, rosemary + peppermint oils, <i>Beauveria bassiana</i>
leafminers <i>Liriomyza</i> spp.	Bore into roots and leaves	<ul style="list-style-type: none"> ▪ Remove older infested leaves ▪ Use biocontrol: release <i>Diglyphus</i> parasitoids 	azadirachtin

PEST		DAMAGE	IPM PRACTICES (monitoring; cultural, physical, mechanical, biological)	PESTICIDES
LEPIDOPTERA	cutworms <i>Agrotis ipsilon</i> , <i>A. segetum</i> , <i>Spodoptera litura</i> , <i>S. exigua</i> , <i>Mamestra brassicae</i> (Noctuidae)	Eat seedlings	<ul style="list-style-type: none"> Use pheromone traps to detect adults. Remove weeds, which serve as a reservoir for cutworms and other noctuids 	Vegetative stage only: Use <i>Bacillus thuringiensis kurstaki</i> if egg-laying adults found, insecticidal soap; azadirachtin
	budworms <i>Helicoverpa armigera</i> , <i>H. zea</i> (Noctuidae)	Eat flowering buds	<ul style="list-style-type: none"> Shake plants to dislodge larvae Remove infested buds Plant corn as trap crop 	Vegetative stage only: Use <i>Bacillus thuringiensis kurstaki</i> , insecticidal soap
	hemp borers (= hemp moth) <i>Grapholita delineana</i> (Tortricidae)	Bore through stalks (caterpillars)	<ul style="list-style-type: none"> Plow crop under in fall; remove plants still standing; remove nearby hemp and hop plants Use light traps at night for monitoring Use biocontrol: <i>Trichogramma</i> 	<i>Bacillus thuringiensis kurstaki</i>
COLEOPTERA	hemp flea beetles <i>Psylliodes attenuata</i> (Chrysomelidae)	Bore into stems (grubs); feed on seedlings and leaves of larger plants (beetles)	<ul style="list-style-type: none"> Use reflective mulches Plant trap crops (e.g., radish or Chinese mustard) 	sulfur
	scarab grubs (possibly other beetles)	Bore into stems	<ul style="list-style-type: none"> Use parasitic nematodes 	—
MAMMALS				
mice (e.g., house mice)		Eat young sprouts and seeds	<ul style="list-style-type: none"> Double wrap a 3'-tall chicken wire fence around plants Trap (minus rodenticides) Mount barn owl boxes 	Rodenticides (see footnote below)
roof rats , <i>Rattus rattus</i> wood rats , <i>Neotoma</i> spp.		Strip bark from stems to build nests		
pocket gophers , <i>Thomomys</i> spp.		Tunnel through planting areas; feed on plants; gnaw on irrigation lines		
Columbian black-tailed deer , <i>Odocoileus hemionus columbianus</i>		Knock over plants; leave dander, droppings, and ticks behind	<ul style="list-style-type: none"> Install deer fencing 	—
black bears , <i>Ursus americana</i>		Knock over plants	<ul style="list-style-type: none"> Install electric fencing 	—

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

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

PEST	DAMAGE	IPM PRACTICES (monitoring; cultural, physical, mechanical, biological)	PESTICIDES
DISEASES			
powdery mildew <i>Sphaerotheca macularis</i>	Grow on leaves as white and gray powdery patches	<ul style="list-style-type: none"> Use fans to improve air circulation 	horticultural oil; neem oil; sodium bicarbonate, potassium bicarbonate; <i>Bacillus subtilis</i>
pythium root rots <i>Pythium</i> spp.	Attack root tips and worsens when plants grow in wet soil	<ul style="list-style-type: none"> Avoid hydroponic production or wet soil conditions 	Incorporate biocontrol agents into root-growing media (e.g., <i>Gliocladium virens</i> , <i>Trichoderma harzianum</i> , <i>Bacillus subtilis</i>)
MITES & INSECTS			
two-spotted spider mite <i>Tetranychus urticae</i>	Suck plant sap; stipple leaves	<ul style="list-style-type: none"> Disinfest cuttings before introducing to growing area Release predatory mites 	neem oil, horticultural oil, sulfur
leafhoppers	Suck plant sap; weaken plants	<ul style="list-style-type: none"> Encourage natural enemies by planting nectar sources 	horticultural oil or insecticidal soaps for nymphs
whiteflies <i>Trialeurodes vaporariorum</i> , <i>Bemisia tabaci</i> , <i>B. argentifolii</i>	Suck plant sap; weaken plants	<ul style="list-style-type: none"> Hang up yellow sticky cards Use biocontrol: <i>Encarsia formosa</i> 	azadirachtin, <i>Beauveria bassiana</i> , cinnamon oil, horticultural oil
thrips <i>Heliothrips haemorrhoidalis</i> , <i>Frankliniella occidentalis</i> , <i>Thrips tabaci</i>	Stipple leaves and vector viruses	<ul style="list-style-type: none"> Hang up yellow or blue sticky cards 	
dark-winged fungus gnats (Diptera: Sciaridae) <i>Bradysia</i> spp.	Damage roots and stunt plant growth	<ul style="list-style-type: none"> Avoid overwatering Use growing media that deters gnat development Hang up yellow sticky cards Use biocontrol: soil-dwelling predatory mites 	<i>Bacillus thuringiensis israelensis</i> (BTI); predatory nematodes; azadirachtin soil drenches

Table 4. PESTS OF MARIJUANA BY PLANT PART

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

Appendix G

Hazardous Materials Storage Guidelines

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Appendix G. Hazardous Materials Storage Guidelines

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

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

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

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

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

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

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

Oxidizers, caustic materials, acids, and bases.

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

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

Appendix H

PWA Typical Drawings

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