

## Attachment D

### CEQA Findings

CALIFORNIA ENVIRONMENTAL QUALITY ACT  
FINDINGS OF FACT FOR ORDER R1-2012-0087  
WASTE DISCHARGE REQUIREMENTS  
FOR  
DISCHARGES RELATED TO GREEN DIAMOND RESOURCE COMPANY'S FOREST  
MANAGEMENT ACTIVITIES CONDUCTED WITHIN  
THE AREA COVERED BY ITS AQUATIC HABITAT CONSERVATION PLAN  
IN THE  
NORTH COAST REGION

#### **I. PROJECT OVERVIEW**

Discharges from forest management activities covered by proposed Order R1-2012-0087 (Project), including timber product harvest, silvicultural regimes and methods, timberstand regeneration and improvement, minor forest product harvest, instream and riparian restoration, and mitigation measures, have the potential to affect water quality. Under the California Porter-Cologne Water Quality Act, discharges of waste to waters of the state require the issuance of waste discharge requirements (WDR) unless otherwise waived. WDRs prescribe requirements, such as limitations on temperature, toxicity, or pollutant levels, as to the nature of any discharge. (Water Code, § 13260, subd. (a).) The Project also includes activities that may require a Clean Water Act section 404 permit from the Army Corps of Engineers (Corps). Under section 401 of the federal Clean Water Act (33 U.S.C. §§ 1251-1387), every applicant for a federal license or permit which may result in a discharge into navigable waters to provide the licensing or permitting federal agency with certification that the project will be in compliance with specified provisions of the Clean Water Act, including water quality standards and implementation plans promulgated pursuant to section 303 of the Clean Water Act (33 U.S.C. § 1313). Clean Water Act section 401 directs the agency responsible for certification to prescribe effluent limitations and other limitations necessary to ensure compliance with the Clean Water Act and with any other appropriate requirement of state law. Section 401 further provides that state certification conditions shall become conditions of any federal license or permit for the project.

In July 2007, Green Diamond began implementing the Aquatic Habitat Conservation Plan (AHCP) approved in June 2007 by the National Marine Fisheries Service and the U.S. Fish & Wildlife Service. On June 10, 2010, the Regional Water Board adopted Order R1-2010-0044, *Waste Discharge Requirements for Discharges Related to Road Management and Maintenance Activities Conducted Pursuant to the Green Diamond Resource Company Aquatic Habitat Conservation Plan in the North Coast Region*

(Roads WDR). The Roads WDR provides waste discharge coverage for activities performed under Green Diamond's Road Management Plan from the AHCP. Concurrently with development of the Roads WDR, the California Department of Fish and Game (DFG) developed a Master Agreement for Timber Operations (MATO, 1600-2010-0114-R1). The California Department of Forestry and Fire Protection (CAL FIRE) is the state agency responsible for overseeing timber harvesting activities through implementation of the Forest Practice Rules (Cal. Code Regs., tit. 14, §§895-1115.3). The Regional Water Board is not a party to or otherwise bound by any agreements and assurances Green Diamond may have with other state and federal agencies; however, the AHCP and MATO contain management measures that minimize impacts and protect and improve water quality that the Regional Water Board intends to rely on, in part, and in conjunction with existing regulations in order to implement Basin Plan water quality standards and restore the beneficial uses of water across Green Diamond's ownership. This approach will result in greater consistency across multiple state and federal agencies, streamline paperwork submittals, and promote landscape-based stewardship of water quality. The Regional Water Board will continue to participate as a Review Team member for individual THPs proposed by Green Diamond to ensure compliance with this Order.

The project area includes all commercial timberland acreage on the west slopes of the Klamath Mountains and the Coast Range of California in Del Norte and Humboldt counties where Green Diamond owns land or harvesting rights that are covered by the AHCP. This area is currently 384,400 acres, and is subject to adjustment as Green Diamond buys and sells property. This area is located in portions of the following watersheds: Smith River, Lower Klamath River, Redwood Creek, Maple Creek, Little River, Mad River, Jacoby Creek, Freshwater Creek, Elk River, Salmon Creek, Van Duzen River and the Eel River.

## **II. CEQA FINDINGS OF FACT**

As indicated in the Regional Board's August 1, 2012 Notice of Intent, in October 2006, the U.S. Fish & Wildlife Service and National Marine Fisheries Service issued an Environmental Impact Statement (EIS) covering the AHCP. Where, as here, a project requires compliance with both CEQA and the National Environmental Policy Act (NEPA), and the federal EIS is prepared first and meets the requirements of CEQA, CEQA provides that the state agency should use the EIS rather than preparing a separate EIR or negative declaration, pursuant to California Code of Regulations, title 14, section 15221. The NOI added any points of analysis not covered in the EIS but required under CEQA. For those aspects of the project for which the Regional Board is relying on the EIS, the Regional Board is the lead agency under CEQA, in connection with the proceeding to consider issuing WDRs and water quality certification for the Project. (Pub. Resources Code, §§ 21000-21177.) The Regional Water Board is a responsible agency under the California Environmental Quality Act (CEQA) with regard to its consideration of the IS/MND issued by the Department of Fish and Game in support of its issuance of a MATO. The IS/MND analyzed activities carried out in riparian areas, stream crossings and roadways, including obstruction and sediment removal, vegetation removal, bank stabilization, maintenance of watercourse crossings,

water drafting and diversion, deposition and disposal of material, decommissioning and instream restoration. While there is considerable overlap in the EIS and IS/MND, the Regional Water Board relies on both for the most complete and comprehensive impacts analyses.

CEQA requires that the lead agency make one or more of a set of three findings whenever an EIR identifies a significant effect on the environment. These findings are set forth in section 21081, subdivision (a) of the Public Resources Code:

- (1) Changes or alterations have been required in, or incorporated into, the project which mitigate or avoid the significant effects on the environment.
- (2) Those changes or alterations are within the responsibility and jurisdiction of another public agency and have been, or can and should be, adopted by that other agency.
- (3) Specific economic, legal, social, technological, or other considerations, including considerations for the provision of employment opportunities for highly trained workers, make infeasible the mitigation measures or alternatives identified in the environmental impact report. (See also Cal. Code Regs., tit. 14, §15091.)

When significant effects are subject to a finding under paragraph (3) of subdivision (a), the public agency finds that specific overriding economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment (Pub. Resources Code, § 21081, subd.(b)).

A public agency shall provide that measures to mitigate or avoid significant effects on the environment are fully enforceable through permit conditions, agreements, or other measures. Conditions of project approval may be set forth in referenced documents which address required mitigation measures or, in the case of the adoption of a plan, policy, regulation, or other public project, by incorporating the mitigation measures into the plan, policy, regulation, or project design. (Pub. Resources Code, § 21081.6, subd.(b).)

All of the potentially significant impacts identified in the EIS and IS/MND will be fully avoided or rendered less than significant by implementation of the AHCP measures, including identified mitigation measures, referenced in the EIS and IS/MND. These findings are made under Public Resources Code, section 21081, subdivision (a)(1). All measures are incorporated as conditions of Order R1-2012-0087 issued by the Regional Water Board to Green Diamond and, as applicable in the previous approved Road Management WDRs and the MATO. Further, as proposed by Green Diamond, all these measures are incorporated into the Project to avoid the significant environmental effects identified in the EIS and IS/MND. Green Diamond is responsible for carrying out these mitigation measures as well as monitoring and reporting under the WDRs.

Public Resources Code section 21081.6, subdivision (a) requires that if a public agency makes changes or alterations in a project to mitigate or avoid the significant adverse

environmental effects of the project, it must adopt a monitoring or reporting program to ensure compliance with the changes or alterations. The Regional Board has imposed a number of conditions in the Order to protect and improve water quality, including incorporation of all the impact mitigation and avoidance measures included in the EIS and IS/MND. The Regional Water Board has adopted a monitoring and reporting program (MRPR1-2012-0088) for the Project pursuant to Water Code section 13267(b) and approval of the WDRs. This MRP will assess the implementation and effectiveness of the measures required under the Order and provide feedback for adaptive management. The MRP also implements the monitoring and reporting requirements under Public Resources Code section 21081.6, subdivision (a).

### **Geology, Geomorphology, and Mineral Resources**

#### **Impact 1: Implementation of the project could adversely impact surface erosion, hillslope mass wasting, bank stability, and road-related sediment production.**

Potential adverse impacts to geology and geomorphology include acute or chronic changes in geomorphic and hydrologic processes that affect soil productivity and delivery of surface materials to streams and rivers. Potential impacts could be localized or dispersed over a wide area. The primary processes with the potential to result in impacts to geology and geomorphology and deliver sediment to watercourses are:

- Surface erosion
- Hillslope mass wasting
- Reduced bank stability
- Road related sediment production

Geomorphology and geologic impacts include movement of surface materials, including soils, weathered rock, and sediment (i.e., hillslope mass wasting). When delivered to streams, these materials can affect water quality (see Section 4.3, Hydrology and Water Quality) and fish habitat (see Section 4.4, Aquatic Resources). In the past, sediment inputs to stream networks resulted from existing roads, implementation of THPs, natural conditions, and legacy conditions. Excessive sediment, both coarse and fine has resulted in significant adverse effects to watercourses. Future management-related sediment delivery to impaired streams above existing levels could prolong the time required for recovery of habitat. Mineral-resource depletion, fire-prevention and fire-suppression activities, and earthquakes or volcanic eruptions would have no or negligible direct or indirect impacts.

A number of ownership-specific AHCP measures (described in Mitigation Measures 1-4 below) are required to minimize and mitigate the individual and cumulative impacts of forest management activities on geology and geomorphology and to reduce sediment inputs.

**Implementation of Mitigation Measures 1-4 will reduce geologic and geomorphologic impacts to a less-than-significant level.**

## **Mitigation Measure 1: Implement the AHCP Measures Directed at Surface Erosion**

To address potential impacts on surface erosion, Green Diamond must implement riparian conservation measures, harvest-related ground disturbance measures, and the Road Management Plan.

Riparian Management Zone (RMZ) management prescriptions in the AHCP are designed to impede sediment delivery in areas where sediment has relatively short transport distances to watercourses. These measures include minimum overstory canopy-retention standards within the inner and outer zones of the RMZ, limitations on equipment use, and retention of trees judged to be critical to maintaining bank stability. Vegetation is well documented as an effective means of erosion prevention and control because it absorbs the impact of rain drops, reduces runoff velocity, increases water percolating into the soils, and binds soils with roots (Goldman et al., 1986; Gray and Sotir, 1996). Vegetative buffers are also effective in preventing or impeding eroded sediment from reaching watercourses. Vegetative buffers on toe slopes have also been observed to intercept sediment from upslope landslides. Modified Tier A Class III protection measures will reduce ground disturbance, retain bank stabilizing vegetation, and retain vegetative over-story and ground cover. These measures are similar in type and scope to the RMZ and surface erosion measures in the AHCP (i.e., the measures consist of varying RMZ widths, restrictions on ground disturbance, and vegetation retention requirements). Application of these measures further reduce the level of surface erosion, bank destabilization, and, ultimately, delivery of fine sediment to stream channels and aquatic habitat, in areas with highly erodible soil types.

Harvest-related ground disturbance conservation measures are designed to minimize management-related surface erosion. In particular, there are operational restrictions on silvicultural and logging activities during those time periods when timber operations have a greater potential for sediment delivery to watercourses. The time period restrictions allow only those harvest activities with relatively low ground disturbance (and associated low potential for surface erosion), such as shovel logging and skyline and helicopter yarding, to be conducted during the winter period. Those harvest activities that have the potential to create more ground disturbance (e.g., skid trail construction and mechanized site preparation) are limited to the summer period, with some activities (e.g., ground-based yarding with tractors, skidders, or forwarders) extending into the early spring or late fall if certain favorable climatic conditions occur. More closely spaced waterbreaks are required on highly erodible soil types upslope of RMZs or Equipment Exclusion Zones (EEZs) where skyline yarding roads require treatment. In addition, some harvest-related ground disturbance measures focus on minimizing ground disturbance and the associated exposure of bare mineral soil within harvest units.

Road-related conservation measures are designed to reduce road-related sediment production and delivery to streams. In particular, the road measures increase the estimated proportion of hydrologically disconnected roads to 93 percent. The measures also place strict wet weather restrictions on road use, construction, upgrading and decommissioning. The MATO and Roads WDR also contain specific erosion control

measures designed to minimize and prevent sediment from entering watercourses during and following road treatment activities.

These measures are specified in AHCP Sections 6.2.1, 6.2.3, 6.2.4, MATO Section 11.A.6 and incorporated in Order R1-2012-0087 Condition II.D.

## **Mitigation Measure 2: Implement the AHCP Measures Directed at Hillslope Mass Wasting**

To address potential impacts on hillslope mass wasting, Green Diamond must implement riparian conservation measures and slope stability measures. The slope stability measures are intended to reduce landslide occurrences and sediment production from landslides associated with steep streamside slopes, headwall swales, and active deep-seated landslides.

The riparian conservation measures and the steep stream slope prescriptions address stream-side landslides. Timber harvesting is prohibited within the inner zone of all Class I RMZs and 2nd order or larger Class II RMZs that are located below designated steep streamside slope management zones (SMZs), except for purposes of creating cable-tyarding corridors when other options are impractical. RMZ areas located below an SMZ are referred to as Riparian Slope Stability Management Zones (RSMZs) in the AHCP. Retention of a minimum 85 percent overstory canopy closure is required in Class I and 2nd order or larger Class II outer zones where RSMZs have been established. Limited timber harvesting is permitted within the first 1,000 feet of a 1st order Class II RSMZ inner zone subject to 85 percent overstory canopy closure retention post-harvest. A minimum 75 percent canopy retention within the first 1,000 feet of a 1st order Class II RSMZ outer zone is also required. Single-tree selection is the initial default silvicultural prescription within designated SMZs. One commercial harvesting entry is permitted within SMZs for the term of the AHCP, except where cable corridors are necessary to conduct intermediate treatments. If cable corridors through SMZs are necessary to conduct intermediate treatments (e.g. commercial thinning) in adjacent stands prior to even-aged harvest, the restrictions in AHCP/CCAA Section 6.2.2.1.7 apply except harvesting of trees in the SMZs are limited to cable corridors only. Any cable roads established in the SMZ as part of the intermediate treatment are, to the extent feasible, reused during the even-aged entry in the adjacent stand. All hardwoods within SMZs are retained with unharvested conifers evenly distributed, wherever possible, such that all species and size classes represented in pretreatment stands are generally represented post-harvest. Applied in areas with highly erodible soil types, the modified Tier A Class III protection measures require an EEZ width of 30 feet with 15 square feet of basal area of hardwoods and all channel zone trees retained. Tier B Class III watercourse have an EEZ with of 50 feet with 100% hardwood retention and one conifer retained every 50 feet of stream length.

In high-risk headwall swales, single-tree selection is the initial default silvicultural prescription. All hardwoods within headwall swales are retained with unharvested conifers evenly distributed, wherever possible, such that all species and size classes represented in pretreatment stands are generally represented post-harvest. Only one

commercial harvesting entry is permitted within headwall swales for the term of the AHCP.

Active deep-seated landslides are provided with not-cut zones on the toe and 25 feet upslope from the top of the toe, except for purposes of creating cable-yarding corridors when other options are impractical. No-cut zones are also established upslope of the scarp of deep-seated landslides. The body of active deep-seated landslides are evaluated by a California Professional Geologist.

Harvesting is prohibited within the boundaries of shallow rapid landslides and a minimum 70 percent overstory canopy buffer is retained within 50 feet above and 25 feet on the sides of the slide.

During THP development RPFs survey the THP area to determine whether portions of plan meet the CFPR definition of unstable areas. Additionally RPFs determine if portions of the THP area contain headwall swales, steep streamside slopes, deep-seated landslides or shallow rapid landslides.

RPFs do one of the following when he or she determined that any portion of the THP met the definition of a steep streamside slope; headwall swale; deep-seated landslide or shallow rapid landslide:

- Impose the default prescription applicable to that feature as set forth above, or
- Retain a California Professional Geologist to:
  - Evaluate the likelihood that timber harvesting operations will cause, or significantly elevate the risk of causing or reactivating, landslides within these areas that will likely result in sediment delivery to watercourses; and
  - Work with the RPF to prepare a more cost-effective, site-specific alternative to the default prescription designed to minimize that likelihood and minimize and mitigate potentially significant impacts on aquatic species from sediment delivery resulting from landslides caused or exacerbated by timber harvest operations. Alternative prescriptions can be applied to any of these areas except RSMZs. A qualified biologist is involved in evaluating the potential biological consequences whenever a more cost effective alternative to the default prescription is proposed.

The alternate approach could be applied to portions of any SMZ outside of RMZs, field verified headwall scarps, deep-seated landslides or shallow rapid landslides. THPs for which a geologic report has been prepared (and whose conclusions allow for measures other than those specified in the AHCP) are identified as such when submitted for review by CDF and other agencies, including the Regional Water Board. A THP map and letter of notice that describes the alternative prescriptions are sent to the Services when a THP with alternative prescriptions is proposed.

The goal of the slope stability conservation measures in the AHCP is to reduce management-related landslide occurrences and associated sediment loads, which will minimize the possible effects of management-related sediment input on aquatic species from mass-soil movement. Tree retention in SMZs and associated RSMZs, headwall swales, deep-seated landslides, and shallow rapid landslides is expected to maintain a

network of live roots that will preserve soil cohesion and contribute to slope stability in these areas. Tree retention also is expected to help maintain forest canopy, which will preserve some measure of rainfall interception and evapotranspiration. Maintenance of rainfall interception and evapotranspiration is expected to contribute to slope stability conditions in some locations by minimizing the likelihood of management-induced high ground water ratios. Limited road construction and road reconstruction on unstable slopes and in RMZs will likely result in avoiding or reducing the undercutting and overburdening of sensitive hill slopes and help avoid unnatural concentration of storm runoff on these slopes. The application of more conservative SMZ prescriptions in HPAs more susceptible to hillslope mass wasting, plus the avoidance or limitation of timber harvesting in certain landslide-prone areas, will result in a reduced potential for sediment delivery to streams in the area covered by the AHCP. On this basis, the measures in the AHCP are anticipated to result in improvements in water quality.

These measures are specified in AHCP Sections 6.2.1 and 6.2.2 and incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 3: Implement the AHCP Measures Directed at Bank Stability**

To address potential impacts on bank stability, Green Diamond must implement the riparian conservation measures.

The riparian conservation measures for Class I and II watercourses require retention of 85 percent overstory canopy closure in the RMZ inner zone and prohibit harvesting of trees that are likely to recruit to stream channels. Tier B Class-III measures require retention 100% hardwood retention and trees that are judged to be critical to maintaining bank stability and Modified Tier A Class III protection measures require the retention of 15 square feet of basal area of hardwoods and all channel zone trees. Collectively these riparian conservation measures will likely lead to increased bank stability. In addition, implementation of the general riparian conservation measures in the AHCP is expected to contribute to streambank stabilization.

These measures are specified in AHCP Sections 6.2.1 and incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 4: Implement the AHCP Measures Directed at Road-related sediment production**

To address potential impacts on road-related sediment production, Green Diamond must implement the measures described in the AHCP Road Management Plan and Roads WDR.

Road-related surface erosion and road-related mass wasting are recognized as major contributors to the sediment budget in most managed watersheds. The AHCP includes road management conservation measures for both new and existing roads to address potential road-related sediment production. The AHCP provides a methodology to classify roads on the basis of use and to prioritize road work and site-specific repairs.



The road conservation measures improve the standards for general road repairs and upgrades and improve the design standards for stream crossings. The standards for temporary and permanent road decommissioning are also improved under the AHCP. A training program is required for equipment operators and supervisors on the Road Management Plan and other AHCP/CCAA standards and practices to ensure familiarity with the measures. Green Diamond is required to provide \$2.5 million (inflation adjusted) per year for 15 years to accelerate the repair of high-and moderate-risk sediment delivery sites across the area covered by the AHCP. All high and moderate-risk sediment delivery sites must be treated by the end of AHCP term. The road-related conservation measures also increased restrictions on wet weather road use, construction, upgrading, and decommissioning.

These road-related measures are specified in AHCP Sections 6.2.3 and MATO Section 11 and incorporated in the Roads WDR, Order R1-2012-0087 Condition II.D.

Cumulative effects. The cumulative impact of implementing all these measures on erosion and sediment control under the AHCP would be an improvement of aquatic resources and riparian habitat conditions in each of the 11 Hydrographic Planning Areas over time. The Road Management Plan and the accelerated road sediment site repair provide the greatest sediment control benefits among the AHCP sediment conservation measures. Implementing the AHCP (as well as the requirements of the MATO, Roads WDR and IS/MND) will incrementally reduce adverse conditions associated with on-going and past land management activities.

## **Hydrology and Water Quality**

### **Impact 2: Implementation of the project could adversely impact hydrology, water temperature and sediment control.**

The EIS evaluated the potential impacts of expected changes in watershed characteristics on hydrology and water quality as a result of implementing forest management activities under the AHCP. The primary water quality parameters of concern for the evaluation were suspended sediment, turbidity, and water temperature. The EIS identified the following potentially significant impacts:

Increases in summertime stream temperatures can adversely affect the salmonid and aquatic species by reducing growth efficiency, increasing disease susceptibility, changing the age of smoltification, causing loss of rearing habitat, and shifting the competitive advantage of salmonids over non-salmonid species. Decreases in water temperatures are beneficial to aquatic resources. Stream temperatures can be affected by direct shading, reduced surface and groundwater flows and sediment disposition and can affect the survival and/or reproduction of both salmonids and amphibians.

Hydrology in forested areas can be affected by peak flows during storm events that can cause scour, alter channel morphology, and cause flooding. Alteration of snow pack, enhancement of runoff throughout timber harvest units or along roads, interception of groundwater flows by roads, and alteration of evapotranspiration through changes in

forest structure all have the potential to affect hydrology. In particular, snow buildup in logged areas above 2,000 feet elevation and subsequent melting during rainstorms (known as rain-on-snow events) results in enhanced flows and increased potential for erosion. Summer base flows could increase in logged versus unlogged areas in the short term and return to pre-harvest conditions within a few years. Excessive sediment input can fill pools, eliminate spawning gravels, decrease channel stability, increase nutrient and contaminant loads, and modify overall channel morphology. Sediment input is important in directly affecting fish and fish spawning success but is also useful as a surrogate for changes in concentrations of sediment-associated contaminants (primarily metals and many pesticides) and nutrient input.

The AHCP includes a number of ownership-specific measures (described in Mitigation Measures 5-7 below) to minimize and mitigate the individual and cumulative impacts of forest management activities on hydrology and water quality. Implementation of Mitigation Measures 5-7 will reduce hydrologic and water quality impacts to a less-than-significant level.

### **Mitigation Measure 5: Implement the AHCP Measures Directed at Hydrology**

To address potential impacts on hydrology, Green Diamond must implement riparian conservation measures, slope stability conservation measures, road management measures and harvest-related ground disturbance measures.

Through the road upgrading and decommissioning program, it is anticipated that 93 percent of the road network will be hydrologically disconnected from area watercourses. Mitigation measures such as hydrologic disconnects, cross-drains, rolling dips, and outsloping, reduce the amount of concentrated surface runoff at any point along the road surface. As these measures are implemented, water from inboard ditches is dispersed onto the forest floor where it infiltrates and reduces the potential effects on peak flows and sediment delivery associated with road network runoff.

In general, harvest-related ground disturbance can cause soil compaction and result in reduced infiltration capacity of soils and altered subsurface water movement, leading to increased surface runoff. The riparian conservation measures require Equipment Exclusion Zones (EEZs) that result in a reduction of locations potentially exposed to soil compaction from use of heavy equipment. In addition, for those areas in which heavy equipment is used, site preparation measures (including seasonal operating limitations for tractors, skidders, and forwarders, and minimized use of tractor and-brushrake piling) will reduce potential for ground compaction related to covered activities compared to pre-AHCP conditions. These harvest-related ground disturbance prevention/conservation measures are expected to reduce: (1) adverse impacts of operations-related alterations in hydrology (by minimizing soil compaction that can increase the magnitude of peak flows) and (2) the volume of sediment available for runoff during peak flow events.

The slope stability conservation measures will result in a greater reduction in sediment delivery from steep streamside slopes and unstable areas than forest operations without

these measures by avoiding new road construction on these features or by substantial upgrades of existing roads already located on these features. In addition, tree retention in these and other potentially unstable areas will preserve rainfall interception and evapotranspiration.

The riparian conservation measures maintain in-channel large woody debris (LWD) and provide increased potential for LWD recruitment. The presence of LWD in stream channels aids in pool formation, and sediment storage and sorting. Increased LWD recruitment and the volume of LWD are expected to improve aquatic habitat and stream substrate conditions.

Conservation measures under the AHCP are anticipated to minimize the potential impacts that could otherwise result from altered hydrology. They will reduce the impacts of forest management on surface runoff and peak flows, reduce soil compaction and disturbance, and maintain or enhance in-channel LWD. Adverse impacts to hydrology and water quality that would occur will be minimized by the improved riparian conditions resulting from riparian management and decreased sediment production and delivery.

These measures are specified AHCP Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4 and MATO Section 11. All these measures are incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 6: Implement the AHCP Measures Directed at Water Temperature**

To address potential impacts on water temperature, Green Diamond must implement riparian conservation measures, road management measures and the slope stability measures.

The riparian conservation measures have overstory canopy closure requirements and tree retention standards that are more protective overall than those implemented prior the AHCP approval. The minimum width of RMZs on Class I (fish bearing) watercourses is 150 feet with 85% overstory canopy retention in the inner zone (50-70 feet depending on slope class) and 70% overstory retention in the remaining outer zone. Class II watercourses have a minimum buffer width of 75-100 feet with 85% overstory canopy retention in the inner zone (30 feet) and 70% on the remaining outer zone.

Implementation of riparian measures will help to maintain stream shading in the critical "inner zone" where microclimate effects are anticipated to have the greatest potential to affect water temperatures. Overall, overstory canopy closure, while expected to slightly decrease in the short term following harvesting is likely to increase in all stands as they regenerate following timber harvesting. The overall increase in overstory canopy closure is anticipated to result in slight decreases in water temperatures in streams. Any increase in water temperature that might occur in any individual location is expected to be slight and less than significant.

Reduced sediment delivery as a result of implementing the road management measures, the slope stability measures and the MATO, also could indirectly contribute

to minor decreases in water temperature. Sediment input, particularly increases in fine sediment, can affect stream temperatures through changes in channel morphology such as reduced pool volume and increased channel width. With the slope stability and road management measures designed to minimize management-related sediment inputs, sediment production and delivery will be reduced. relative to existing conditions and conditions prior to AHCP implementation.

These measures are specified in AHCP Sections 6.2.1, 6.2.2 and 6.2.3 and MATO Section 11 and are incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 7: Implement the AHCP Measures Directed at Sediment Control**

To address potential impacts on sediment control, Green Diamond must implement riparian conservation measures, slope stability measures, road management measures, and harvest-related ground disturbance measures.

The riparian conservation measures are designed to impede sediment delivery in areas where sediment has relatively short transport distances to watercourses. These measures include increased overstory canopy retention standards within RMZs, limitations on equipment use, retention of trees likely to recruit as LWD, and retention of trees that contribute to maintaining bank stability. Implementing the retention standards is expected to result in almost no loss in total forest canopy in the inner zone of RMZs along Class I and Class II watercourses, and is anticipated to increase overstory canopy along Class II watercourses. This overstory canopy impedes sediment mobilization in these critical areas, where sediment has relatively short transport distances to watercourses. On this basis, the measures associated with the AHCP are anticipated to result in reductions in sediment delivery.

Harvest-related ground disturbance conservation measures focus on minimizing ground disturbance and exposure of bare mineral soil within harvest units. These measures include: (1) site-specific site preparation methods, (2) limited operating periods for the construction of skid trails and use of ground-based yarding equipment, (3) limiting use of ground-based yarding equipment that requires constructed skid roads to slopes less than or equal to 45 percent (with some exceptions), (4) preferential use of cable yarding systems, and (5) water-barring of cable corridors, where necessary. All of these ground disturbance conservation measures will minimize the potential for soil compaction and management related surface erosion within harvest units.

Sediment production from hillslope mass wasting is greatest in steep streamside slopes, headwall swales, and deep-seated landslides. These areas are subject to default slope stability conservation measures intended to reduce landslide occurrences and associated sediment production. The implementation of the AHCP results in these sensitive areas receiving additional protection by establishing slope management zones (SMZs) upslope of the RMZ along Class I and Class II watercourses. The width of the SMZ vary among the 11 HPAs, with wider more conservative SMZs identified for those HPAs with the potential deliver sediment from the longer locations from watercourses.

Single tree selection harvest is the most intensive silvicultural prescription allowed within the SMZ and no harvesting is allowed in the inner portion of the RMZ downslope of the SMZ (i.e., the RSMZ) along Class I and larger Class II watercourses. In addition, no harvest is allowed within the toe and 25 feet upslope from the top of the toe or scarp of historically active deep-seated landslides. Alternative prescriptions to the default slope stability measures may be developed through site-specific review by a California registered geologist.

Tree retention in the SMZs and associated RSMZs is expected to maintain a network of live roots that will provide soil cohesion and contribute to slope stability in these areas. Tree retention also is expected to help maintain forest canopy, which preserves some measure of rainfall interception and evapotranspiration. Maintenance of rainfall interception and evapotranspiration is expected to contribute to slope stability conditions in some locations by minimizing the likelihood of high ground water ratios that are management related. Limited road construction and road reconstruction on unstable slopes and in RMZs will result in avoiding or reducing the undercutting and overburdening of sensitive hill slopes, helping to avoid unnatural concentration of storm runoff on these slopes. The implementation of SMZs (and the application of more conservative SMZ prescriptions in HPAs more susceptible to hillslope mass wasting) will reduce impacts because of reduced potential for sediment delivery to streams.

Road-related erosion and hillslope mass wasting are known to be substantial contributors to the sediment budget in most managed watersheds. The Road Management Plan and associated conservation measures in the MATO will reduce road-related sediment production and delivery to watercourses relative to pre-AHCP measures and existing conditions. The Road Management Plan provides for accelerated repair of high- and moderate-risk sediment delivery sites on roads. The road-related conservation measures will reduce road-related sediment production and, therefore, result in benefits to the aquatic resources because of reduced potential for sediment delivery. AHCP measures emphasize strategic identification and classification of roads targeted for improvement. High- and moderate-risk sediment delivery sites will be addressed using an accelerated program.

Green Diamond has performed a general assessment of its ownership that identifies road-related sediment sources requiring treatment (e.g., stabilization of dirt or other remediation to prevent road-related, sediment-producing failures or hillslope mass wasting events). The Road Management Plan is designed to provide treatment of all high- and moderate-risk sediment delivery sites, and to minimize potential delivery of sediment to riparian and aquatic areas. In addition, the AHCP requires that Green Diamond provide an average of \$2.5 million per year for the first 15 years of the AHCP (for a total of \$37.5 million) to accelerate implementation of the treatments for the high- and moderate-risk sites. (The acceleration period is to be adjusted following revision of the estimate of sediment yield from high- and moderate-risk sediment delivery sites at the end of the first five years following issuance of the Permits. The acceleration period and monetary commitment could be adjusted (upward or downward) by up to 1.5 years and \$3.75 million depending on the revised estimate of sediment yield.)

These measures are specified in AHCP Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4 and MATO Section 11 and incorporated in Order R1-2012-0087 Condition II.D.

Cumulative effects. Past timber management within the 11 HPAs had affected peak flows, water temperatures and sedimentation of streams. Changes in peak flows (timing and intensities) has resulted in additional water runoff throughout timber harvest units or along roads, the interception of groundwater flows by roads, and alteration of evapotranspiration through changes in forest structure. The normal hydrologic cycles for some of the HPAs have also been modified by dams, water diversions, development, and agriculture. These activities have resulted in adverse environmental conditions in some locations including insufficient stream flows, and have resulted in instances of increases in stream temperatures, stranded juvenile entrainment, and alterations to aquatic habitat.

Existing adverse conditions related to the hydrologic cycle are expected to improve. Implementation of the measures in the AHCP will result in an incrementally greater improvement in conditions. The most important measures will address road upgrading and decommissioning programs that would hydrologically disconnect the road network from area watercourses on a THP-by-THP basis (see AHCP Section 6.2.3), although incremental short-term and localized increases in the peak flows will likely occur in association with timber harvesting. AHCP measures will reduce the incremental impacts of forest management activities and result in improvements over what would occur under the No Action alternative.

## Aquatic Resources

### **Impact 3: Forest management activities could adversely impact hydrology, riparian conditions, sediment production and delivery and aquatic habitat.**

The EIS evaluated potential impacts of forest management activities on habitat and biota, including:

- Changes in peak flows that have the potential to affect channel morphology through bed scour and bank erosion
- Reduction (over time) in the amount of Large Woody Debris (LWD) that could be recruited into the watercourses, contributing to reduced sediment storage sites, and reduced pool numbers and volumes
- Removal of riparian vegetation, resulting in altered thermal regimes, changes in nutrient cycling, and destabilization of streambanks
- Increases in sediment supplies from surface erosion, hillslope mass wasting, and bank erosion, leading to channel aggradation, loss of pool volume, and degradation of spawning gravels

Such changes to the stream channel and associated riparian areas could adversely or beneficially affect the quantity and quality of aquatic habitat for aquatic species through changes in temperature, sedimentation, habitat complexity, and connectivity. These impacts are potentially significant.

The AHCP requires a number of ownership-specific measures (described in Mitigation Measures 8-12 below) to minimize and mitigate the individual and cumulative impacts of forest management activities on aquatic resources. **Implementation of Mitigation Measures 8-12 will reduce potential impacts on aquatic resources to a less-than-significant level.**

### **Mitigation Measure 8: Implement the AHCP Measures Directed at Hydrologic Effects**

To address potential impacts on aquatic resources, Green Diamond must implement riparian conservation measures, road management measures and harvest-related ground disturbance measures.

Under the harvest-related ground disturbance measures, there are greater seasonal operating limitations that minimize soil compaction. This could decrease the magnitude of peak flows and the volume of sediment available for runoff during such events. The road treatment accelerated period associated with the road management plan will increase the rate at which roads will be hydrologically disconnected from the watercourses. The riparian management measures will also increase LWD recruitment. Over time these measures will increase the amount of LWD in streams, ultimately increasing the overwintering habitat for juvenile salmonids. This could avoid species

displacement that can be caused by altered hydrology by providing increased habitat options for salmonids.

Harvest-related ground disturbance can reduce the infiltration capacity of soils and alter the process of subsurface water movement through soil compaction, leading to increased surface runoff. Site preparation measures include seasonal operating limitations for tractors, skidders, and forwarders, and minimized use of tractor-and-brushrake piling. These harvest-related ground disturbance conservation measures substantially reduce the impacts of any operations-related alterations in hydrology by minimizing soil compaction, which can increase the magnitude of peak flows and reduce the volume of sediment available for runoff during peak flow events.

Riparian conservation measures reduce potential impacts of altered hydrology on aquatic habitat. Specifically, the riparian conservation measures maintain in-channel LWD and provide increased LWD recruitment potential through enhanced riparian conservation measures. The presence of LWD in stream channels aids in pool formation, sediment storage and sorting, provides refugia from peak flows, and maintains overwintering habitat for anadromous and resident salmonids and other fishes.

Conservation measures reduce the impacts of forest management on surface runoff and peak flows, reduce soil compaction and disturbance, and maintain or enhance in-channel LWD. Any impacts to aquatic habitat that could occur are mitigated by improved riparian conditions resulting from riparian management and decreased sediment production and delivery.

These measures are specified in AHCP Sections 6.2.1, 6.2.3, and 6.2.4 and are incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 9: Implement the AHCP Measures Directed at Improving Riparian Conditions**

To mitigate or avoid potential impacts on riparian conditions, Green Diamond must implement the AHCP's riparian conservation measures and slope stability measures.

The AHCP limits commercial entry into the RMZs to one harvest entry during the term of the AHCP, except where cable corridors are necessary to conduct intermediate treatments. The RMZs are at least 150 feet wide along Class I watercourses, with a variable-width inner zone ranging from 50 to 70 feet. The AHCP limits harvesting to only those trees that have a low likelihood of recruitment within Class I RMZs. The AHCP also establishes SMZs upslope of Class I watercourses in areas identified as steep streamside slopes.

Minimum 100-foot-wide RMZs are established along 2nd order or larger Class II watercourses; minimum RMZ width along 1st order Class II watercourses are 75 feet. The RMZ contains a 30-foot wide inner zone for Class II watercourses within which 85 percent of the overstory canopy is retained post-harvest; at least 70 percent overstory



canopy is retained within the outer zone of Class II RMZs. The AHCP limits harvesting to only those trees that have a low likelihood of recruitment within the first 200 feet of Class II RMZs adjacent to a Class I RMZ. The AHCP also establishes SMZs upslope of Class II watercourses in areas identified as steep streamside slopes.

Overall, the AHCP provides riparian protection along Class III watercourses by establishing minimum 30- to 50-foot-wide EEZs. Within the EEZ of Tier A (less than 60 percent to 70 percent slopes) Class III watercourses, all existing LWD on the ground is retained and there is no fire ignition during site preparation. Within the EEZ of Tier B (greater than 60 percent to 70 percent slopes) Class III watercourses, all hardwoods and nonmerchantable trees are retained, as are all conifers that contribute to bank stability or act as a control point (retaining sediment or preventing headcutting) in the channel; at least one conifer per 50 feet of stream length is retained. Within the EEZ of modified Tier A (applied in areas with highly erodible soil types) Class III watercourses, 15 square feet of basal area of hardwoods and all channel zone trees are retained.

Overall, the riparian conservation measures under the AHCP provide greater protection of riparian functions such as LWD recruitment, stream shading, sediment filtration, bank stability, and nutrient input. These measures contribute to maintenance and development of a more suitable microclimate for amphibians and other species that use habitats along streams, and benefit habitat used by the various life stages of fish species present in streams. The protection measures and the effects of these additional protections provided under the AHCP on individual riparian functions and related aquatic functions are described below.

#### LWD Recruitment:

The overstory canopy closure requirements and tree retention standards will help to increase the potential for LWD recruitment so that in-channel LWD loading and size is likely to increase in the future. Whether such an increase will occur within a given stream reach depends on the current condition and trend of existing LWD levels, and the length of time necessary to recruit additional wood to streams from adjacent riparian areas. For example, if little or no recruitment of wood has occurred recently, and existing pieces of wood are decaying or being washed out of a stream reach, in-stream levels of wood could continue to decline for some time, despite the fact that riparian management provides an increase in sources of future LWD and thereby increased potential for wood recruitment in the future.

The AHCP is expected to provide additional LWD recruitment by retaining at least 15 conifer stems greater than 16 inches dbh per acre. All trees within the inner zone of RMZs along Class I streams and portions of Class II streams that are determined to be likely to recruit LWD to the stream channel are retained. Numerous criteria are used to identify trees with a low likelihood of recruitment to the watercourse as potential candidates for harvesting within the RMZ. These criteria include, but are not restricted to, distance from the stream, direction of the tree lean, intercepting trees, side slope gradient, slope stability, and streambank stability. The riparian conservation measures ensure that all trees with the greatest potential for LWD function (e.g., that can influence fluvial processes or provide cover for fish) are retained. The limitation to a single commercial harvest entry into the RMZ (except where cable corridors are necessary for

intermediate treatments) ensure that this additional LWD recruitment potential will be maintained.

Riparian conservation measures will minimize and mitigate impacts of past practices and improve LWD recruitment in streams. These measures will help to maintain and improve channel complexity and provide habitat necessary for all life stages of salmonids and amphibians. Implementation of these riparian conservation measures will result in increased tree retention and LWD recruitment that will help mitigate effects of altered hydrology that could occur as a result of upslope management.

#### Stream Shading:

Overstory canopy closure requirements and tree retention standards help to maintain stream shading in the critical “inner zone” where microclimate effects have the greatest potential to impact amphibians directly or impact anadromous and resident salmonids indirectly through changes in water temperatures. Although the inner zone width along Class I watercourses is slightly less under the AHCP than pre-AHCP measures, the effects on microclimate and stream temperatures are not expected to be substantially different. Overstory canopy closure will likely increase over current conditions in all stands as they regenerate after timber removal and could temporarily decline slightly following harvesting in the future. In some stands there could be an immediate net reduction of overstory canopy closure of up to approximately 15 percent to 20 percent following timber harvest in the outer zone that will be replaced within 5 to 10 years by recovery of the remaining tree crowns. On average, the average-sized harvest unit (currently about 25 acres) can influence approximately 1,000 feet of watercourse if the unit surrounds or is adjacent to a watercourse.

On the basis of the minimal changes in temperature under the most extreme annual conditions, and the anticipated substantial increase in riparian protection under the AHCP, a measurable increase in water temperature in Class I or larger Class II streams caused by minor reductions in canopy closure following timber harvesting is not anticipated. Limiting entry (i.e., a single commercial entry during the term of the Permits except where cable corridors are necessary for intermediate treatments) into the RMZ will further reduce any potential minor impact from any slight temperature increases. Any increase in water temperature will be slight and less than significant. Stream temperatures will be maintained or improved.

#### Sediment Filtration:

Although sediment can be delivered to streams from outside of the riparian zone, maintenance of riparian buffers aids in filtering overland sediment flow and helps to minimize direct sediment inputs from or through the riparian zone. Exclusion of heavy equipment and mechanical site preparation within Class I and Class II RMZs, plus exclusion of heavy equipment in Class III EEZs, minimize the level of ground disturbance that occurs adjacent to watercourses. Maintaining at least 50 percent surface cover and treating bare soil in excess of 100 square feet minimizes the potential for management-related sediment delivery from within the RMZs along Class I and Class II watercourses. The RMZs are at least 150 feet wide along Class I watercourses, with a variable-width inner zone ranging from 50 to 70 feet within which 85 percent of the overstory canopy is retained post-harvest; at least 70 percent overstory canopy is

retained within the outer zone of Class I RMZs. Minimum 100-foot-wide RMZs are established along 2nd order or larger Class II watercourses; minimum RMZ width along 1st order Class II watercourses are 75 feet. The RMZ has a 30-foot wide inner zone for Class II watercourses within which 85 percent of the overstory canopy is retained post-harvest; at least 70 percent overstory canopy is retained within the outer zone of Class II RMZs. LWD recruitment helps minimize the effects of sediment production and delivery by providing in-channel LWD, which functions to sort and increase the storage of sediment within stream channels. All of these improved functions will benefit aquatic and riparian habitat used by aquatic species.

#### Streambank Stability:

Management-induced erosion and hillslope mass wasting from watercourse banks can be amplified by increased peak flow intensity and duration, as well as by reductions in root reinforcement of soil cohesion when vegetation is removed. Riparian conservation measures for Class I and II watercourses require 85 percent overstory canopy retention in the RMZ inner zone and prohibit harvesting of trees that are likely to recruit to stream channels. In addition, Tier B Class-III measures require retention of trees that are judged to be critical to maintaining bank stability. The current FPRs also require that removal of trees may not result in any measurable decrease in the stability of a watercourse bank.

#### Nutrient Input:

Riparian conservation measures favor conifer retention over hardwoods in the RMZs. The level of harvest in both the inner and outer zones of all RMZs will maintain the overstory canopy, so that the longer-lived conifers will eventually replace the short-lived hardwoods. In the long term, this is anticipated to reduce the level of nutrient inputs, although such a process will be slow and gradual, and will not result in complete elimination of hardwoods or complete elimination of insufficient levels of nutrient input from riparian areas where it already exists.

Aggradation of channels and scour from debris flows favor recolonization by the more rapidly growing hardwoods such as red alder. Therefore, both the slope stability and road management measures will tend to cause a decline in riparian hardwoods over time and a corresponding decrease in nutrient inputs. However, as noted above, this will be a long and gradual process that will not result in the total elimination of hardwoods.

It is anticipated that any effects on aquatic species and their habitats will be minimal (i.e., less than significant) and mitigated by the benefits of increased LWD recruitment through the retention of conifers. This is particularly relevant where structural elements of aquatic habitat are more limiting than nutrient availability.

These measures are specified in AHCP Sections 6.2.1 and 6.2.2 and incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 10: Implement the AHCP Measures Directed at Sediment Production and Delivery.**

To address potential impacts on sediment production and delivery, Green Diamond must implement riparian conservation measures, slope stability measures, road management measures, and harvest-related ground disturbance measures.

Sediment production and delivery to streams will be reduced. Potential benefits associated with reduced sediment loading, include, among others, increased quantity and quality of suitable salmonid spawning gravels, greater survival of salmonid eggs and alevins in the gravels, and increased production of aquatic invertebrates that serve as foods for fish and other species.

Reduced sediment delivery to streams also could contribute to small decreases in water temperature. Sediment input, particularly increases in fine sediment, can affect stream temperatures through changes in channel morphology such as reduced pool volume and increased channel width. With the slope stability and road management measures designed to minimize management-related sediment inputs, sediment production and delivery will be reduced.

Sediment production from surface erosion is of most concern on slopes that are adjacent to watercourses, although erosion does occur higher on the hillslopes and within harvest units. The RMZ management prescriptions include conservation measures designed to impede sediment delivery in areas where sediment has relatively short transport distances to watercourses. These measures include minimum overstory canopy retention standards within RMZ inner and outer zones, limitations on equipment use, and retention of trees judged to be critical to maintaining bank stability. The retention standards ensure that there will be almost no net loss in total forest canopy in the inner zone of RMZs along Class I and Class II watercourses, and will greatly increase overstory canopy along Class II watercourses relative to existing conditions. This overstory canopy will impede sediment detachment in these critical areas, where detached sediment will have relatively short transport distances to watercourses.

Also, harvest-related ground disturbance measures focus on minimizing ground disturbance and the exposure of bare mineral soil within harvest units. The AHCP contains conservation measures, including site preparation methods, limited operating periods for the construction of skid trails and use of ground-based yarding equipment, limiting use of ground-based yarding equipment that requires constructed skid roads to slopes less than or equal to 45 percent (with some exceptions), preferential use of cable yarding systems, and water-barring of cable corridors where necessary. The AHCP also includes conservation measures for treatment of bare mineral soil within RMZs and on stream crossings. All of these ground disturbance conservation measures are expected to contribute directly to minimizing management related surface erosion within harvest units.

Sediment production from hillslope mass wasting is greatest in RMZs, steep streamside slopes, headwall swales, and deep-seated landslides. These areas are subject to specific slope stability conservation measures intended to achieve a reduction in management-related sediment delivery from landslides. Steep streamside slopes receive additional protection through establishment of SMZs upslope of the RSMZ along Class I and Class II watercourses. The width of the SMZ varies among the 11 HPAs,

with wider SMZs identified for those HPAs with potential to deliver sediment to watercourses from the longest distances. Selection harvest is the most intensive silvicultural prescription allowed within the SMZ without geologic review, and no harvest is allowed in the inner portion of the RMZ downslope of the SMZ along Class I and larger Class II watercourses. In addition, no harvest is allowed within the toe and 25 feet upslope from the top of the toe or scarp of active deep-seated landslides without geologic review.

Tree retention in the SMZs and associated RSMZs is expected to maintain a network of live roots that will preserve soil cohesion and contribute to slope stability in these areas. Tree retention also helps maintain forest canopy, which preserves some measure of rainfall interception and evapotranspiration. Maintenance of rainfall interception and evapotranspiration is expected to contribute to slope stability conditions in some locations by partially mitigating high ground water ratios that may be management related. Limited road construction and road reconstruction in SMZs and RSMZs are expected to reduce the undercutting and overburdening of sensitive hillslopes and help avoid unnatural concentration of storm runoff on these slopes.

The riparian conservation measures for Class I and II watercourses that require 85 percent overstory canopy retention in the RMZ inner zone, and that prohibit harvesting of trees that are likely to recruit to stream channels, will likely lead to increased bank stability. The Tier B Class-III measures that require retention of trees determined to be critical to maintaining bank stability will also contribute to increased bank stability.

Road-related erosion and hillslope mass wasting are known to be important contributors to the sediment budget in most managed watersheds. Eroded sediment can be delivered to watercourses through gullies or rills or through sheet transport processes from roads or through hillslope mass wasting. The Road Management Plan and associated conservation measures in the MATO will reduce road related sediment production and delivery to watercourses relative to pre-AHCP measures.

The Road Management Plan includes:

- A methodology to classify roads on the basis of use and prioritize road work and site-specific repairs
- Standards for road repairs and upgrades
- Standards for stream crossing, culvert repairs and upgrades
- Standards for temporary and permanent decommissioning of roads
- A training program for equipment operators and supervisors on the Road Management Plan and other AHCP standards and practices
- An accelerated repair of high- and moderate- risk sediment delivery sites
- A commitment to address all of the high- and moderate-risk sites by the end of the term of the AHCP
- Increased restrictions on wet weather road use, construction, upgrading, and decommissioning

Green Diamond has performed a general assessment of its ownership within the AHCP covered area that identifies road-related sediment sources requiring treatment (e.g., stabilization of dirt or other remediation to prevent road-related, sediment-producing failures or hillslope mass wasting events). The Road Management Plan is designed to provide treatment of all high- and moderate-risk sediment delivery sites over the term of the Permits, to minimize potential delivery of sediment to riparian and aquatic areas. In addition, the AHCP requires that Green Diamond provide an average of \$2.5 million per year for the first 15 years of the AHCP (for a total of \$37.5 million) to accelerate implementation of the treatments for the high- and moderate-risk sites. Implementation of the Road Management Plan will result in improved sediment control by accelerating the reduction of sediment loading. This will result in direct beneficial effects to aquatic and riparian species.

These measures are specified in AHCP Sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4 and MATO Section 11 and incorporated in Roads WDR Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 11: Implement the AHCP Measures Directed at Protecting and Improving Aquatic Habitat.**

To address potential impacts on aquatic habitat, Green Diamond must implement riparian conservation measures, slope stability measures, road management measures, harvest-related ground disturbance measures and a special project.

Water quality and substrate in streams are expected to improve because of reduced sediment delivery. There will be little or no change in other clean water parameters such as nutrient loading, contaminant loading (e.g., herbicides), and dissolved oxygen levels. Because improvements in overstory canopy closure, shading, sedimentation, and turbidity are expected, future thermal conditions for aquatic species will be similar to or better than existing conditions. Habitat complexity will likely increase through increased LWD loading, similar or increased bank stability, and reduced sediment delivery.

Potential fish passage problems at existing road crossings are documented during the road inventory process, and culverts that are impeding fish passage are prioritized for replacement with a bridge or other “fish friendly” structure. As culvert replacement is implemented over time, fish passage problems at road crossings will be eliminated. These actions will result in improved stream connectivity and have the potential for providing access to potentially suitable, but presently unavailable, habitat in some stream reaches.

There are stream reaches that occur above natural barriers to anadromy that appear to have habitat for anadromous salmonids, particularly coho salmon. Green Diamond will undertake a special project that is expected to expedite the conservation of this species by increasing the available habitat for spawning and rearing. Green Diamond will undertake a project involving trapping and transporting coho that are native to the stream system around a barrier during the spawning season for a ten-year period and allow them to spawn. Prior to undertaking the project, Green Diamond will evaluate the selected stream to assess whether salmonids residing in the basin above the barrier will

be adversely affected by the translocation. The project will include monitoring of subsequent spawning, utilization of summer rearing habitat by the juvenile fish, and outmigrant trapping to document the number of smolts leaving the system. The upper North Fork of the Mad River has been identified as being one of the top candidate sites for the initial project. Impacts associated with relocating anadromous salmonids upstream of natural barriers will be thoroughly evaluated prior to implementation.

These measures are specified in AHCP Sections 6.2.1, 6.2.2, 6.2.3, 6.2.4, and 6.2.8 and MATO Section 11 and incorporated in Order R1-2012-0087 Condition II.D.

### **Mitigation Measure 12: Implement the AHCP Measures Directed at Research, Monitoring and Adaptive Management Program**

To further address potential impacts on aquatic resources, Green Diamond must implement research and monitoring measures, including effectiveness monitoring, wildlife surveys, environmental assessments and watershed studies.

In addition to the required and voluntary research and monitoring activities presently being conducted by Green Diamond, additional monitoring is being conducted under the AHCP to document the level of effectiveness of the AHCP measures.

Effectiveness monitoring is designed to evaluate the implementation and overall effectiveness of the Operating Conservation Program in achieving the AHCP's biological goals and objectives. This monitoring tracks trends in the quality and quantity of habitat for the covered species (as well as the distribution and relative abundance of the covered species) and provides information to better understand the relationships among specific aquatic habitat elements and the long-term persistence of the covered species. The effectiveness monitoring projects include temperature monitoring, channel and erosion monitoring, salmonid and amphibian population monitoring, and LWD assessments. These and other monitoring efforts are described in detail in Appendix D of the AHCP and incorporated into the Regional Water Board's MRP.

Monitoring data are collected year-round, as with some in-stream temperature recorders, or seasonally, as with the Class I channel dimensions monitoring. The data collected through some monitoring projects are analyzed on an annual basis and other monitoring projects on a longer time interval. The intent is to provide a timely review of monitoring data that have monitoring thresholds associated with them to allow for corrective actions, if necessary, to occur. Based on the results of the effectiveness monitoring, changes to management and conservation measures could be implemented through adaptive management.

Adaptive management is an important tool for natural resource management when there is substantial scientific uncertainty regarding appropriate management and conservation strategies. Adaptive management has two key features: (1) a direct feedback loop between science and management, and (2) the use of management strategies as a scientific experiment. Green Diamond's monitoring and adaptive management program incorporates both these features with the goals of: (1) increasing

the understanding of watershed processes and the effects of management activities on the habitats and populations of the covered species over the term of the Permits; and (2) modifying some of the AHCP's conservation measures as necessary in response to this new information. Order Conditions I and L provide for Regional Water Board Executive Officer approval of any significant changes to the Order, including any alterations of AHCP water quality prescriptions, and only if modified prescriptions are found to be equally or more protective of water quality.

The overall benefit of the monitoring and adaptive management program is to: (1) monitor through time the habitat and populations of the covered species where they currently exist; (2) document the expected trend in recovery in areas that have been affected by past management activities or natural disturbances; (3) modify or augment existing conservation measures where necessary; and (4) re-allocate resources to make the AHCP more efficient, where warranted. In addition, the monitoring and experimental studies that are conducted as part of the AHCP will further the knowledge on conservation of aquatic species on managed landscapes, potentially benefiting these species throughout their range.

These measures are specified in AHCP Section 6.2.5 and incorporated in Order R1-2012-0087 Condition II.D.

Cumulative effects. The anticipated improvement in riparian conditions and the reduction in sediment production and delivery to streams would speed the improvements expected over time under existing conditions, and would likely result in improved physical habitat for the covered species. Improvements in aquatic and riparian habitat benefiting the covered species would, in general, benefit other species associated with these habitats.

### **Vegetation/Plant Species of Concern**

#### **Impact 4: Forest management activities could adversely impact vegetation resources, riparian areas, listed plant species and other plant species of concern.**

Forest management activities in the Project Area could adversely affect [ ] These impacts are potentially significant.

The AHCP requires a number of ownership-specific measures (described in Mitigation Measure 13 below) to minimize and mitigate the individual and cumulative impacts of forest management activities on vegetation and plant species of concern.

**Implementation of Mitigation Measure 13 will reduce these impacts to a less-than-significant level.**

#### **Mitigation Measure 13: Implement the AHCP Measures Directed at riparian area management, Research, Monitoring and Adaptive Management Program**

To address potential impacts on vegetation and species of concern, Green Diamond must implement the AHCP's research and monitoring measures, including effectiveness monitoring, wildlife surveys, environmental assessments and watershed studies.



The AHCP requirements include:

- Class II RMZ widths of 75 to 100 feet
- EEZs of 30 to 50 feet for Class III watercourses
- Inner- and outer-zone tree and overstory canopy retention standards for RMZs
- No mechanical site preparation by wheeled or tracked equipment in Class I or Class II RMZs

In addition, the AHCP:

- Prohibits timber harvesting within the “inner zone” of all Class I RSMZs and 2nd order or larger Class II RSMZs that are located below designated “steep streamside slope management zones” (SMZs), except for purposes of creating cable-yarding corridors when other options are impractical. Retention of a minimum 85 percent overstory canopy closure is required in Class I and 2nd order or larger Class II RSMZ “outer zones.”
- Limits timber harvesting within the first 1,000 feet of a 1st order Class II RSMZ inner zone subject to 85 percent overstory canopy closure retention post-harvest. A minimum 75 percent overstory canopy retention within the first 1,000 feet of a 1st order Class II RSMZ outer zone is also required.
- Prohibits timber harvesting within the entire RSMZ for the Coastal Klamath and Blue Creek Hydrographic Areas.
- Uses single-tree selection as the initial silvicultural prescription within SMZs headwall swales. In addition, only one commercial entry is allowed within SMZs and headwall swales for the term of the Permit (except for cable corridors necessary to conduct intermediate treatments). All hardwoods within SMZs and headwall swales are retained and, wherever possible, Green Diamond provides for even spacing of unharvested conifers such that all species and size classes represented in pretreatment stands are generally represented post-harvest. The AHCP provides flexibility for this default prescription to be modified pursuant to site-specific geologic review.
- Establishes no-cut zones within the toe, and 25 feet upslope from the top of the toe of active deep-seated landslides, except for purposes of creating cable-yarding corridors when other options are impractical. Similarly the AHCP establishes no-cut zones upslope of the deep-seated landslide scarp so as to taper to the lateral margins of the scarp. The AHCP provides flexibility for this default prescription to be modified pursuant to site-specific geologic review.
- Prohibits timber harvesting within the boundaries of shallow rapid landslides, and retains a minimum 70 percent overstory canopy within 50 feet above and 25 feet on the sides of shallow rapid landslides. The AHCP provides flexibility for this default prescription to be modified pursuant to site-specific geologic review.

Activities conducted under the MATO and Roads WDR are subject to conditions detailed in a property-wide survey and consultation process for sensitive plants developed by Green Diamond and DFG, which is described in the *Green Diamond Resource Company Sensitive Plant Conservation Plan* (see MATO Attachment 2). Implementation of these measures will avoid or minimize potential adverse impacts to sensitive plant species. Green Diamond will continue to minimize adverse effects to

listed plants and plant species of concern, including continuing to adhere to measures contained in the FPRs (special protections afforded to meadows and wetlands), Green Diamond's own Plant Protection Program, and other measures identified during the THP preparation and review process.

Survey and monitoring results from 2001-2008 suggest the most efficient and effective approach to the long-term conservation of sensitive plants on Green Diamond lands is through adaptive management that is informed by appropriate inventory, monitoring and research. A combination of compatible land management practices, plant protection measures (PPMs), property-wide consultations, and area-specific botanical management plans (BMPs) provide the foundation of the SPCP. Various conservation strategies will continue to be developed, implemented, reviewed and revised over time with the ultimate goal of dividing the ownership into botanical management areas (BMAs). The BMAs are managed under BMPs that rely on known existing conditions within the BMA rather than project-by-project surveys.

These measures are specified AHCP Sections 6.2.1 and 6.2.2 and MATO Attachment 2 and incorporated in Order R1-2012-0087 and MRP E1-2012-0088.

### **Terrestrial Habitat/Wildlife Species of Concern**

Potential benefits to listed species under the Proposed Action would generally be greater than under the No Action Alternative, primarily because of increased overstory-canopy requirements within Class II RMZs, retention of all LWD within Class III Tier A EEZs, and retention of evenly distributed conifer trees within SMZs. Also, slightly more land would likely be left undisturbed in riparian areas relative to the No Action Alternative. These differences would amplify benefits described under the No Action Alternative for listed species and other wildlife species of concern that breed or forage in older trees and late-seral-forest stands. The EIS found that individual and cumulative impacts upon terrestrial habitat/wildlife species of concern would be less than significant.

### **Air Quality**

Under existing conditions, PM10 would be generated by slash-burning activities associated with site preparation under even-aged management. Although various alternative management practices would result in some change in PM10 generation, these changes are not expected to be significant.

### **Visual Resources**

Implementation of the AHCP may reduce, to some degree, the visual effects of commercial forest management relative to the historical level. Individual and cumulative impacts upon visual resources would be less than significant.

### **Recreational Resources**

Recreational opportunities would continue to occur, subject to written entry permits. The potential for harvest-related impacts would likely be similar to current conditions. Some potential for additional benefits to recreational experiences provided by improved riparian and fishery conditions. Individual and cumulative impacts upon recreation would be less than significant.

### **Cultural Resources**

Current FPRs contain measures for protection of cultural resources that would minimize the effects of timber harvesting on cultural resources. No significant individual or cumulative effects would result from implementation of the Project.

### **Land Use**

Current land use would continue in a manner consistent with local land use plans and compatible with surrounding land uses. Individual and cumulative impacts on land use resources from implementation of the project would be less than significant.