

Third Party Proposal
For
Order No. R1-2015-0023

Submitted By
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Program Purpose

As part of the Third Party Program, Natural Resources Management Corporation (NRM) will assist our clients with enrolling under the Water Board Order No. R1-2015-0023. Services NRM will provide include site assessments to determine compliance with the orders conditions, determining the sites appropriate Tier, developing water resource protection plans, and monitoring and reporting as laid out in the Order. NRM can also assist any of our clients in Tier three with restoration, mitigation and monitoring plans as needed. NRM can also assist our clients with Division of Water Rights registration.

NRM proposes to fulfill the following functions laid out in **Order No. R1-2015-0023 finding 21:**

- Tracking names of enrolled (and non-enrolled) dischargers. This will include data entry in the California Integrated Water Quality System (CIWQS), using a unique and secure identifier and providing a framework for annual compliance reporting to CIWQS or other program as approved by the Executive Officer.
- Collecting and submitting required fees to the Board.
- Managing communication and notifications between enrolled dischargers and the Regional Water Board, including informing growers of the program and status of implementation.
- Assisting dischargers with identifying the proper Tier for a specific site.
- Assisting self-certification requirements for dischargers meeting Tier 1 characteristics.
- For Tier 2 Dischargers, developing water resource protection plans, helping individual dischargers to develop individual plans, and/or developing a more comprehensive community plan which individual dischargers agree to abide by. Plans will include a timeline for implementation as appropriate.
- Assisting dischargers in implementing water resource protection plans. This will include site inspections and documentation of timely implementation or installation of management measures per schedule in the water resource protection plan, and evaluation of their effectiveness in meeting intended objectives.

- Monitoring and reporting to Regional Water Board, including compliance with the Order, and effectiveness of management measures.

Procedural Description

Tracking names of enrolled (and non-enrolled) dischargers

NRM will keep a database that will track all cannabis clients who enlist our assistance in meeting the standards laid out in the Order. This database will contain the names of both clients who are enrolled under the order and those still working towards enrollment. NRM will enter annual compliance data into our in house database as well as into the CIWQS system annually for each discharger NRM has enrolled.

Collecting and submitting required fees to the Board

NRM will collect from our clients and submit to the Water Board the annual required water quality fees from each of the discharges enrolled in the program. The fees will be based on the participant's Tier status and will be in accordance with the fee schedule provided by the Board. NRM will use professional accounting software such as Quick Books to track receipt of the payment from the client and the payment to the RWQCB. NRM will not hold the fees for more than 45 days. Transfer of the payment for all fees NRM is holding to the RWQCB will take place once a month.

Managing communication and notifications between enrolled dischargers and the Regional Water Board, including informing growers of the program and status of implementation.

NRM will manage communication between our enrolled and enrolling clients and the Water Board. A file will be kept for each client (NRM's current filing system is client based). Communication from the Water Board will be passed on to the client by the client's chosen method (mail or email), and a copy of the communication will be stored in NRM's client's file. Likewise communication from the discharger will be submitted to the Board by NRM; again a copy will be kept in the client's file. Files will be maintained for at least four years after the Order has expired, a client is no longer enrolled, and/or no longer using NRM's services. NRM will keep clients up to date with any program changes and the status implementation. NRM currently manages communications between our clients and many agencies including Calfire, California Department of Fish and Wildlife (CDFW), Army Corps of Engineers (ACOE), Environmental Protection Agency (EPA), Regional Water Quality Control Board, Coastal Commission, etc.

Assisting dischargers with identifying the proper Tier for a specific site

NRM will assist clients in identifying the proper Tier for their property. Any parcel with less than 2000 square feet of production space and with **no** potential for discharge of waste is not required to enroll. NRM understands the Tier requirements as summarized in the Order: **Tier 1:** site poses a low risk to water quality, less than 5000 square feet of cannabis production space; cannabis production spaces are not on slopes greater than 35% and not located within 200 feet of surface water; and no surface water is being diverted between May 15 and October 31 for cannabis production. **Tier 2:** includes operations that present a higher threat to water quality and water resources. The site does not meet the characteristics of Tier 1 stated above; or the site meets the Tier 1 characteristics but does not meet standard conditions.

Tier 2 dischargers must develop and implement a water resource protection plan that includes management measures to be implemented to meet standard conditions. Clients with cultivation areas less

than 10,000 square feet that have fully implemented a water resource protection plan and are determined to pose a low threat to water quality based on full compliance with standard conditions qualify for star status (**Tier 2***). This includes sites that may be over 5,000 square feet, but otherwise meet Tier 1 site characteristics. The following site-specific details will be recorded, mapped, and photo documented, for enrollment:

- Total cultivation area (square feet)
- Distance of closest cultivation area or associated facility to surface waters (feet)
- Average slope of (each) cultivation area on parcel
- Total number of stream crossings on parcel
- Average amount of fertilizer used per season listed individually by N-P-K value (pounds)
- Total surface water diversion volume by month (gallons or acre feet)
- Total water used per month from each source with specific source listed separately (e.g. rainfall catchment, surface water, groundwater well, water hauler)
- Total amount of utilized water storage capacity by type (e.g. pond, storage tank, bladder)
- All streams on the property identified and mapped

Site visits will be conducted by at least two people. Either Bob Kelley CPESC erosion control specialist or Sandra Brown hydrologist will lead the site visits. They will be assisted by Prairie Moore, Paul Grunden or one of NRM's technicians. Site's requiring wetland investigation or restoration will also be visited by Prairie Moore.

Assisting self-certification requirements for dischargers meeting Tier 1 characteristics

NRM will first confirm using the methods listed above that the property is in Tier 1. We will then fill out and submit the Notice of Intent from Appendix A and the monitoring report self-certification from Appendix C for the client. Copies of the documents along with the order will be given to the client to be kept on the cultivation site.

For Tier 2 Dischargers, developing water resource protection plans, helping individual dischargers to develop individual plans, and/or developing a more comprehensive community plan which individual dischargers agree to abide by. Plans will include a timeline for implementation as appropriate.

NRM will develop water resource protection plans for clients in Tier 2. First using the methods outlined above NRM will confirm the property falls into Tier 2. In addition to filling out the Notice of Intent from Appendix A and the monitoring report self-certification from Appendix C for the client we will also develop the water resource protection plan. NRM has the technical expertise to develop these plans, our staff includes a Certified Professional Erosion Control and Sediment Control Specialist (CPSEC), a hydrologist who specializes in watershed management and sedimentation, and a restoration ecologist who specializes in riparian restoration. NRM regularly produces sediment control plans for timber operations, identifying road erosion and potential road sediment sources documented on maps for correction; we also have designed, implemented and monitored restoration projects for both wetland mitigation and riparian restoration. NRM can also

develop a community plan if a group of clients located in close proximity to each other want to take that option. Plans will have timeline for implementations as appropriate. NRM regularly writes Mitigation and Monitoring Plans (MMPs) for clients. MMPs always include a timeline for both the implementation of restoration or mitigation measures as well as a timeline for monitoring.

Assisting dischargers in implementing water resource protection plans. This will include site inspections and documentation of timely implementation or installation of management measures per schedule in the water resource protection plan, and evaluation of their effectiveness in meeting intended objectives.

NRM will assist our clients with implementation of their water resource protection plans. NRM regularly assist clients with hiring licensed and experience equipment operators both for timber operations where we use Licensed Timber Operators (LTOs) and other restoration and repair projects where we use construction firms that specialize in things like wetland creation, levee repair, etc. We would assist our clients in selecting the most qualified operator for their job. NRM also regularly provides construction monitoring for timber operations, road and highway construction, wetland creation etc. We would provide oversight in implementing the water resource protection plan as needed to ensure the plan is implemented properly. NRM will also inspect the site following seasonal implementation measures to ensure the plan was implemented correctly and all BMPs called for in the plan are complete.

Monitoring and reporting to Regional Water Board, including compliance with the Order, and effectiveness of management measures.

NRM will monitor our client's area of operation as laid out in Appendix C. This will include annual monitoring, documenting and photographing features on the site map to provide the basis for recertification. It will include monitoring prior to October 15th to ensure the site is prepared for winter storm events, after three inches of rain accumulation or by December 15 whichever comes first, and after any rain event with three or more inches of accumulation in a 24 hour period. Monitoring will also be done before and after any significant alterations or upgrades to stream crossings, road segments, or controllable sediment discharge sites. NRM will fill the reporting document in Appendix C following each monitoring visit and submit the results to the Water Board by March 31st of each year. NRM will allow clients to self-monitor if they choose to. Prior to self-monitoring NRM will work with the client to ensure they understand how to conduct the monitoring. The NRM staff or the client will conduct the inspections and take the required photographs of each controllable sediment discharge site, areas where pollutants or wastes have the potential to be transported into waters, and locations where runoff from roads or developed areas drain towards surface waters. If self-monitoring the client will then submit the inspection paper work and photos to NRM. NRM will review the documenting paper work and photos from the inspection. NRM will ensure the monitoring was done correctly, or it will be redone by the client or by NRM staff. If monitoring shows a potential for discharge into waters or management measure that are not effective NRM's staff will immediately design new management measures. We will then work with the client to implement the new or revised management measures. The new management measures will be implemented as soon as is feasible, if necessary temporary BMP's will be used to ensure discharge does not reach waters.

The Water Board will be able to verify proper implementation of the Order on our client's sites in the following ways. NRM will document the site by taking measurements and photos of all features of interest on our client's properties. All of these features of interest will also be included on an accurate site map of the property. All of the data collected during site visits will be reported and available to the Water Board. Additionally NRM agrees to allow the Water Board access to our accounting and other records to conduct audits and verify proper implementation.

Technical Experience/ Qualifications

NRM has been a leader in the consulting forestry, land resources management, and Environmental Permitting business for over 40 years. On staff includes highly experienced Registered Professional Foresters and Resource Specialists including hydrologist, erosion control specialist, restoration ecologist, botanist, and wildlife biologist. NRM has laid out timber harvest plans meeting the best management practices and all of California's harvesting regulations to conduct such operations. NRM has conducted hundreds of miles of road sediment inventories and associated remediation and restoration plans. NRM had written and implemented numerous mitigation and monitoring plans, as well as restoration plans.

NRM assists clients with procuring environmental permits for projects including 1600 permits, 401 and 404, Coastal Development Permits, and grading permits. We also author documents for NEPA and CEQA compliance including EIR, EIS, EA's, BA's and Initial Studies. NRM regularly coordinates and works with all of the regulatory agencies in order to conduct proper land management activities. NRM has the stability to conduct the required monitoring efforts into the future. Additionally, NRM has the

geographic mapping capabilities to produce the necessary maps needed for registration and water resource protection plans. Please see Appendix A for a list of relevant experience, SOQ and resumes.

Organizational Capacity

NRM is a C corporation in business since 1971 and governed by a Board of Directors. Corporate officers include a President, Vice President, Treasurer, and Secretary. Staff includes Registered Professional Foresters, a hydrologist/watershed specialist, a Certified Professional Soil Erosion and Sediment Control Specialist, botanist/wetland specialist, wildlife biologists, an office manager, and numerous qualified field technicians. NRM also works closely with other licensed professionals who provide expertise where needed such as an RG/CEG, archaeologist, or engineer. Enrollment into the Order will likely require obtaining permits from other agencies. NRM regularly assists clients with obtaining state and county permits. NRM's outside consultants will be used indirectly for preparation of soils/geo reports or engineering if necessary. Site evaluations will determine if licensed engineers or geologist will be necessary. Ponds, or landings, roads and flats built in unstable areas may require an engineer and/ or geologist to verify stability. NRM's hydrologist and CPESC erosion control specialist have years of experience determining if geology is stable or needs more investigation. Any action associated with the implementation of this Order that requires a licensed professional shall be performed by such as required by the California Business and Professions Code and California Code of Regulations. Prairie Moore (NRM's Environmental

Services Program Director) will provide coordination, task allocation, and supervision for NRM's Third Party Program. NRM's professionals and field technicians will provide technical expertise required with field work and preparing associated technical documents. NRM's office manager will be responsible for tracking names of participating (and non-participating) dischargers, and collecting and submitting required fees. NRM's Environmental Services Program Director will oversee and manage communications between NRM, Dischargers, and the Regional Water Board, and maintaining the database of information needed to satisfy annual compliance reporting to CIWQS. NRM's Third Party Program is funded by consulting fees charged to the participating clients. All records generated that are related to the Order shall be available to Regional Water Board staff, and shall be maintained for at least two years following the expiration of the Order.

NRM's billing cycle is monthly. NRM will reimburse the Regional Water Board within 30 days of receipt of collected fees which is in line with the CALIFORNIA PROMPT PAYMENT ACT, Government Code, Section 927, et seq. Consulting fees charged to the clients will be variable based upon the complexity of the site and property conditions. It is expected consulting fees will vary from approximately \$1,000- 12,000, with most expected in the \$2,000-4,000 range. Travel and Labor will be charged for hourly. Mileage will be charged by the mile. NRM's current charge rates are: Labor and Travel time \$70/hr., GIS Mapping \$75/hr., Mileage for travel \$0.70/mile, Supplies- at cost.

NRM will keep annual summaries of expenditures and revenues, including fees for services provided, used to help dischargers comply with this Order. This will include audited financial statements according to generally accepted accounting procedures for the United States of America.

NRM maintains a \$2,000,000 general liability insurance, and a \$1,000,000 automobile liability policy.

Sample Water Resource Protection Plan

NRM will develop water resource protection plans for clients that fall into Tier 2 status. NRM has the experience to identify potential water quality impacts as associated with forestry as well as cannabis cultivation, including road associated erosion and sediment delivery. NRM anticipates helping clients obtain the appropriate permits, such as CDFW 1600 permits, grading permits, etc., as they are needed to remediate any controllable sources of erosion. Additionally, NRM has the experience to assist and/or oversee implementation.

Please see attached Sample Water Resource Protection Plan.

Framework for Annual Compliance Reporting to CIWQS

NRM will commit to the annual monitoring and compliance reporting to CIWQS. This will include:

- a. Total number of sites enrolled through the third party, by HUC-12 subwatershed, or smaller hydrologic watershed, as determined necessary by the Executive Officer.
- b. Total number of sites in each subwatershed enrolled in each specific Tier category.
- c. Number of sites in compliance with standard conditions in each specific watershed in the covered region.

- d. Number of sites with active water resource protection plans meeting milestones.
- e. Monitoring data from each enrolled site in the coverage area
- f. Summary of education and outreach activities of efforts

The required information will be available in our annual monitoring data collected at our client's sites. NRM will keep a database that will track all cannabis clients who enlist our assistance in meeting the standards laid out in the Order. This database will contain all the pertinent information gathered in the site visit for enrollment, the location of the site by HUC-12 subwatershed or smaller hydrologic watershed. For annual monitoring this information can then be queried and updated as to the current conditions or status of the site.

Annual monitoring reports will include the total number of sites enrolled through NRM by HUC-12 subwatershed (and smaller hydrologic watershed where applicable), their Tier category, the site status as it pertains to standard conditions and compliance with BMPs; and whether Tier 2 sites have an active water resource protection plan meeting milestones. Reports will include the monitoring updates and any changes of those sites and. All data gathered under the Order will be made available to the Water Board.

In the event that NRM participates in education and outreaches we will gather data on its effectiveness. Details reported to the Water Board will include: type of activities, number of activities, and number of people attending. We will also track the number of dischargers we work with one on one. We will provide all of our clients with informational material about water quality and discharge as well as a standard list of BMP's.

Sample liability waiver

Please see Attached

Framework, Process, Procedures for Compliance

NRM will work with our client's throughout the enrollment process. We will assist our clients in making changes to ensure they meet the requirements for Tier 1 or 2. Following successful enrollment we will continue with the monitoring as laid out in the order. Thorough monitoring at the times laid out in the Order will help ensure our clients abide by the Order. It will allow us to consider changes in site conditions that may have occurred, and determine if additional BMP's are needed to prevent discharge. NRM will work closely with and encourage to the best of our ability our clients to make sure their site stay in compliance with the Order. All non-compliance will be recorded during monitoring and that information will be reported to the Water Board.

Appendix A

SOQ, Resumes, Past Project Experience



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Statement of Qualifications

EXECUTIVE SUMMARY

Natural Resources Management Corporation (NRM) established in Eureka, California in 1971, is an employee owned certified small business that specializes in forestry and environmental consulting. NRM is organized into two divisions – a *Forestry Division* offering a full range of forestry services (timber harvesting plans, inventories, operation management, forest management planning, due diligence and appraisals) and an *Environmental Division* that performs biological surveys and assessments, land use planning and prepares regulatory compliance documents.

NRM's staff of Registered Professional Foresters includes experienced forestland and timber appraisers, forestland managers specializing in timber inventories and timber resource planning and operations. Our diverse environmental resources staff and associates are specialists in the fields of wildlife, botany, hydrology, wetlands, and GIS cartography. For more than 40 years, NRM has been meeting the needs of clientele including federal, state and local agencies, private landowners, major timber companies, utility companies, law firms and Native American tribes.

The services provided by NRM include wildlife management, watershed analysis, hydrology/watershed management, watershed rehabilitation, erosion control plans, botanical surveys, range inventories, feasibility studies, environmental assessments, vegetative analysis, timber and timberland appraisal services, litigation support services, timber inventories, forest management, logging engineering, timber and log marketing and complete mapping services. Many of these services are commonly triggered by regulatory compliance; the application of, and adherence to, a combination of local, state and federal environmental regulations. Consequently, NRM performs all of the permitting requirements and documentation necessary to comply with applicable regulations; for instance, the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), Clean Water and Air Acts, Endangered Species Act, Coastal Act and California Forest Practice Act, to name a few.

The support staff includes IT, cartographic and clerical personnel. NRM's facilities are equipped with a mapping and drafting section, computer facilities, Map Info™ and Arc View™ Geographic Information Systems (GIS), a resource library, a fleet of highway and off-highway vehicles and an inventory of all necessary field equipment.

Regulations and methodologies for the management of natural resources are constantly undergoing changes. To stay informed with the latest in social and technological adoptions, NRM's staff is involved in professional organizations such as the Appraisal Institute, California Botanical Society, the Society of Wetland Scientists, the Geological Society of America, the Wildlife Society, the California Native Plant Society, the Association of Consulting Foresters, Forest Landowners Association, Society of American Foresters and the California Cattlemen's Association. This ensures current knowledge of changes in the sciences as well as technical and governmental regulations.

Areas of specific expertise include the following brief descriptions:

- **Appraisals:** NRM has a Certified General Real Estate Appraiser who conducts forestland appraisals, feasibility studies, marketing and negotiation services and litigation support.
- **Botany and Wetlands:** NRM Botanists conduct surveys, habitat assessments, mitigation & monitoring plans, impact analyses and consultations for endangered, threatened and other special-status species. NRM Wetland Specialists conduct wetland assessments, delineations, typing & mapping, mitigation plans, monitoring plans, restoration plans and invasive species management.
- **GIS/Cartography:** NRM's Cartographic Division has MapInfo & ArcView GIS capabilities.
- **Environmental Planning, Consultations, & Documentation:** NRM Environmental and Timber Resource Specialists prepare all types of documents and permit applications for CEQA & NEPA compliance. NRM has authored EIS's, EA's, BA's/BE's, WA's, CE's, THP's, and NTMP's.
- **Forestry & Forest Engineering:** NRM's Registered Professional Foresters prepare timber harvest plans, non-industrial timber management plans and land management plans for a diversity of private landowner and timber industry clientele. Harvest plans prepared in coastal areas with anadromous species also require sediment site inventories and erosion control plans on controllable sites. The staff also conducts timber inventories, performs data analysis and evaluation and designs site appropriate harvesting and transportation systems that minimize cost, maintain safety and reduce impacts to the soil, water, wildlife and other forest resources. Foresters also prepare and administer timber harvesting and road work contracts and log sales.
- **Watershed, Hydrology:** NRM's Hydrologist conducts aerial-photograph interpretation, erosion and sediment inventories, treatment prescriptions, culvert risk analyses, stream profiles, hydrologic analyses, impact assessments, cumulative effects analyses and watershed analyses. NRM also has a CPESC on staff to assist with erosion control plans and sediment site inventories.
- **Wildlife:** NRM Wildlife Biologists conduct surveys, habitat assessments, impact assessments, mitigation plans, endangered & special-status species consultations, and monitoring.

More detailed descriptions of NRM's areas of expertise include the following:

TIMBER INVENTORIES, APPRAISALS, AND LITIGATION SUPPORT

NRM has performed timber inventories throughout the western U.S., Southeastern U.S and Alaska on public and private lands to include general management inventories, timber and timberland appraisal inventories (for purchase or sale) litigation inventories, timber stand analysis and special studies as requested. NRM maintains a full-time inventory staff to provide services to our land based clients and respond to the needs of industrial landowners as well as governmental agencies. NRM's in-house computer program allows for customized job-specific data collection and inventory reports. NRM routinely provides inventory services for clients who have their own in-house inventory system but do not have the necessary field personnel. Appraisal services have included valuation for federal 631a capital gains values, inheritance tax considerations, general appraisal values, and acquisition, disposal and condemnation appraisals. NRM's chief appraiser has over 35 years of experience in forestry consulting and forestland valuations.

NRM also provides pre-trial and during trial forestry-related expertise to law firms. NRM has provided expert testimony regarding general forest management, silvicultural applications, timber inventory issues, timber sale contract disputes and timber loss damages. NRM's cartographic staff provides graphics and court exhibits to support the testimony.

FOREST MANAGEMENT SERVICES

NRM provides direct management services on more than 70,000 acres for private clients in northwestern California. These services include the planning, recommendation of silvicultural treatments, writing and implementation of the timber harvesting plans, supervision of site preparation and reforestation activities, log accounting and comprehensive logging administration. NRM routinely authors forest management plans and supervises their implementation for large and small landowners. NRM's biologists and botanists assist our foresters in the preparation of harvesting plans thereby providing multi-disciplinary input to better assure statutory compliance through adequate biological evaluations and environmental assessments. NRM also provides administrative and business management assistance by conducting log accounting and logging administration services throughout the sale and harvesting process. All facets of forestry and harvesting from planning and permitting through approvals and sales are conducted by NRM professionals with long histories in the practice of forestry.

NRM provides marketing and negotiation services for a full range of timberland activities. These services include negotiating the best price for delivered logs to purchasers for our management clients, contract negotiations with loggers and truckers in relation to timber operations and regularly negotiating rights-of-way fees and easement acquisition. NRM has also been involved in the negotiations for partitioning large industrial forest properties. NRM's services have included involvement in the negotiations for public and private land exchanges and timberland acquisitions.

WILDLIFE BIOLOGY

NRM provides clients with a comprehensive wildlife assessment program emphasizing inventory and management of threatened, endangered and sensitive wildlife species. For more than two decades, NRM has conducted inventories for a variety of protected, endangered and threatened species and species of special concern. Since 1991, NRM has conducted roughly 4,500 marbled murrelet surveys and inventoried more than 250,000 acres for northern spotted owls. Extensive surveys have also been conducted for the northern goshawk, red tree vole, golden eagle, great gray owl and Pacific fisher, as well as various amphibians, reptiles and mollusks. Staff wildlife biologists, working in conjunction with aerial photo interpretation specialists, have assisted in the modification of the California Wildlife Habitat Relationships (WHR) System to provide the level of site specific information required for biological evaluations associated with specific wildlife habitat assessments and various proposed projects. NRM's wildlife biologists have conducted both California and Federal Endangered Species Act consultations. Information gathered has supported project permitting, BA/BE reports for CEQA/NEPA requirements and other numerous reports for project documentation.

BOTANICAL

The NRM staff botanists perform in-depth botanical evaluations and field surveys for the presence and potential habitat of rare, threatened, endangered and sensitive plant and lichen species with particular expertise in the regions of Northern California, the Sierra Nevada Mountains and Oregon. Botanical surveys are typically implemented for environmental and biological assessments, timber harvesting plans and as a part of responsible planning for land development and various proposed actions by state and federal governments and landowners. NRM conducts wetland assessments and delineations and prepares and implements wetland mitigation and monitoring plans for projects across the region, including the Coastal Zone. NRM also conducts aerial photographic analysis (with field verification) to delineate riparian and other vegetation types and determine habitat quality and quantity. Our botanists are experienced in various vegetation sampling techniques including relevé and rapid assessment methodologies.

NRM's botanical and wetlands expertise has been utilized in the preparation of various planning and management guiding documents such as Watershed Analyses, Environmental Impact Reports, Environmental Assessments, Land Management Plans and a Local Coastal Program update. NRM's botanical and wetlands services clientele includes industrial and non-industrial forest ownerships, the U.S.D.A. Forest Service and other federal agencies, state agencies, numerous private landowners of residential and business parcels, developers, utility companies and non-profit organizations. Routine work products include the preparation and implementation of mitigation plans, planting plans and monitoring plans to avoid, minimize or mitigate impacts to sensitive species and habitats in various ecological settings such as wetlands, timberlands and grazing lands.

SPECIES MONITORING & HABITAT TYPING

NRM has monitored a list of species including birds, fish, amphibians, reptiles, plants, lichen, fungi, mammals and mollusks. NRM has conducted biological assessments in an exhaustive number of habitats, each presenting a unique set of species. NRM is experienced in habitat and biological assessments in and/or near coastal dunes, salt marshes, prairies, grass lands, oak woodlands, coastal and montane coniferous forests, riparian forests, wetlands and serpentine zones.

HYDROLOGY

NRM's hydrologist evaluates and inventories erosion and sediment sources on roads, trails, and landings, investigates hill slope stability, assesses stream channel impacts and aquatic habitat, maps and classifies watercourses and conducts riparian surveys. NRM's hydrologist conducts aerial photograph interpretation to analyze road construction history, landslide activity and other erosion processes. This experience in designing and directing road rehabilitation projects on public and private landholdings has proven to be of critical importance for a number of different project types.

MAPPING & GIS

Project analyses often require integrating diverse data sets to create unified GIS products. NRM staff personnel conduct aerial photograph interpretation for a variety of projects including vegetative analysis, road construction, timberland management, timber and vegetation inventories wildlife habitats and watershed analysis. Aerial photograph interpretation has been completed on over 25 million acres to date. NRM's Intergraph, MapInfo and Arcview Geographic Information Systems (GIS) facilitate data analysis through efficient integration of spatial and tabular data. Data can be converted from other prominent GIS formats. The NRM map library contains base maps that cover hydrology, transportation, land ownership, land net and topographic layers in both hard copy and electronic form for all of Northern California. The hardcopy library includes geologic, soils, vegetation, wetlands and precipitation maps.

COMPANY STRUCTURE

NRM Management William S. Dann, President
 Robert Kelley, Vice President
 Frank Mileham, Corporate Treasurer
 Juanita Petersen, Corporate Secretary

Staff Personnel William S. Dann, Registered Professional Forester
 Robert Kelley, Registered Professional Forester, CPESC
 Frank Mileham, Registered Professional Forester, Certified Appraiser
 Paul Grunden, Registered Professional Forester, Licensed Timber Operator
 Merritt Lindgren, Registered Professional Forester,
 Prairie Moore, Professional Botanist, Ecologist, GIS Support
 Michelle McKenzie, Wildlife Biologist
 Brad Norman, Wildlife Biologist
 Catherine McGourty, Fisheries Biologist
 Sandra Brown, Hydrologist, GIS Manager and Data Base Specialist
 Chad Bowman, Forestry Technician
 Sara Phipps, Forestry Technician
 Dylan Leonard, Forestry/ Wildlife Technician
 Juanita Petersen, Corporate Records and Project Accounts Management,
 Data/Word Processing

Personnel Qualifications

Name	Qualifications	Professional Experience (Years)
WILLIAM S. DANN	Company President Registered Professional Forester (RPF #1825) B.S. Degree, Forestry	42
ROBERT KELLEY	Vice President RPF #1994; CPESC #699 B.S. Degree, Forestry	33
FRANK MILEHAM	RPF #1985 Certified Appraiser #AG11884 B.S. Degree, Forestry	35
PAUL GRUNDEN	RPF #2296 B.S. Degree, Forestry	30
MERRITT LINDGREN	RPF #2522 B.S. Degree, Forestry	30
PRAIRIE MOORE	Environmental Services Department Manager Professional Botanist Botanical and Wetlands Surveys and Assessments M.S. Degree, Botany	11
MICHELLE MCKENZIE	Wildlife Biologist B.S. Degree, Wildlife Biology	23
BRADFORD NORMAN	Wildlife Biologist/Fisheries	20

	Biologist/Herpetologist B.S. Degree, Biology	
CATHERINE MCGOURTY	Fisheries Biologist B.S. Degree, Environmental Science M.S. Degree, Fisheries Biology	8
SANDRA BROWN	Professional Hydrologist/ Watershed Analysis GIS Manager /Database Specialist M.S. Degree, Watershed Management	14
CHAD BOWMAN	Forestry Technician Crew Leader	3
SARA PHIPPS	Forestry Technician	2
DYLAN LEONARD	Forestry Technician	2
JUANITA PETERSEN	Corporate Secretary Business Manager & Accounting, QA/QC Corporation and Project Records Management	34

CURRENT FIELD TECHNICIANS

Michael Schmidt- B.S. Degree, Wildlife Biology

Nick Kotko- B.S. Degree, Botany

Tobin Weathersen- B.S. Degree, Botany

Trey August- B.S. Degree, Wildlife Biology

PARTIAL CLIENT LIST

Natural Resources Management Corporation has regularly provided services to numerous major forest industry firms and large land owners, innumerable small land owners, and public agencies. Many of NRM's projects are performed for clients on a confidential basis, but past and/or current clients include the following:

Public Agencies

U.S. Forest Service
U.S. Bureau of Land Management
U.S. Bureau of Indian Affairs
U.S. National Park Service
U.S. Soil Conservation Service
U.S. Internal Revenue Service
American Government of Samoa
Federated States of Micronesia
California Dept. of Forest & Fire Protection
California Dept. of Transportation- CalTrans
California Division of Beaches & Parks
California Resources Agency
California Real Estate Division
California State Lands Commission
CA. State Solid Waste Management Board
Humboldt County, California
Del Norte County, California
City of Arcata, California
City of St. Helena, California
Jackson Demonstration State Forest
Humboldt Bay Municipal Water District

Non-Industrial or Private

Asociacion de Duenos & Predios Boscosos de Durango (Mexico)
Barnum Timber Company
Coombs Tree Farm
Cloquet Timber Company
Farm Credit Auction
Fort Seward Ranch
Fundacion para el Desarrollo de los Pueblos Jovenes (Peru)
Hearst Corporation
Herb Russ Estate
Nylander Ranch
Pacific Gas and Electric
Ribar Timberlands
Russ & McBride Ranches
Sears World Trade, Inc.
Sequoia Associates
Vertrees, McAdams, and Muecke families

Native American Organizations

California Indian Legal Services
Covelo Indian Community Council
Hoopa Valley Business Council (California)
Hoopa valley Tribal Council
Indian Health Services
Inter-tribal Timber Council
Round Valley Reservation
Sealaska Corporation
Warm Springs Confederated Tribes

Yak-Tat & Kwaan Tribes
Yurok Tribal Council
Annette Island Reservation (BIA)
Fort Peck Agency (BIA)
Belknap & Blackfeet Reservations (BIA)
Navaho Reservation (BIA)
Resighini Rancheria
Washoe Tribe of Nevada and California

Forest Industry

Arcata Redwood Company
Blue Lake Forest Products
Boise-Cascade Corporation
Champion International
The Campbell Group, LLC
Citifor, Inc.
Collins Pine
Crown-Zellerbach Corporation
Diamond National Corporation
Eel River Sawmills
Empresa Forestal Peruana, S.A. (Peru)
Georgia-Pacific Corporation
Green Diamond Resources Company
Gualala Redwoods Inc.
Gulf States Paper Corporation
Hancock Natural Resources Group
Harwood Enterprises
Hawthorne Timber Company, LLC
Hull-Oakes Lumber Company
Humboldt Redwood Company
Longview Fibre Corporation
Louisiana-Pacific Corporation
MacMillan-Bloedel, Ltd. (British Columbia)
McNamara & Peepe Lumber Company
Masonite Corporation
Menasha Corporation
Mendocino Redwood Company
Miller Redwood Company
National Bulk Carriers (Mexico)
Potlach Corporation
Scotia-Pacific Co., L.L.C.
St. Regis Paper Company
Sierra-Pacific Industries
Simonson Lumber Company
Simpson Timber Company
Southwest Forest Industries
Stone Forest Industries
The Pacific Lumber Company
Wetsel-Oviatt Lumber Company
Weyerhaeuser Company
Wickes Company Inc.

Surface Mining Industry

Arcata Redimix
Tom Bess
Eureka Redimix
Granite Construction
Hansen (formerly Kaiser Sand & Gravel)
Hansen Trucking
Mad River Sand & Gravel
Mercer-Fraser Company
Jack Noble
Redwood Empire Aggregates
Randall Sand & Gravel
Leland Rock
Shamrock Materials
Syar Industries

Law Firms

Bragg, Perlman, Russ, Stunich & Eads LLP (CA)
Cappello & Foley (CA)
Carr, Kennedy, Peterson & Frost (CA)
Coombs & Dunlap (CA)
Davis, McClendon, Poovey, Anderson & Morrison (Eureka, CA)
Falk, Buxton & Brown (CA)
Harland & Gromala (CA)
Hartig, Rhodes, Norman, Mahoney & Edwards (AK)
Helsell, Fetterman, et al (WA)
Huber & Goodwin (CA)
Hudson & Creyke (Wash. DC)
Janssen, Malloy, Needham, and Morrison (CA)
Keesal Young & Logan (CA)
Latham and Watkins LLP (CA)
Mackenroth, Laird & Lynes (CA)
McCutchen, Doyle, Brown & Enersen (CA)
Mudge, Rose, et. (NY)
Pillsbury, Madiso & Sutro (CA)
Severson, Werson, Berke & Melchoir (CA)
Stokes, Calligan & Steeves (CA)
Thelen, Marrin, Johnson & Bridges (CA)
Windrem & Associates (CA)

Non-profit Organizations

California Forestry Association
California Redwood Association
Forest Science Project
National Forest Products Assoc.
Save-the-Redwoods League
Western Forestry & Conservation Assoc.
Western Timber Assoc.

For more information, contact:

Natural Resources Management Corporation

1434 Third Street, Eureka, CA 95501

Phone: (707) 442-1735 **Fax:** (707) 442-8823

Web: www.nrmcorp.com **Email:** nrm@nrmcorp.com

Prairie L. Moore
Environmental Services Director
Professional Botanist

SUMMARY

Mrs. Moore is a botanist/ restoration ecologist with 10 years' experience in a professional setting. As a botanist she has conducted field research and surveys for rare plants, restoration monitoring, wetlands and fire effects in California and Washington. She has experience with both wetland delineation and wetland mitigation. She has designed studies in riparian restoration ecology with attention to succession and the effectiveness of various planting plans. Ms. Moore's master thesis investigated restoring the understory plant species community in riparian forests. She has designed and overseen the implementation of numerous re-vegetation/ restoration projects. Ms. Moore has coordinated with agencies, land managers, principal investigators and field technicians to ensure studies were conducted in a rigorous manner. Mrs. Moore has excellent communications skills, both oral and written. She has 6 years of experience writing NEPA and CEQA reports. She has authored multiple Ecological Assessments, Biological Assessments, Biological Reports, Initial Studies, and Mitigated Negative Declarations. Ms. Moore has 6 years' experience coordinating with different state and federal agencies during the CEQA and NEPA process. She has experience providing clients with Environmental Permitting assistance, and has secured numerous 401 and 404 certifications, CDFW 1600 permits, and Coastal Development Permits. She has experience monitoring construction projects for environmental permit guidelines. She is knowledgeable with GIS and data analysis. Ms. Moore is currently the director of NRM's Environmental Services Department and acts as the project lead on all wetlands, vegetation, wildlife, fisheries and environmental permitting projects. Her duties include managing projects, writing reports, supervising biologists/ botanists and communicating with agencies, clients and other professionals.

PROFESSIONAL EXPERIENCE

Environmental Services Director, Natural Resources Management Corp., Eureka, CA (2012-current)

Staff Botanist, Natural Resources Management Corp., Eureka, CA (2009-2012)

Interpretive Specialist, California State Parks, Weott, CA (2009)

Research Scientist, California State University Chico, (2006-2008)

Botanical Technician, North State Resources, Chico CA, (2008)

Project Manger, Chico Research Foundation, Chico CA, (2008)

Interpretive Specialist, California State Parks, Weott, CA, (summer seasons 2003-2004)

Wetlands Nursery Worker, Fresh Water Farms, Eureka CA, (2002 – 2003)

Field Research Assistant, University of California, Santa Cruz CA, (1999 – 2001)

EDUCATION

M.S., Botany, 2009, California State University Chico

B.A., Biology/ Ecology, 2001, University of California, Santa Cruz

PROFESSIONAL AFFILIATIONS

California Native Plant Society, 2008- present

REFEREED PUBLICATIONS

Moore, P.L, K.D. Holl and D.M. Wood, 2011, *Strategies for Restoring Native Riparian Understory Plants along the Sacramento River: Timing, Shade, Non-native control, and Planting Method*. San Francisco Estuary and Watershed Science 9(2): 1-15

SELECTED NRM PROJECT EXPERIENCE

- Project lead for Ealison Apartments wetland delineation. Delineated wetlands on 2.5 acres of undeveloped property in Blue Lake California using the ACOE standards. GPS and flagged wetland area in the field. Authored wetland delineation report. (2015)
- Writer/ Editor for Resource Management Plan/ Environmental Impact Statement and the Record of Decision for the Jarbridge office of the BLM. (2013 to 2015)
- Project lead and technical author for CEQA and other permitting processes for a levee repair. Coordinated with Costal Commission, California Department Fish and Game, Army Corps of Engineers, NOAA, US Fish and Wildlife, Regional Water Quality Control Board and local entities. Authored Initial Study and Biological Assessment. (2013)
- Technical author for a BA and EA for the NEPA process involving a Forest Service visitor center construction project. Coordinated with the Forest Service and other entities. (2009)
- Technical author of the CE and BA for the NEPA process involving a Forest Service plantation maintenance project. Coordinated with the Forest Service and other entities. (2010)
- Technical author of the CE and BA for the NEPA process involving a Forest Service fuels reduction and forest restoration project. Coordinated with the Forest Service and other entities. (2010)
- Project lead for wetland delineation, mitigation, and monitoring project at the Bear River Rancheria. Assisted with wetland design. Oversaw wetland construction. Coordinated and performed wetland sampling, report writing and future restoration efforts for five year monitoring plan. (2010-present)
- Project lead on environmental permitting process for private road development stream crossing. Coordinated with California Department Fish and Game, Army Corp of Engineers, Regional Water Quality Control Board, and local entities. (2012)
- Author of the Re-vegetation Mitigation and Monitoring Plan for the city of Eureka's water pipeline repair project. Created re-vegetation design and monitoring plan for riparian forest that was destroyed during pipeline installation. Monitored plant installation. Conducted first annual monitoring and authored monitoring report. (2014 to present)

- Project lead for riparian restoration, mitigation, and monitoring project at the Bear River Rancheria. Created planting design. Oversaw plant installation. Coordinated and performed annual monitoring, report writing and future restoration efforts for five year monitoring plan. (2012-present)
- Project Manager for Biological Monitoring for the construction of mitigation areas for the Willits bypass project. Oversaw crew of 4 wildlife biologists monitoring construction. Reviewed daily monitoring reports to ensure construction followed permit guidelines. Coordinated directly with Caltrans and Faltiron (prime contractor) staff. (2014)
- Project Manager for Northern Spotted Owl surveys on the Mendocino National Forest. Oversaw wildlife technicians conducting the surveys. Authored weekly and final reports including GIS analysis. (2014)
- Wetland delineation and special status plant surveys for city of Eureka pipeline repairs. Performed wetland delineation, botanical surveys, overall site assessment and authored reports. (2012)
- Site Assessment for wetlands and special status botanical species for Fortuna pipeline repairs. (2012)
- Project manager for botanical surveys for special status species on timber lands. Coordinated and performed field surveys and report writing. (2009 to present)
- Project lead for Northern Spotted Owl, Osprey, Heron and Golden Eagle Surveys. Report writing and agency consultation. (2012 to present)
- Project manager for a riparian forest restoration project. Oversaw implementation of restoration plan. Coordinated and performed vegetation sampling, report writing and future restoration efforts. (2009 to 2013)
- Project manager for Forest Service vascular and nonvascular botanical surveys. Coordinated field work, biweekly submissions and final reports. Oversaw the field crew. (2010)

SANDRA L. BROWN
Hydrologist & Database Specialist

SUMMARY

With over 17 years as a consulting hydrologist, Sandra Brown has worked on issues of land management activities and their effects within the watershed. Her background includes extensive practical fieldwork that combines her knowledge of watershed management, riparian succession, fisheries ecology, wetland hydrology and environmental policy. She is experienced in erosion and sediment source inventories and culvert risk analysis. She has over 15 years of experience inventorying, identifying and prioritizing basin-wide sediment source problems, including specific site mitigation recommendations and supervising watershed restoration projects. Ms. Brown has also spent time in the watercourses measuring stream complexity characteristics such as large woody debris, stream shade, fish habitat types, fish snorkel surveys and surveying stream cross sectional and longitudinal profiles.

Her position has involved a wide range of research, data analysis, field work, compliance review, permitting applications, technical writing and coordination with other professionals. In this capacity, Ms. Brown has obtained grants, determined budgets, supervised projects, and has worked both individually and as a team member to complete the tasks at hand. She has produced and contributed to numerous watershed, fisheries and cumulative effects analyses for a variety of documents including environmental assessments (EA) and watershed analyses, among others.

Ms. Brown also excels in data assimilation using both spreadsheets and database. She develops Access databases to organize, query, program complex calculations and produce reports on data ranging from natural resource inventories, appraisals and accounting applications. Ms. Brown also works with GIS applications and often facilitates the coordination of database results with GIS mapping applications.

PROFESSIONAL EXPERIENCE

Watershed & Database Specialist, Natural Resources Management Corp., Eureka, CA (1994-present)

Hydrological Technician, U.S.D.A. Forest Service, Six Rivers National Forest, Lower Trinity, Orleans and Gasquet Ranger Districts, CA (1991-1993); **Wildlife Biology Technician**, U.S.D.A. Forest Service, Deschutes National Forest, Fort Rock Ranger District, Bend, OR (1990).

EDUCATION

M.S., Watershed Management, 1993, Humboldt State University, Arcata, CA

B.S., Environmental Policy Analysis and Planning, 1987, University of California at Davis

PROJECT EXPERIENCE

Overview

- Project leader for road sediment source inventories in Humboldt, Mendocino and Sonoma County watersheds including Minor Creek (in the Redwood Creek drainage), Sproul Creek (tributary to the South Fork Eel River), Hulls Creek (tributary to the Eel River near Covelo) and Ryan Slough (tributary to Humboldt Bay). Each inventory is entered into an Access database for analysis and prioritization. Priority sites and road reaches are identified based on estimated cubic yards of erosion potential from stream crossings, surface erosion and mass wasting sites. Over 800 miles have been inventoried (1997-present).

- Conducts database development for numerous projects: timber cruises, fisheries habitat typing, botany survey tracking, road & sediment source inventories, environmental documentation and timberland appraisals. Uses Access database to compile, calculate, report and graph data (2000–present).
- Develops hydrologically correct mitigations for diversions and problematic sediment sources; typically on forest road systems (1991-present).
- Extensive field experience in classifying, mapping and flagging watercourse and lake protection zones (WLPZs) under the California Department of Forestry rules and regulations (1994-present).
- Prepares watershed and fisheries cumulative effects analysis for large industrial and small non-industrial timberland owners. Analysis includes impacts to soils, riparian areas, fisheries habitat, water temperatures and other factors (1994-present).
- Inventories streams for LWD, future LWD recruitment and riparian condition (1993-present).
- Completed a Water Availability Analysis (WAA) and Cumulative Flow Impairment Index (CFII) required for obtaining a water rights permit which was approved by the State Water Resources Board, Division of Water Rights (2004-2005).
- Team member for the mainstem Trinity River Watershed Analysis on the Six Rivers National Forest. Duties included database development and data entry, analyzing information for multiple disciplines and developing the transportation, hydrology and soils sections and maps (2003).
- Provided the hydrologic analysis for the Jackson State Demonstration Forest - Forest Management Plan EIR Project. Modeled hydrologic conditions and prepared the discussion of the Forested land management element of the plan with respect to hydrology (2002).
- Conducted cross sections & Rosgen Stream Classification for channel migration zone analyses (2000).
- Provided watershed, soils and cumulative effects documentation on 140,000 acres for the Middle Hayfork and Salt Creeks Watershed Analysis for the Shasta-Trinity National Forest, CA (1999-2000).
- Assisted with fisheries monitoring for gravel operators on the Mad, Eel, Trinity and Van Duzen Rivers. Duties included fall migration snorkel surveys for adult and juvenile salmon counts (1997-1999).
- Conducted a road erosion and sediment source inventory, treatment prescriptions, rehabilitation cost estimates and subsequent heavy equipment erosion and sediment reduction work on 7,500 acres in the upper Redwood Creek basin, Humboldt Co., CA. This project also included cross training of personnel in sediment source inventorying (1996-1998).
- Project leader for a watershed analysis that characterized mass wasting and sediment sources in Stitz Creek, a 2,587 acre watershed in Northwestern California. Work included an aerial photo analysis of the watershed over time, measurements of recent landslides, a road inventory and recommendations for prioritized sediment source sites (1998).
- Conducted watershed and hydrologic effects analysis for the Medicine Bow-Routt National Forest, Cold Springs EIS in Wyoming (1996-1997).

- Assisted in the inventory of LWD, future woody debris, fish habitat, stream cross sections and Wolman pebble counts for Gualala Redwoods, Inc., Mendocino Co. (1997).
- Performed wetland delineation for an 11-acre parcel in Aldergrove Industrial Park for the City of Arcata using the 1987 Army Corps of Engineers protocol. The site included an atypical wetlands situation due to fill. Assisted in the development of the subsequent wetland mitigation plan (1996).
- Task leader for a watershed rehabilitation plan on approx. 20,000 acres for the BLM in Honeydew and Bear Creek watersheds, King Range National Conservation Area, CA. Project involved aerial photo interpretation, landslide & erosion history analysis, culvert flood risk analysis, road sediment source inventory, road maintenance recommendations and cost estimates for rehabilitation operations (1996).
- Performed fisheries snorkel monitoring for gravel extraction operations in the Van Duzen, Eel and Mad Rivers in Humboldt Co., CA (1996).
- Researched and authored the Environmental Setting, hydrological section, of the Leland Rock Aggregate Extraction Project Supplemental EIR (1996).
- Assisted in the preparation of an EA for the Robinson Salvage and Thinning Project, Plumas National Forest. Conducted analyses for transportation and water quality issues (1996).
- Trained in the identification of Southern Torrent (Olympic) Salamander and its habitat (1995).
- Certified and surveyed for marbled murrelets in Northwest California (1994-1995).

Other Relevant Experience

- Directed heavy equipment operators in road restoration projects involving stream channel excavation and road outcropping (1993-1994).
- Project leader and grant writer for Willow Creek watershed restoration plan. This included the field inventory of the watershed roads, stream crossings, diversion potential, landings and landslides (1993).
- Measured sediment accumulation in stream pool tail-outs known as v* (1993).
- Analyzed red alder establishment and succession along a naturally fluctuating river system considering recent and historic flow trends in conjunction with alder age. This work included development of flood frequency curves with analysis of alder encroachment over a six-year drought (1992-1993).
- Conducted fisheries monitoring of streams and lakes conducting habitat typing, visual snorkel surveys, analyzing water quality and performing cross section and longitudinal level surveys (1991-1993).
- Inventoried lava tube caves for hibernating bats by counting the number of bats by species (1990).

PROFESSIONAL AFFILIATIONS

Member of City of Arcata Wetlands and Creeks Advisory Committee (1997-2001)

American Fisheries Society

ROBERT KELLEY

NRM Vice President

Registered Professional Forester (RPF #1994)

Certified Professional Soil Erosion and Sediment Control Specialist (#699)

Mr. Kelley has been an RPF since 1981, and in 2005 he became Vice President at NRM. Mr. Kelley's expertise lies in resource assessment and analysis of potential impacts of project implementation. His responsibilities include forest management, FMP/THP/NTMP preparation and implementation, silvicultural prescriptions and applications, timber inventories and growth evaluations, logging system analysis, road system development and improvement, and transportation planning. He has extensive experience with resources-at-risk identification, cumulative effects analysis, surface soil erosion and sediment control procedures.

PROFESSIONAL EXPERIENCE

Vice President, Natural Resources Management Corp. (NRM), Eureka, CA (2005-present)

Forest Properties Division Manager, NRM, Eureka, CA (1990-2005)

Staff Forester, NRM, Eureka, CA (1982-1990)

Asst. Logging Engineer; Area Forester, Simpson Timber Co., Klamath & Korbel, CA (1977-1982)

CPSEC – Certified Professional Soil Erosion and Sediment Control Specialist

EDUCATION

B.S., Forest Production Management, 1977, Humboldt State University, Arcata, CA

PROJECT EXPERIENCE (partial list)

- Oversees management of timberland properties. Responsibilities include preparation and implementation of forest management plans, THP and NTMP preparation, silviculture applications, timber inventory and growth, and road system development and improvement (1982-present).
- Preparation of erosion control plans (1992-present).
- Timber sale layout, timber marking, logging system analysis and design, silviculture method determination, road location and design, transportation system planning. (1977-present).
- Field-locates and designs roads associated with timber harvesting operations and property subdivisions, ranging from small private holdings to large industrial ownerships (1977-present).
- Identifies and implements stream crossing locations, culvert size determination, and bridge locations associated with new road construction and reconstruction of existing roads (1977-present).

ACHIEVEMENTS AND OTHER EXPERIENCE

Board of Directors Northern California Log Scaling & Grading Bureau – Past President
Board of Directors Redwood Region Logging Conference Board of Directors

PAUL GRUNDEN

Registered Professional Forester (RPF #2296)

Licensed Timber Operator #A-590

Paul Grunden specializes in forest management planning and THP/NTMP preparation which include the following considerations: inventory, silviculture, harvesting methods, transportation systems, identifying resources at risk and protection measures, and cumulative effects assessments and constraints. He also provides timber and land valuations to assist in real estate transactions. Mr. Grunden oversees project implementation and duties include log marketing, and contract preparation and administration.

PROFESSIONAL EXPERIENCE

Staff Forester, Natural Resources Management Corp., Eureka, CA (1987-present)

Private Consulting Forester, Eureka, CA (1986-1987)

Timber Cruiser, Frank and Dean Solinsky, Corte Madera, CA (1978-1985)

Self-employed Forestry Contractor, contracted with Peter Joos, San Anselmo, CA; and Marshall Rousseau, Blue Lake, CA (1979-1985)

EDUCATION

B.S., Forest Resource Management, 1984, Humboldt State University, Arcata, CA

PROJECT EXPERIENCE (partial list)

- Prepares FMPs, THPs & NTMPs for clients in northern California (on-going).
- Conducts timber sale preparation and property management for industrial and private clients (on-going).
- Timber sale layout, timber inventory design and cruising, timber marking, logging system analysis and design, silviculture method determination, road location and design, transportation system planning (on-going).
- Designs and implements timber cruises for numerous large and small projects (on-going).
- Conducts aerial photograph interpretation for preliminary road system planning, management units, and timber stand and habitat typing (on-going).
- Field-locates and designs roads associated with timber harvesting operations and property subdivisions, ranging from small private holdings to large industrial ownerships (1985-present).
- Identifies and implements stream crossing locations, culvert size determination, and bridge locations associated with new road construction and reconstruction of existing roads (on-going).

Prepares growth and yield projections (on-going).

Relevant Experience

On-going planning and implementation of NTMPs, THPs, and other forestry and land management projects.

Road Sediment Source Inventory - Gooseneck area. Conduct a sediment source inventory on 1,411 miles of Forest Service system and non-system roads in the Klamath National Forest. Record the data in electronic and GIS layers. Contract ending in 2011.

Klamath Road Sediment Inventory - Happy Camp area. Inventory of sediment sources on 418 miles of system and non-system road in the Klamath National Forest. Record the data in electronic and GIS layers. Contract ending in 2011.

Scott River Road Sediment Source Inventory. Conduct a sediment source inventory on 300 miles of Forest Service system and non-system roads in the Scott River and Klamath River watersheds in the Klamath National Forest. Contract ending in 2010.

Sediment Source Inventory for Beegum Creek and Upper McCloud River. Region 5 IDIQ road inventory of sediment sources on approximately 254 miles of system and non-system roads, and trails located in the Beegum Creek and Upper McCloud watersheds. An inventory of all stream crossings, mass wasting sites and other potential erosion features was completed using the Shasta Trinity National Forest Route Focused Sediment Source Inventory Protocol. Report includes maps of locations and prioritization of all sites based on erosion potential and sediment amounts. Contract ending in 2009.

Covelo Empire Road Inventory. Road inventory of sediment sources on approximately 162 miles of system and non-system roads within the Hulls Creek watershed. Inventoried all stream crossings, mass wasting sites, and prioritized road reaches for potential sediment savings. Report included maps of locations and prioritization of all sites. Contract ending in 2002.

Santa Angelina Ranch Road Inventory. A road inventory was conducted sediment sources and chronic non-point source erosion problems on approximately 50 miles the active and abandoned road network on the Santa Angelina Ranch properties that lie in the drainages of Briggs, Bear and Ingalls Creeks. These drainages are tributary to Maacama Creek, which is tributary to the Russian River, Sonoma County. Contract ending in 2002.

Fearrien Ranch Road Inventory. A road inventory was conducted on two ranch parcels near the town of Blocksburg, CA to identify sources of potential future erosion on the road network, with the long-term goal of reducing sediment delivery to salmonid bearing streams. Field measurements and data were entered into a database for erosion potential and prioritization and summarization. Contract ending in 2002.

Redwood House Road Inventory. Road inventory of sediment sources on approximately 75 miles of system and non-system roads in tributaries to the Van Duzen River, including portions of Yager Creek and Stevens Creek. Inventoried all stream crossings, mass wasting sites, and prioritized road reaches for potential sediment savings. Report included maps of locations and prioritization of all sites. Contract ending in 2001.

Ryan Slough Road Inventory. Road inventory of sediment sources on approximately 82 miles of system and non-system roads in the Ryan Creek watershed. Inventoried all stream crossings, mass wasting sites, and prioritized road reaches for potential sediment savings. Report included maps of locations and prioritization of all sites. Contract ending in 2001.

Willow Creek Road Inventory. Road inventory of sediment sources on approximately 60 miles of system and non-system roads in the Willow Creek and Freezeout Creek drainages. Inventoried all stream crossings, mass wasting sites, and prioritized road reaches for potential sediment savings. Report included maps of locations and prioritization of all sites. Contract ending in 2000.

Sproul Creek Road Inventory. Road inventory of sediment sources on approximately 200 miles of system and non-system roads in Sproul Creek watershed and tributaries to the Mattole River. Inventoried all stream crossings, mass wasting sites, and prioritized road reaches for potential sediment savings. Report included maps of locations and prioritization of all sites. Contract ending in 2000.

Minor Creek Road Inventory. Road inventory of approximately 200 miles in the Minor Creek watershed and adjacent drainages within the Redwood Creek Basin, above the RNP Park Protection Zone. Inventoried all stream crossings, mass wasting sites, and prioritized road reaches for potential sediment savings. Report included maps of locations and prioritization of all sites. Land is primarily Barnum Timber, with limited land in the ownership of Eel River Sawmills. Contract ending in 2000.

Blue Lake Development. Delineated wetlands on 2.5 acres of undeveloped property in Blue Lake California using the ACOE standards. GPS and flagged wetland area in the field. Authored wetland delineation report. Contract ending in 2015.

Nylander Levee Repair. CEQA and other permitting processes for a levee repair. Coordinated with and received permits from Coastal Commission, California Department Fish and Game, Army Corps of Engineers, NOAA, US Fish and Wildlife, Regional Water Quality Control Board and local entities. Authored Initial Study and Biological Assessment. Monitoring site for 3 years for re-vegetation. Contract ending in 2017.

Bear River Wetland Mitigation. Wetland delineation, mitigation, and monitoring project at the Bear River Rancheria. Created wetland design. Oversaw wetland construction. Coordinated and performed wetland sampling, report writing and future restoration efforts for five year monitoring plan. Contract ending 2018.

Private Road Crossing. Environmental permitting process for private road development stream crossing. Coordinated with California Department Fish and Game, Army Corp of Engineers, Regional Water Quality Control Board, and local entities. Received 1600 permit 401 certification and county grading permit. Contract ending in 2012.

Tish Non Village Restoration. Riparian restoration, mitigation, and monitoring project at the Bear River Rancheria. Created planting design. Oversaw plant installation. Coordinated and performed annual monitoring, report writing and future restoration efforts for five year monitoring plan. Contract ending in 2016.

Appendix B
Sample Water Resource Plan

Water Resource Protection Plan for APN 555-555-555

Submitted to:

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

Prepared by:

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

August 16, 2016



Water Resource Protection Plan

This document serves as the water resource protection plan for site APN 555-555-555 pursuant to Order No. R1-2015-0023. On August 13, 2015, the North Coast Regional Water Quality Control Board (Regional Water Board) adopted a General Waiver of Waste Discharge requirements and General Water Quality Certification for Discharges of Waste Resulting from Cannabis Cultivation and Associated Activities or Operations with Similar Environmental Effects in the North Coast Region, Order No. R1-2015-0023. One of the requirements of the order is to prepare a Water Resource Protection Plan (WRPP) for all sites that are **enrolled under Tier 2 of the order**, including all of the elements listed below.

Site Assessment

This 35 acre property meets the Tier 2 standards laid out in the order. The Cultivation Area is 4,672 square feet. Slopes in the cultivation areas range from 0 to 20%. The entire property was inspected for erosion sites with a focus on those having potential for sediment delivery to watercourses. Prior to the site visit, aerial photos and 7.5' USGS quadrangle maps were examined for watercourse location, developed sites, roads and trails, slope instabilities, and erosional features (gullies, slides, etc.). There are three distinct areas on the property being used for cultivation (Figure 1). Most cultivation is taking place inside raised beds or pots in hoop houses, with additional plants in Smart Pots scattered around hoop house 3.

A shed on the property (Figure 1) is used for storage of fertilizer as well as drying and processing. No pesticides or fungicides are used. This cultivation is done with all natural light. A small Honda EU3000i portable generator is used to provide power to the shed. A generator shed with space for gas cans is adjacent to the storage shed. The buildings storing the fertilizers, generator, and fuels are adequately covered and provide good containment in the event of leakage or spills. It was noted the landowner had a supply of absorbent pads on-site in the larger shed for liquid spill cleanup purposes.

Water for cultivation comes from a well on the property. A description of the well including installation date, depth, location and bore hole logs will be submitted to the Water Rights Division of the water board. If the Water Rights division determines that the well is surface water requiring a water right then the lander owner will build up storage over the next two years to meet his water needs between May 15 and October 31. Plants are watered using drip irrigation. The slow dripping process does not cause irrigation runoff. Plants are watered three times a week using the drip system. During each watering each plant receives approximately 5 gallons of water. Plants are fertilized using Maxsea All Purpose Plant Food (16-16-16) during the beginning of the growing season. During flowering (August through October) Maxsea Bloom Plant Food 3-20-20 is used. Fertilizer is mixed in the 300 gallon water tank (Figure 1). It is then watered through the driplines. Fertilization is cycled into the watering schedule, so each plant receives 5 gallons of fertilizer water mix every 7 to 14 days depending on growth needs. The drip irrigation soaks slowly into the soil causing no runoff from watering or fertilizing.

Soils are reused each year. Therefore there are no spoils piles located on the property. The property also has no open trash piles.

The landowner does not live or stay on the property outside the growing season April 15 to November 15. A travel trailer provides living space during the growing season there is no water or sewage hooked up to the trailer. A porta potty provides human waste facilities. It is pumped monthly and the pumping log will be provided with the yearly monitoring reports. The porta potty is not situated near a water course. The porta potty is ensuring no human waste enters surface or ground water.

Current Conditions

Watercourses

There are three small, ephemeral first order Class III watercourses on the property (Figure 1). One watercourse flows within 50 feet of hoop house 3. This area is the origin of the stream. It has very little bed and bank at this point and is surrounded by grass and herbaceous vegetation.

Minor levels of channel downcutting was observed below road crossings where runoff from road surfaces during rain events was directed into the watercourses. This appears to have caused overloading of the channels and resulted in the downcutting.

Roads

Roads on the property are considered seasonal. There are no noted road segments which have been surface rocked; however, the soils observed contain a medium amount of native rock providing some surface stability and resistance to surface erosion. Some road segments have steep grades (>20%), most notably the segment beginning at the porta-potty extending upslope NE past hoop houses 1 and 2 up to Tank 2. Remaining roads have more moderate grades (5-15%). Drainage features (rolling dips and out sloping) are present on the steep section of road leading up to hoop houses 1 and 2. No critical dips at watercourse crossings or disconnects were noted.

Watercourse Crossings

Erosion issues with this property are primarily associated with stream crossings on the original ranch roads/ logging roads constructed under previous owners. There are four stream crossings (RC 1-4) on the property, as well as one cutbank seep (Table 1). Minor levels of channel downcutting/gullying were noted in short watercourse segments below road crossings RC 1-3 resulting in sediment transport downslope. The head of a Class III channel is 40 feet from hoop house 3.

There was minor to moderate levels of sediment delivery to area watercourses observed primarily at road crossings due to described road conditions. RC 1 lacks a pipe and during wet weather, water flows across the surface and back into the channel below. RC 2 is a Class III crossing with an undersized pipe. There is another Class III watercourse diverted into the RC 2 inlet which intersects the road approximately 30' above. RC 3 lacks a pipe and during wet weather, water flows across the road surface and into the watercourse channel below. RC 4 has a failed 18" pipe due to the natural depositional characteristics above the road which has resulted in plugging the inlet from the deposition. Given the current condition of sediment delivery during the wet season from the road surfaces and crossings, there exists an on-going moderate level of threat to water quality.

Timber Operations

Timber operations are not currently proposed under the NTMP as no NTOs have been filed with CalFire, or required enrollment of the NTO with the NCRWQCB. Future NTOs submitted under the NTMP will be enrolled under the terms of WDRs for NTMPs complying with Order Number R1-2013-0005.

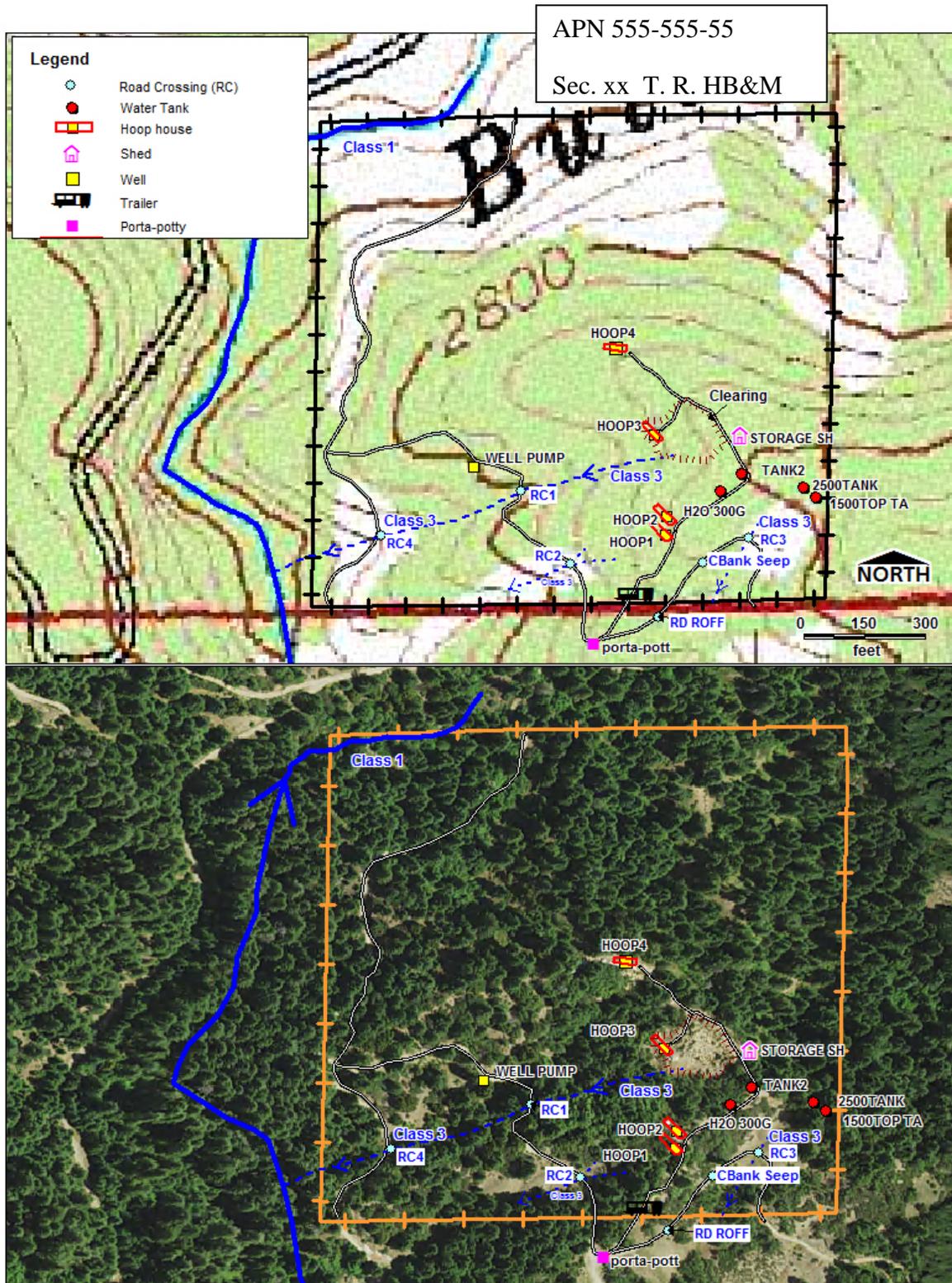
Landings and Flats

The three flats are well established and out sloped to drain. The storm water runoff does not drain into any of the water courses on the property. The flats are stable without perched fill. Vegetation is well established on fill. The water tank flats were wither hand dug with shovel moving very little soil or shimmed up with pallets (for the small tank). These flats are not causing any runoff into water courses.

General Property Conditions

With the exceptions listed above the property meets the standard conditions laid out in the order. There are no spoils piles on the property. Water is from a well being used to water the cultivation areas. Whether it is surface water is being determined by the Water Rights Division. If it is determined to be surface water the landowner will amend this plan to include the purchasing of 27,000 gallons of hard sided storage each year in 2016 and 2017. The landowner will also have the well checked by CDFW to determine if a 1600 permit is necessary. Plants are watered by drip without causing runoff. Fertilizer used is stored in a properly maintained shed. No pesticides, fungicides, or herbicides are used. There is less than 5 gallons of gas stored on site for the generator. The gas cans are contained within a properly maintained shed. Human waste is controlled with a regularly pumped porta potty. There are not trash piles on the property. Trash cans are properly maintained secured with well-fitting lids and taken to the dump regularly.

Figure 1 – Site Map



Corrective Actions

Watercourse Crossings

The property has a NTMP (Non-industrial Timber Management Plan). Road work and culvert installations for stream crossings (RC1-RC4) are incorporated under the NTMP. Table 1 details road crossing specifications. An application for a 1600 Stream Bed Alteration Permit for all four crossings was filed with California Fish and Wildlife by NRM under the NTMP on behalf of the land owner and has recently been approved. Figure 2 shows the locations of corrective actions. Photos attached as Appendix A. Road work will be completed in the summer of 2016 when crossings are dry and under the terms of the 1600 permit. Road work will be done by a Licensed Timber Operator. This road work will be performed under the approved NTMP on the property and to the terms of the CDFW 1600 permit. The approved CDFW 1600 permit is attached to this WRPP. Additionally Appendix D from the Order will be submitted for the stream crossing work for 401 certification or waste discharge requirements. Culvert work will be replacements and all work will take place within the existing road prism, there will be no new fill placed in water of the US therefore we do not believe 404 permit will be necessary. The land owner will however do a pre-consult with ACOE to confirm this. If 404 is not necessary, the land owner shall comply with the relevant BMPs in Appendix B of the Order.

Class III Watercourse Buffer

A 50 foot buffer will be established around the Class III stream near hoop house 3. Twelve feet of hoop house 3 will be removed so it is no longer infringing on the buffer area. No cultivation activities will take place in this 50 foot buffer (Figure 2). The portion of the hoop house removal will take place in the spring of 2016 prior to planting. The disturbed area will be re-vegetated with a grass seed mix.

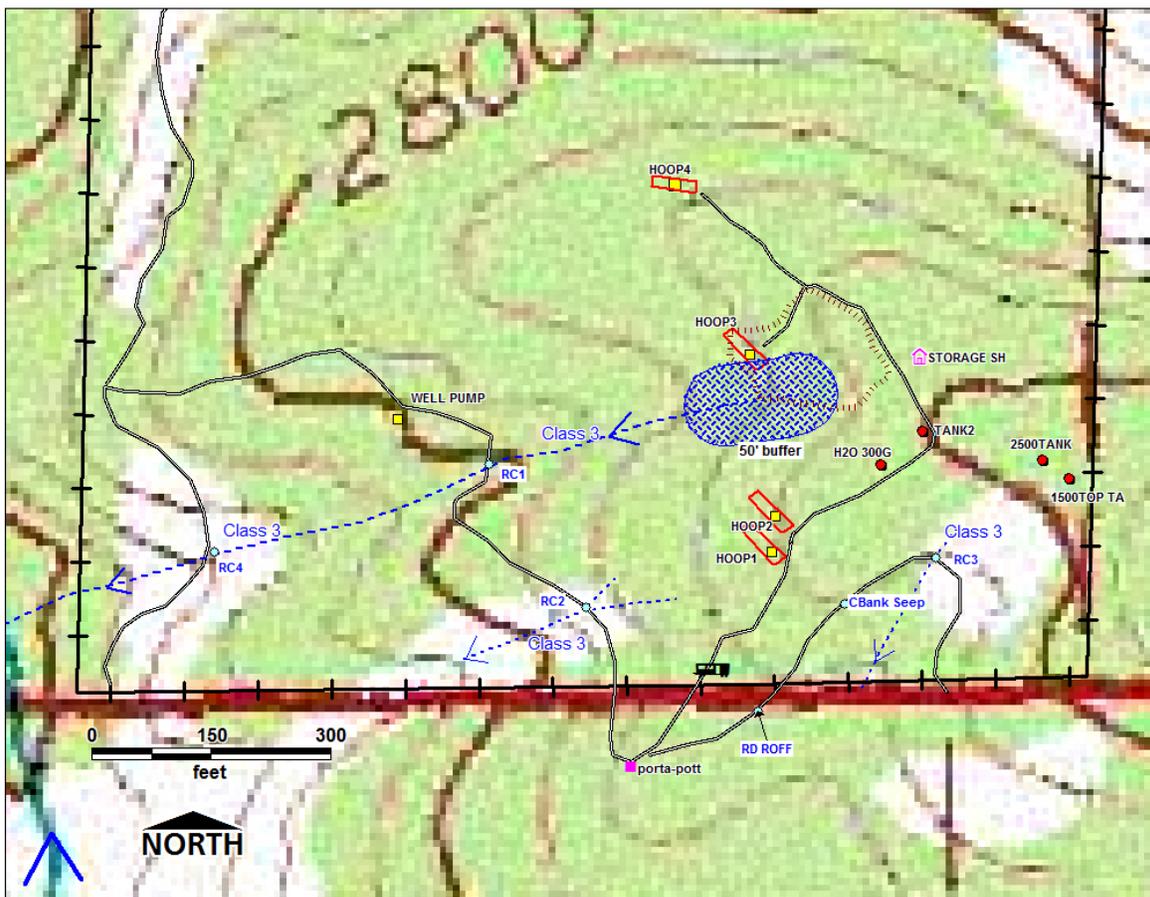


Table 1. Corrective Actions

Unique Map Points	Map Point Description	Assoc. Standard Condition	Temporary BMP	Permanent BMP	Priority for Action	Time Schedule for completion of Permanent BMP	Completion Date
RC1 (Rd Xing)	Small Class III with no pipe	I.A.2.a I.A.2.b	NA	Install 24" culvert	1	9/1/16	
RC2 (Rd Xing)	Keyhole Class IIIs with (1) 12" pipe	I.A.2.a I.A.2.b	NA	Install (2) 18" culverts	1	9/1/16	
RC3 (Rd Xing)	Small Class III with no pipe	I.A.2.a I.A.2.b	NA	Install 18" culvert	1	9/1/16	
CB seep	Cutbank seep creating small gully diversion down rd	I.A.1.a I.A.1.b I.A.1.e	NA	Install 18" culvert; Waterbar/dip road	1	9/1/16	
RC4 (Rd Xing)	Near-grade Class III w/ 50' depositional inlet	I.A.2.d I.A.2.e	NA	Rocked Ford	1	9/1/16	
Hoop 3 & hillside	Operations within 50 ft of a Class III	I.A.3.a	NA	Establish 50' buffer zone, re-vegetate disturbed area with native grass seed mix	2	5/15/16	

The above crossing types and pipe sizes specified for installation were determined through professional judgement of water flow occurring at a 100 year storm event evidenced by channel size, scour, and noted site conditions. These crossing installations are on small first order class III watercourses near the upper end of the contributing watershed areas (1 to 7 acres). The Waananen & Crippen (W & C) hydrologic calculation method was used as a check against professional judgement. Variables used were 100 year storm event, 2.5"/hr. for 100 yr. event, and a mean annual rainfall of 60". The W&C method corroborated pipe sizing using professional judgement with calculated crossing sizes as follows- RC1 24", RC2 18", RC3 18", and RC4 24". These above crossing specifications are adequate to allow for both water flow and debris to pass during storm events.

Following completion of the above road work under the terms of the CA DFW 1600 LSAA, road maintenance will be required following the BMPs outlined below:

Road Related Best Management Practices (BMPs)

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

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

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

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

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

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

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

- permanent roads,
- seasonal roads crossing Class I watercourses,
- roads used from October 15 to June 1.
- inside ditches will be evaluated for watercourse diversion and reconnection will be part of corrective action.

Ditches along the following shall be treated to prevent scour:

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

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

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

Erosion control materials shall be applied in sufficient quantity 48-hours prior to the onset of a likely precipitation event forecasted to have a 50% or greater chance of precipitation in the project area with re-application as needed to avoid any visible surface erosion during rainfall that results in runoff or turbidity increases in receiving watercourses.

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

Other BMPs for roads

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

- 1) Road surfaces shall be outsloped with rolling dips, wherever feasible.
- 2) All road segments shall be hydrologically disconnected, to the extent feasible, from watercourses by site specific application of the following: outsloping, rocking, installation of rolling dips, cross drains, and/or waterbars. All of these features shall drain to stable sediment filter strips.
- 3) Crossings and associated fills shall be removed or reconstructed where there is evidence of failure potential or sediment delivery to Class I, Class II, or Class III watercourses and lakes.

4) Culverts on Class I, Class II, or Class III watercourses shall be replaced or removed if they are crushed, perforated, undermined (flow is piping through fill), separated, sized inadequately to carry water from the hundred-year storm event, located in unstable fill, or positioned such that they erode fill.

(A) Replaced culverts shall be installed at or as close to the original stream grade and slope as feasible.

(B) Permanent culverts shall be designed to pass 100-year floods.

(C) Watercourse crossings and associated fills and approaches shall be constructed or maintained to prevent diversion of stream overflow down the road and armored to minimize fill erosion should the drainage structure become obstructed or when precipitation is sufficient to generate overland flow off the road surface.

5) The surface of each road approach to a watercourse crossing shall be treated to create and maintain a stable operating surface, and to avoid the generation of fines during use in accordance with subsection (A) through (F) below.

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

(i) permanent roads,

(ii) seasonal roads crossing Class I watercourses, or tributary to Class I watercourses,

(iii) roads used from October 15 to June 1.

(B) Road surfaces on the following shall be treated as described in (A) with rock, seed and straw mulch, or seed and stabilized straw:

(i) all seasonal roads used in the current year,

(ii) all seasonal roads used from October 15 to June 1,

(C) Approaches to temporary crossings on permanent roads shall be rocked as needed after crossing removal to avoid rutting or pumping fines during use.

(D) Ditches exhibiting downcutting along the following shall be lined with high quality, durable rock:

(i) permanent roads,

(ii) seasonal roads crossing Class I watercourses, or watercourses tributary to Class I watercourses,

(iii) roads used from October 15 to June 1.

(E) Ditches along the following shall be treated to prevent scour:

(i) seasonal roads used in the current year,

(ii) seasonal roads used from October 15 to June 1.

(F) Bare soil on associated fill slopes, shoulders and cuts shall be treated to minimize erosion.

6) Sediment discharge from unstable or eroding cutbanks, fill slopes, crossing and landing fills will be prevented by pulling, buttressing, or other means, followed by installing and maintaining effective erosion control measures and materials.

7) Bridges (including associated fill, rip-rap, and abutments) and bridge approaches showing evidence of failure potential or sediment delivery to Class I, Class II, or Class III watercourses and lakes shall be repaired, replaced, or removed.

8) Erosion control materials shall be applied in sufficient quantity 48-hours prior to the onset of a likely precipitation event forecasted to have a 50% or greater chance of precipitation in the project area with re-application as needed to avoid any visible surface erosion during rainfall that results in runoff or turbidity increases in receiving watercourses.

9) All roads in Class I WLPZs shall exhibit a rocked or paved stable operating surface. The surface shall consist of high quality, durable, compacted rock, or paving. The road surface and base shall be maintained to avoid generation of fines during use.

10) Use of unpaved roads shall cease when:

(A) precipitation is sufficient to generate overland flow off the road surface,

(B) use of any portion of the road results in rutting of the road surface, or

(C) a stable operating surface can not be maintained.

11) Use of unpaved roads may be resumed only when there is a stable road surface without having any of the conditions as described under 10)(A), (B), or (C).

12) Road and activity area construction or reconstruction shall cease when conditions prevent a stable operating surface that does not exhibit any of the conditions as described under 10)(A), (B), or (C)..

13) Road or activity area construction or reconstruction may resume only after soil conditions allow a stable operating surface without having any of the conditions as described under 10)(A), (B), or (C).

14) Discharge sites below the outlets of drainage facilities on all roads on the property shall be inspected by the landowner for evidence of sediment delivery to Class I, Class II, or Class III watercourses, wetlands and lakes as well as evidence of gully formation or enlargement at least at the following times:

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. By December 15.

4. following any rain fall event with an intensity of 3 inches or 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> .

If evidence of sediment delivery or gully development is present, additional cross drains, waterbars, rolling dips or other erosion control measures shall be installed to prevent sediment delivery to water courses.

Design Drawings for Water Course Crossings

Best Management Practices (BMPs) / Road Improvement Design Schematics

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

2014 Includes schematics for:

- Rolling Dips
- Armored Fills
- Proper Culvert Installation

Downloadable copy obtained from the Mendocino County RCD: http://mcrsd.org/wp-content/uploads/Handbook_for_Forest_Ranch&Rural_Roads.pdf

Rolling Dips: Copy of pages 64 – 67.

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

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

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

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

FIGURE 33A.

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



FIGURE 33B.

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



TABLE 21. Table of rolling dip dimensions¹

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

¹USDA-SCS (1981)²See also Figure 36

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

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

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

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

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

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

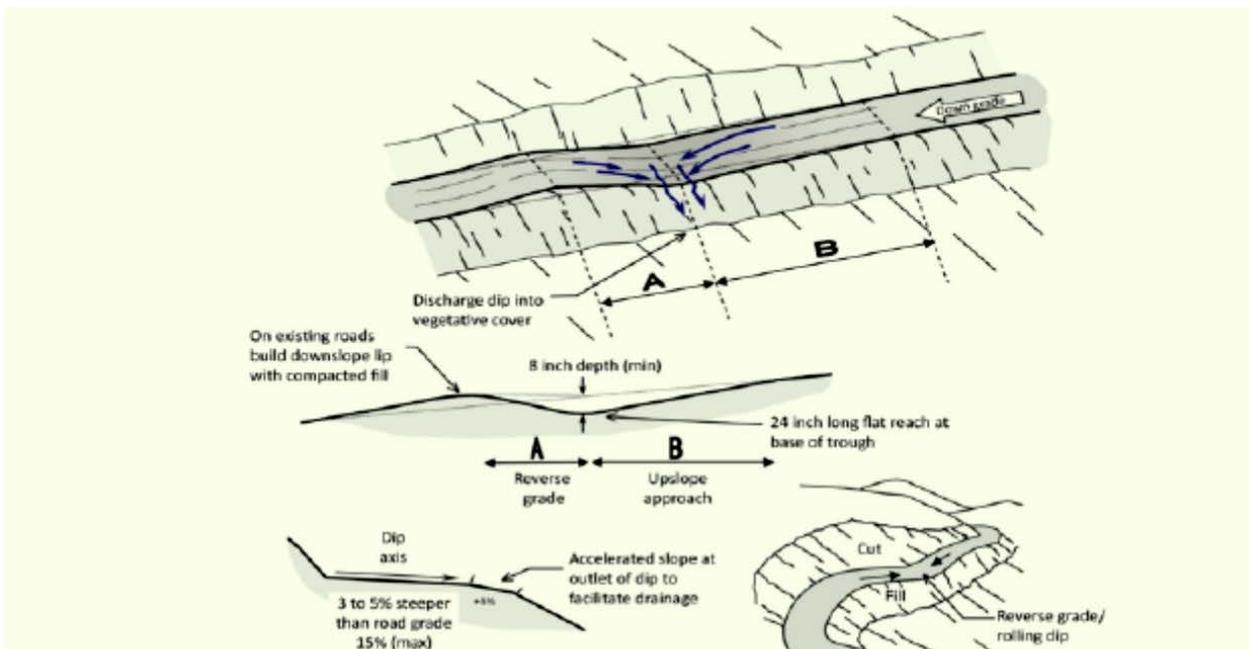
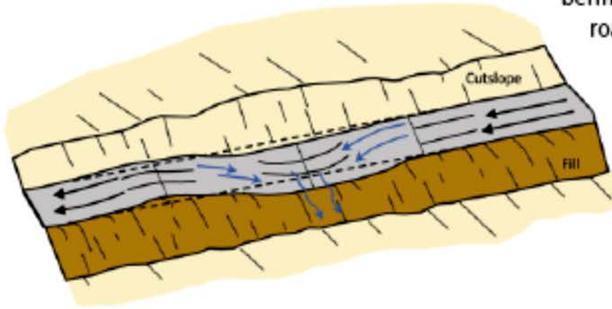


FIGURE 34. A classic Type I rolling dip, where the excavated up-road approach (B) to the rolling dip is several percent steeper than the approaching road and extends for 60 to 80 feet to the dip axis. The lower side of the structure reverses grade (A) over approximately 15 feet or more, and then falls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

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

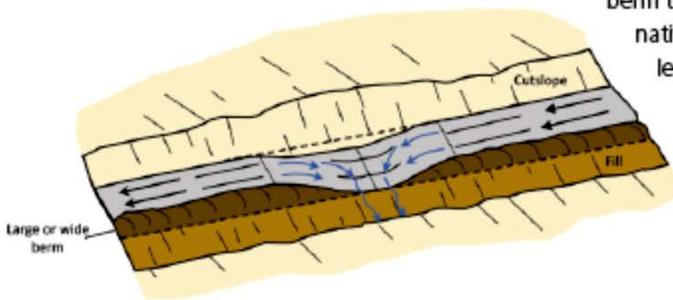


**Type 1 Rolling Dip
(Standard)**



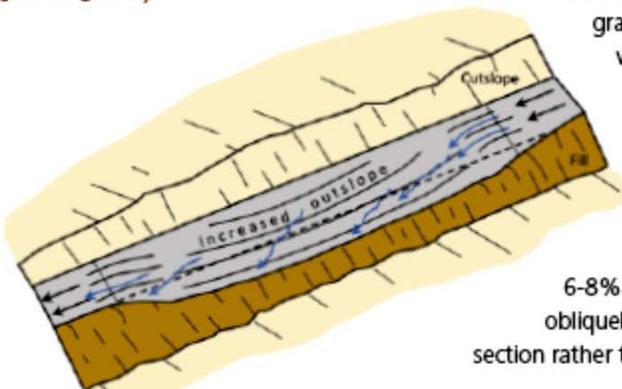
Type 1 rolling dips are used where road grades are less than about 12-14% and road runoff is not confined by a large through cut or berm. The axis of the dip should be perpendicular to the road alignment and sloped at 3-4% across the road tread. Steep roads will have longer and more abrupt dip dimensions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

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



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

**Type 3 Rolling Dip
(Steep road grade)**



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

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

Armored fills (Copy of page 153)

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



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

Proper Culvert Installation (pages 187-189)

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

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

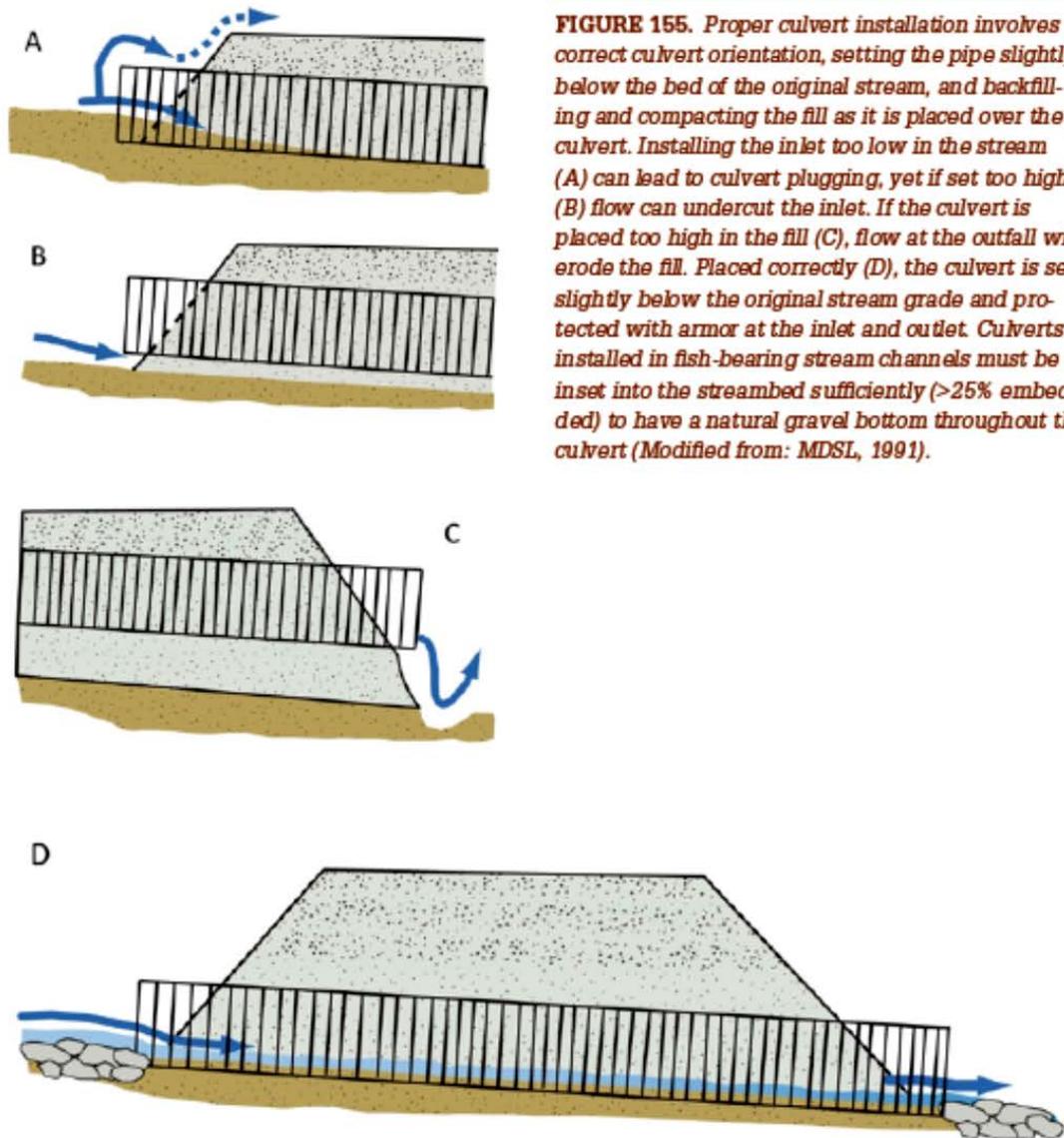


FIGURE 155. Proper culvert installation involves correct culvert orientation, setting the pipe slightly below the bed of the original stream, and backfilling and compacting the fill as it is placed over the culvert. Installing the inlet too low in the stream (A) can lead to culvert plugging, yet if set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

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

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

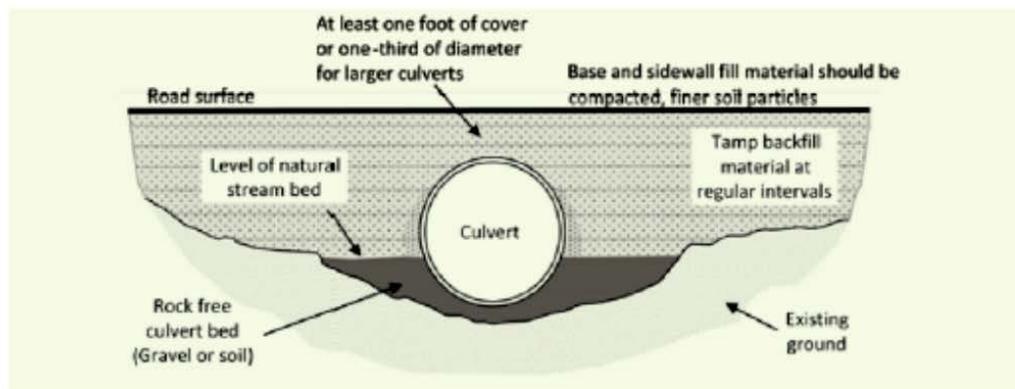
Backfilling can begin once the culvert is in-place in its bed. Backfill material should be free of rocks, limbs or other debris that could dent the pipe or allow water to seep around the pipe. One end of the culvert should be covered, and then the other end. Once the ends are secured, the center is covered.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

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

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

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

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



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

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

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

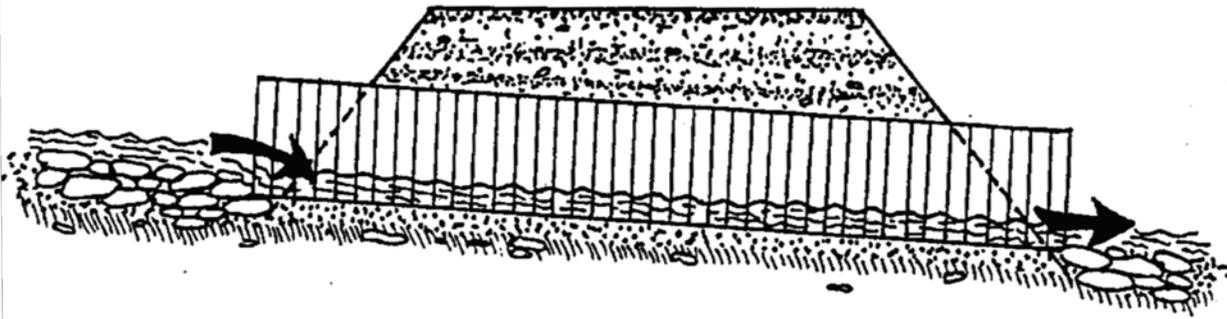


FIGURE 157A. Culvert installation in a shallow fill on a steep, boulder bedded Class II (non-fish bearing) stream replaced a severely undersized pipe (Figure 157a). The new six foot diameter culvert is set slightly into the original streambed and the inlet is armored to prevent erosion. The aggraded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



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

TYPICAL WATERCOURSE CROSSING CULVERT INSTALLATION



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

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

The Storage building is used for drying and storing supplies and fertilizer. Fertilizers stored on site include Maxsea All Purpose Plant Food (16-16-16) and Maxsea Bloom Plant Food (3-20-20). Annually approximately 100 pounds of Maxsea All Purpose Plant Food and 250 pounds of Maxsea Bloom Plant Food are used. Fertilizer is mixed in the 300 gallon water tank (figure 1). It is then watered through the drip lines. Fertilization is cycled into the watering schedule, so each plant receives 6 gallons of fertilizer water mix every 7 to 14 days depending on growth needs. The drip irrigation soaks slowly into the soil causing no runoff from watering or fertilizing.

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

Corrective Actions

NRM will conduct a monitoring visit to the site following the completion of the work on road crossings 1-4, the cut bank seep, and removal and re-vegetation of a portion of hoop house 3. The purpose of this visit will be to ensure the work was done correctly and meets the standard conditions of the order. Photos will be taken of each feature. Records will be kept on sites, on file at NRM, and submitted to the water board. If the work does not meet standard conditions NRM will provide the landowner instructions and guidance for improving it so it meets the standard conditions.

Annual Monitoring

Monitoring for this site will follow the revised Appendix C from the order. Annual monitoring will be done each year. At a minimum it will be done prior to October 15th, by December 15th, and immediately following a precipitation event with 3 inches of accumulation in 24hr period. During each monitoring session the following items will be inspected: all water course crossings (1-4 and the cut bank seep) ensure culvert inlets are clear and disconnect dips are installed / functioning, all roads to ensure surfaces are out sloped properly and rolling dips are installed and functioning (especially on hill from the trailer to hoop house 1 and 2), all three cultivation flats will be inspected to ensure proper out sloping so water is not pooling on the flat, and water is being shed properly, The prota potty will be pumped at the end of the season, and inspected to ensure it is stable and secure. This monitoring may be done by NRM staff or the land owner. Photos will be taken at each monitoring point. These photos along with the notes taken during the monitoring will be kept on site. A copy will also be kept on file at NRM. If the landowner chooses to do the monitoring NRM staff will review the notes and the photos. If NRM staff feels more information is necessary they will request that from the land owner, or they will visit the site. If corrective action is needed NRM will work with the landowner to install temporary and permanent BMP's to address the problem.

During the growing season the landowner will monitor the following items at least monthly: Tanks and water lines to ensure there are no leaks, cultivation area during or immediately after watering to ensure irrigation water is soaking into the surface and not running off. The land owner will keep a record of the dates this monitoring was completed, if any corrective action was necessary, and what actions were taken. A copy will also be kept on file at NRM.

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

Water Use

Water is pumped from an on-property well. A description of the well including installation date, depth, location and bore hole logs will be submitted to the Water Rights Division of the water board. If the Water Rights division determines that the well is surface water requiring a water right then the lander owner will build up storage over the next two years to meet his water needs between May 15 and October 31. Approximately 150 plants are grown each year. Each plant receives 15 gallons of water a week. The growing season is approximately 24 weeks long so each plant uses 360 gallons of water each season. Approximately 54,000 gallons of water are used to irrigate the site annually. Plants are watered using drip irrigation. The slow dripping process allows the water to soak into the soil and does not cause irrigation runoff. Plant are watered during the early morning 1am to 3am minimizing evaporation loss. . If the well is determined to be surface water the landowner will amend this plan to include the purchasing of 27,000 gallons of hard sided storage each year in 2016 and 2017.

Name of legally responsible person (LRP): John Smith

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

Signature: XXX Date: April 12, 2016

WRPP prepared by: Natural Resources Management Corp. (NRM) on Date: April 12, 2016

Signature: _____ *Puella Moore*

Date: April 12, 2016

Appendix A. Photo Documentation- Photos taken on March 31, 2016



RC1 Downstream

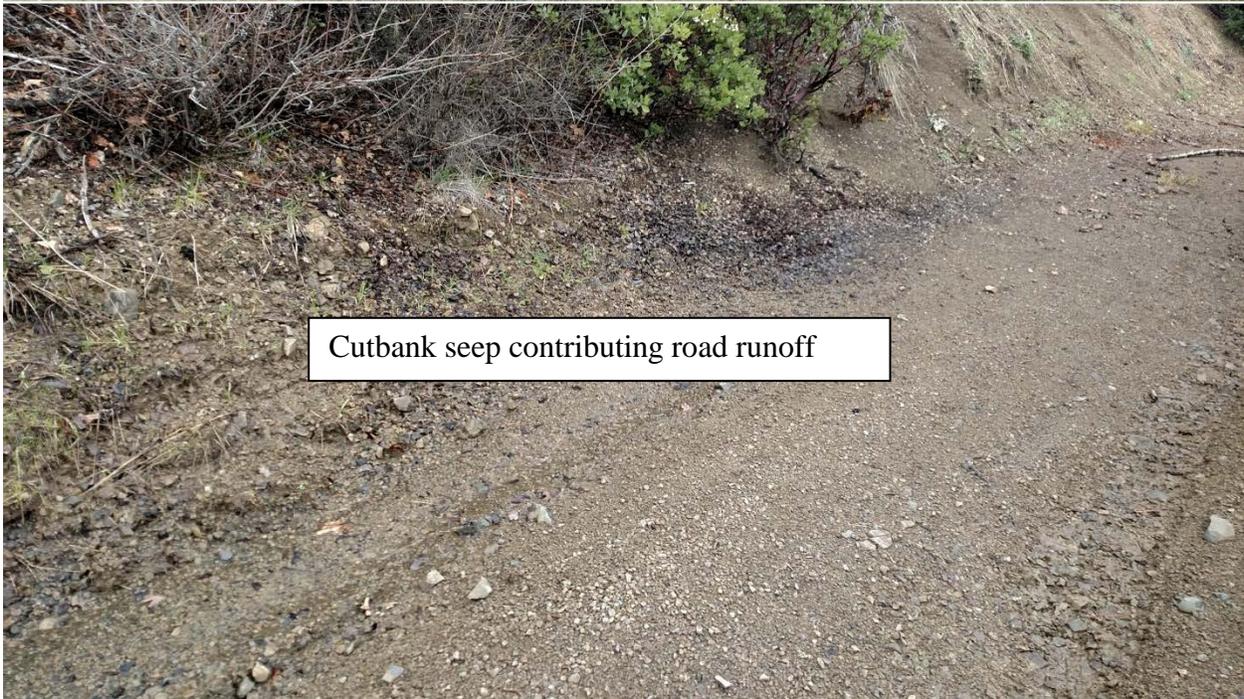


RC2 downslope





RC3 top of Class III



Cutbank seep contributing road runoff

RC4: Downstream from road



RC4: Upstream of road



Hoop 3 and hillside (looking East). Class III not visible to the left hand side.



Class 3

Water Tank



Fertilizer Mixing Tank



Appendix C
Sample Liability Waiver

Sample liability waiver

As a condition of approval for enrollment into the Water Quality Order R1-2015-0023 for the cultivation, processing, manufacture, or distribution of cannabis, the owner or permittee shall indemnify and hold harmless **Natural Resources Management Corporation** and its agents and employees for any claims, damages, or injuries brought by affected property owners or other third parties due to the commercial cultivation, processing, manufacture, or distribution of cannabis for medical use and for any claims brought by any person for problems, injuries, damages, or liabilities of any kind that may arise out of the commercial cultivation, processing, manufacture, or distribution of cannabis for medical use.

As a third party **Natural Resources Management Corporation** is not responsible for any water quality violations. Additionally the land owner understands that if corrective measures prescribed by NRM are not correctly implemented by the land owner, NRM will report the property as out of compliance with the Order to the Regional Water Board.

I/we agree to be responsible to the stated terms and conditions of the Order, and release Natural Resources Management Corporation, its employees, contractors, and consultants from any defense costs, including attorneys' fees or other loss connected with any legal challenge which may arise from implementation of said Order.

Landowner Printed Name: _____

Signature: _____ Date: _____

Permittee Printed Name: _____

Signature: _____ Date: _____