South Fork Elk River Management Plan

Green Diamond Resource Company

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Green Diamond Resource Company (Green Diamond) has developed the South Fork Elk River Management Plan (SFERMP) as a sediment reduction strategy for its timberland ownership within the South Fork of Elk River Watershed. The key goal of this strategy is to implement operational procedures and measures specifically aimed at reducing sediment production, transport, and deposition into watercourses. This plan specifically describes the measures the company will apply to ensure that its operations will achieve this goal, protect water quality and beneficial uses and mitigate or avoid significant impacts to aquatic habitat. These measures were conceived, developed and revised in the context of watershed-specific physical characteristics, past management activities, and future Green Diamond management objectives of South Fork Elk River, as well as to meet the pending Elk River TMDL requirements.

The South Fork Elk River Watershed is significantly influenced by a geologic formation known as the Wildcat Group. This formation incorporates undifferentiated rocks composed of soft yellowish brown to bluish gray siltstones, clay stones and fine sandstones, which, because of their lack of strength and durability, are prone to erosion. This fine grained material becomes easily mobilized and has a high potential to reach fish bearing stream habitat.

Recognizing the underlying geology and the erodible nature of the soils within significant areas of the South Fork Elk River Watershed and acknowledging that Green Diamond planned to re-enter the South Fork Elk River watershed (within its ownership) to harvest timber and maintain road systems; it was deemed necessary and appropriate that watershed specific measures be instituted to ensure the continued protection and enhancement of water quality and aquatic habitat. The SFERMP addresses watershed specific operating procedures in the following five key categories: A) Riparian Prescriptions, B) Geological Prescriptions, C) Harvesting, Yarding and Hauling Prescriptions, D) Road Management and E) Seasonal Restrictions.

These categories include practices directed toward managing riparian zones to protect aquatic habitat, minimizing soil disturbance, minimizing movement of sediment into watercourses, and identifying potential off-site measures which could aid in reducing overall sediment contribution to the system. Green Diamond will follow these measures during administrative activities and incorporate these measures into THPs, within Green Diamond's South Fork Elk River property.

A. Riparian Prescriptions

1) <u>Class I Riparian Management Zone (RMZ):</u>
   a) 150 feet on each side of the watercourse.
   b) At least 85% overstory will be retained, where it currently exists, within the first 75 feet of the watercourse and at least 70% within the remainder of the Class I RMZ. 70% of the overstory canopy and understory vegetation within all Class I RMZ's will be retained.
   c) Class I watercourses will be provided with an additional 25 foot SOZ on slopes between 0-30% or 50 foot SOZ on slopes >30%, where understory vegetation, hardwoods and mid-canopy conifers will be retained on site.

d) No trees will be harvested that contribute to maintaining bank stability. Redwoods will be preferentially harvested over other conifers
e) The following criteria will be used to identify trees within the RMZ as potential candidates for marking to harvest due to their low likelihood of recruitment to the watercourse. (The determination of trees to be marked within the RMZ will be predicated on ensuring that overstory canopy retention standards and slope stability measures are met (See Aquatic Habitat Conservation Plan (AHCP) Sections 6.2.1 and 6.2.2), as well as ensuring that trees that are likely to recruit to the watercourse are not marked for harvest.)

    Criteria for trees that have a low likelihood of recruiting are:

    - Tree has an impeded "fall-path" to the stream (e.g., upslope family members of a clonal group blocked by downslope stems); or
    - Tree or the majority of the crown weight of the tree is leaning away from stream and the tree is not on the stream bank or does not have roots in the stream bank or stream; or
    - The distance of the tree to the stream is greater than the height of the tree; or
    - Tree is on a low gradient slope such that gravity would not carry the fallen tree into the stream or objects such as trees and large rocks impede its recruitment path; or
    - Tree is not on an unstable area or immediately downslope of an unstable area; or
    - Harvesting of the tree will not compromise the stream bank or slope stability of the site or directly downslope of the site.
f) Trees may be felled within Class I RMZs to create cable yarding corridors as needed to ensure worker safety, subject to the canopy closure requirements set forth above. Such trees will be part of the harvest unit.
g) There will be only one harvest entry into Class I RMZs during the life of the AHCP, which will coincide with the even-aged harvest of the adjacent stand.
h) The Class I RMZ is an equipment exclusion zone (EEZ), except for a) existing roads and landings; b) construction of new spur roads to extend operations outside the RMZ; c) road watercourse crossings; d) skid trail watercourse crossings; and e) designated skid trail intrusions.

    The exception for skid trail watercourse crossings is only applicable when the following conditions are met:

    - Construction and use of skid trail watercourse crossings within the RMZ may occur only when construction and use of alternative routes to otherwise inaccessible areas outside of the RMZ would result in substantially greater impacts to aquatic resources. Preference shall be given to utilizing existing skid trail watercourse crossing sites in the RMZ over establishing new skid trail watercourse crossing sites in the RMZ.
    - Skid trail watercourse crossings shall not be constructed or used in the RMZ to provide access to RMZs for the purpose of their harvest.
    - Within the Class I RMZ, trees may be felled to facilitate skid trail watercourse crossing construction and use. All such felled trees will be retained as downed wood in the RMZ.
    - Green Diamond will submit to the Services an explanation, justification, and map of any proposed skid trail watercourse crossings as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

The exception for skid trail intrusions is only applicable when the following conditions are met:

- RMZ hillslopes are less than 25%.
- Construction and use of skid trails within the RMZ may occur only when construction and use of alternative routes to otherwise inaccessible areas outside of the RMZ would result in substantially greater impacts to aquatic resources. Preference shall be given to utilizing existing skid trails in the RMZ over construction of new skid trails in the RMZ.
- Skid trails will not be constructed or used in the RMZ to provide access to RMZs for the purpose of their harvest.
- Within the RMZ, only trees less than 10 inches in dbh may be felled to facilitate skid trail use. All such felled trees will be retained as downed wood in the RMZ.
- Green Diamond has submitted to the Services an explanation, justification, and map of the proposed skid trail and use in the RMZ as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

i) Any ground disturbance caused by management activities that is larger than 100 square feet within an RMZ will be mulched and seeded or otherwise treated to reduce the potential for sediment delivery from sheet and gully erosion. Minimum standards for seeding and mulching operations are 30 pounds per acre of seed and a minimum mulching depth of two inches, covering at least 90% of the surface area.

j) No salvaging within the inner zone of the Class I RMZ. If any part of the salvageable piece is in the inner zone, the entire piece will be left.

k) Salvaging of downed trees within the outer zone of the Class I RMZ is permitted if the following criteria are met:

- The wood is not currently, and is unlikely in the future to be, incorporated into the bankfull channel (including wood located below unstable areas);
- The wood is not contributing to bank or slope stability; or
- The wood is not positioned on a slope such that it can act to intercept sediment moving toward the stream.

2) <u>Class II RMZ:</u>

a) 75 feet or 100 feet on each bank of all Class II watercourse.

b) A 75-foot minimum buffer will be used on the first 1,000 feet of 1st order Class II watercourses (Class II-1 watercourses). Downstream of this first 1000-foot section, the RMZ will be expanded to at least 100 feet.

c) A 100-foot minimum buffer will be used on all 2nd order or larger Class II watercourses (Class II-2 watercourses).

d) Where a 1st order Class II watercourse flows directly into a Class I watercourse, the Class II RMZ will be at least 100 feet on each bank for the first 200 feet of Class II channel upstream of the Class I RMZ boundary.

e) First order Class II watercourses with sideslopes >50% with ground based operations, will have an RMZ of 100 feet.

f) A 30 foot inner zone within the RMZ will be established, measured from the watercourse transition line.

g) An outer zone of the RMZ will be established and extend the remaining 45 feet or 70 feet (depending on whether it is a Class II-1 watercourse or a Class II-2 watercourse, respectively).

At least 85% overstory canopy will be retained in the inner zone. The RMZ inner zone is not flagged. Canopy closure retention standards in the inner and outer RMZs will be determined by varying the mark of harvest trees.

h) At least 70% overstory canopy will be retained in the outer zone.

i) No trees will be harvested that contribute to maintaining bank stability. Redwoods will be preferentially harvested over other conifers.

j) Trees may be felled within RMZs to create cable yarding corridors as needed to ensure worker safety, subject to the canopy closure requirements set forth above. Such trees will be part of the harvest unit.

k) There will be only one harvest entry into Class II RMZs during the life of the AHCP, which will coincide with the even-aged harvest of the adjacent stand.

l) The Class II RMZ is an EEZ, except for a) existing roads and landings; b) construction of new spur roads to extend operations outside the (RMZ); c) road watercourse crossings; d) skid trail watercourse crossings; and e) designated skid trail intrusions.

The exception for skid trail watercourse crossings is only applicable when the following conditions are met:

- Construction and use of skid trail watercourse crossings within the RMZ may occur only when construction and use of alternative routes to otherwise inaccessible areas outside of the RMZ would result in substantially greater impacts to aquatic resources. Preference shall be given to utilizing existing skid trail watercourse crossing sites in the RMZ over establishing new skid trail watercourse crossing sites in the RMZ.
- Skid trail watercourse crossings shall not be constructed or used in the RMZ to provide access to RMZs for the purpose of their harvest.
- Within Class II-1 RMZs, trees may be felled and harvested to facilitate skid trail watercourse construction and use. All harvested trees will be counted towards estimated reductions in “full tree equivalents” (FTE) values and reductions in potential recruitment of LWD (See AHCP Section 6.2.7.3).
- Within Class II-2 RMZs, trees may be felled to facilitate skid trail watercourse crossing construction and use. All such felled trees shall be retained as downed wood in the RMZ and shall be counted towards estimated reductions in FTE values and reductions in potential recruitment of LWD.
- Green Diamond will submit to the Services an explanation, justification, and map of any proposed skid trail watercourse crossings as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

The exception for skid trail intrusions is only applicable when the following conditions are met:

- RMZ hillslopes are less than 25%.
- Construction and use of skid trails within the RMZ may occur only when construction and use of alternative routes to otherwise inaccessible areas outside of the RMZ would result in substantially greater impacts to aquatic resources. Preference shall be given to utilizing existing skid trails in the RMZ over construction of new skid trails in the RMZ.
- Skid trails will not be constructed or used in the RMZ to provide access to RMZs for the purpose of their harvest.
- Within the RMZ, only trees less than 10 inches in dbh may be felled to facilitate skid trail use. All such felled trees shall be retained as downed

wood in the RMZ and shall be counted towards estimated reductions in FTE values and reductions in potential recruitment of LWD.

- Green Diamond has submitted to the Services an explanation, justification, and map of the proposed skid trail and use in the RMZ as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

m) Any ground disturbance caused by management activities that is larger than 100 square feet within an RMZ will be mulched and seeded or otherwise treated to reduce the potential for sediment delivery from sheet and gully erosion. Minimum standards for seeding and mulching operations are 30 pounds per acre of seed and a minimum mulching depth of two inches, covering at least 90% of the surface area.

n) No salvaging within the inner zone of the Class I RMZ. If any part of the salvageable piece is in the inner zone, the entire piece will be left.

o) Salvaging of downed trees within the outer zone of the Class I RMZ is permitted if the following criteria are met:
   - The wood is not currently, and is unlikely in the future to be, incorporated into the bankfull channel (including wood located below unstable areas);
   - The wood is not contributing to bank or slope stability; or
   - The wood is not positioned on a slope such that it can act to intercept sediment moving toward the stream.

3) <u>Class III protection measures:</u>

Green Diamond will apply one of two levels of protection measures within Class III watercourses on their ownership within South Fork Elk River. Class III watercourses having average side slopes under 60% will be provided Modified Tier A protection measures and Class III watercourses having average side slopes over 60% will be provided Tier B protection measures.

a) Modified Tier A Class III Protection Measures:
   - 30 foot EEZ except for a) existing roads, b) road watercourse crossings, c) skid trails*, and d) skid trail watercourse crossings**.
   - Where side slopes average between 30% and 60%, the EEZ shall be expanded to 50 feet.
   - Retain all Channel Zone Trees*** – all species.
   - Retain all LWD on the ground (not including felled trees) within the EEZ.
   - Retain all sub-merchantable conifers and safe snags.
   - Retain a minimum of 15 square feet of basal area of hardwoods per acre where it exists before harvest, including the largest hardwoods available for this purpose. Retain all hardwoods when less than 15 square feet basal area is present before harvest.
   - Retain at least 50% of the understory vegetation following completion of yarding operations.
   - Broadcast burning will not occur within Green Diamond's properties in South Fork Elk River.

b) Tier B Class III Protection Measures:
   - 50 foot EEZ except for a) existing roads, b) road watercourse crossings, c) skid trails*, and d) skid trail watercourse crossings**.
   - Retain all Channel Zone Trees*** – all species.
   - Retain a minimum average of one conifer 15 inches dbh or greater per 50 feet of stream length within the EEZ.

- Retain all hardwoods and non-merchantable conifers located within the EEZ except where necessary to create cable corridors or for the safe falling of merchantable trees.
- Retain all LWD on the ground (not including felled trees) within the EEZ.
- Broadcast burning will not occur within Green Diamond's properties in the South Fork of Elk River.

* The exception for skid trail intrusions is only applicable when the following conditions are met:

1. EEZ hillslopes are less than 25%.
2. The location and use of skid trails within the EEZ may occur only when the use of alternative routes to otherwise inaccessible areas outside of the EEZ would result in substantially greater impacts to aquatic resources. Intrusion into the EEZ is preferred if the alternative routes would result in greater road length and additional watercourse crossings. Preference will be given to utilizing shovel logging equipment and using existing skid trails in the EEZ over locating new skid trails in the EEZ.
3. Skid trails will not be used in the EEZ to provide access to EEZs for the purpose of their harvest.
4. All bare mineral soil greater than 100 square feet created by management activities within the EEZ, will be mulched or treated with slash to adequately cover the exposed soil area prior to any onset of rain or upon completion of operations, whichever occurs first.
5. Green Diamond has submitted to the Services an explanation, justification, and map of the proposed entry into the EEZ as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

** The exception for skid trail watercourse crossings is only applicable when the following conditions are met:

1. Construction and use of skid trail watercourse crossings within the Class III EEZ may occur only when construction and use of alternative routes to otherwise inaccessible areas outside of the RMZ would result in substantially greater impacts to aquatic resources. Preference shall be given to utilizing existing skid trail watercourse crossing sites in the Class III over establishing new skid trail watercourse crossing sites in the Class III.
2. Within Class III EEZs, trees may be felled and harvested to facilitate skid trail watercourse crossing construction and use.
3. Green Diamond will submit to the Services an explanation, justification, and map of any proposed skid trail watercourse crossings as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

*** A "Channel Zone Tree" is defined as follows: A tree with its trunk or surface roots located within the channel or extending into the channel. Typically these trees serve the function as "control points" (retaining sediment and/or preventing channel head cutting) within the channel. When growing on the bank with surface roots extending into the channel, trees can also contribute to overall bank stability.

B. Geologic Prescriptions

A California licensed Registered Professional Forester (RPF) is responsible for conducting field reconnaissance of all proposed timber harvest units specifically for the purpose of identifying unstable

areas, as described by the California Forest Practice Rules and using California Licensed Forestry Association 1999 Check List. The RPF is also responsible for determining the need for additional site assessment by a California licensed Professional Geologist (PG) based on the presence or absence of indicators of unstable areas.

During THP development, an RPF will 1) impose the default prescriptions applicable below if it is determined that any portion of the THP meets the definitions for a steep streamside slope (SSS), headwall swale, deep-seated landslide or shallow rapid landslide; 2) exercise professional discretion to avoid operations in unstable areas; or 3) retain a California PG to develop site-specific alternative prescriptions to the default prescriptions. The default prescriptions below as well as complete avoidance of operations in unstable areas are considered conservative prescriptions. For that reason, where unstable areas are avoided or default prescriptions applied, RPFs will not necessarily retain the services of a PG for further site evaluation and prescription development and a geological report will not typically be included with a proposed THP as a matter of necessity.

Where RPFs determine that unstable areas or indicators of unstable areas exist within a harvest unit and they require a professional geological assessment, RPFs will consult with Green Diamond's staff geologist to develop appropriate site-specific forestry-related prescriptions. Professional geological assessments also may be performed by qualified licensed professional geological consultants, depending on workload or scheduling constraints of Green Diamond's staff geologist. Professional Geologists who conduct geological assessments for RPFs must comply with the California Department of Consumer Affairs Geological Licensing Act and will be expected to utilize professional discretion to follow the guidelines of the California Department of Conservation Division of Mines and Geology Note 45 (Guidelines for Engineering Geological Reports for Timber Harvesting Plans) to whatever extent may be necessary depending on site-specific conditions and the scope of a given project.

1) <u>Steep Streamside Slopes:</u>
   a) Identify all steep streamside slopes (SSS) greater than or equal to 60% leading to Class I or II watercourses.
   b) The initial default maximum width of the SSS zone, measured from the watercourse transition line, is 200 feet for Class I and Class II-2 watercourses and 75 feet for Class II-1 watercourses.
   c) The SSS zone will be comprised of an inner zone (Riparian Slope Stability Management Zone [RSMZ]) and an outer zone (Slope Stability Management Zone [SMZ]).
   d) The width of the RSMZ will be the same as the applicable watercourse RMZ, except where a qualifying slope break exists within that distance the RSMZ may only extend to the slope break. A "qualifying slope break" is an interruption of slope gradient of sufficient degree and scale to reasonably impede sediment delivery to watercourses from shallow landslides originating above the slope break.
   e) The width of the SMZ will be either the remainder of the distance to the default maximum SSS distance for that Hydrographic Planning Area (HPA) or to a qualifying slope break, whichever is shorter.
   f) The RSMZs will be comprised of an inner zone and an outer zone.
   g) The inner zone of RSMZs on all Class I watercourses will be 70 feet, except where a qualifying slope break exists within that distance the RSMZ inner zone may only extend to the slope break, and the outer zone, if any, will be the remainder of the applicable RMZ distance except where a qualifying slope break exists within that distance.
   h) The inner zone of RSMZs on all Class II watercourses will be 30 feet, except where a qualifying slope break exists within that distance then the RSMZ inner zone may only extend to the slope break, and the outer zone, if any, will be the remainder of the

applicable RMZ distance except where a qualifying slope break exists within that distance.

i) On Class I and Class II-2 watercourses, Green Diamond will not conduct harvesting on the inner zone of the RSMZ and there will be 85% overstory canopy retention in the outer zone of the RSMZ.
j) On Class II-1 watercourses, Green Diamond will retain 85% overstory canopy in the inner zone of the RSMZ and 75% overstory canopy in the outer zone of the RSMZ.
k) The silviculture prescription employed within SMZs will be single tree selection.
l) Even spacing of unharvested trees will be provided where the trees are available to allow it, and all hardwoods will be retained. All species and size classes represented in pretreatment stands will be represented post-harvest where feasible.
m) If cable corridors through SMZs are necessary to conduct intermediate treatments (e.g., commercial thinning) in adjacent stands prior to even-aged harvest, Green Diamond will apply the restrictions in this section except harvesting of trees in the SMZs will be limited to cable corridors only. Any cable roads established in the SMZ as part of the intermediate treatment will, to the extent feasible, be reused during the even-aged entry in the adjacent stands.
n) Where no SMZ is identified, the standard default prescriptions for RMZs will apply.
o) Green Diamond may fall trees within RSMZs and SMZs for worker safety and to create cable yarding corridors of up to 25 feet in width.
p) Green Diamond's road construction will avoid RSMZs and SMZs where feasible. Where such zones cannot be avoided or where major road reconstruction is required, the road alignment within a RSMZ or SMZ will be evaluated by a PG and a RPF with experience in road construction in steep forested terrain. In addition, Green Diamond will submit to the Services an explanation, justification, and a map of the proposed exception as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

2) <u>Headwall Swales:</u>
   a) The silviculture prescription employed on a field verified headwall swale will be single tree selection.
   b) Even spacing of unharvested trees will be provided where the trees are available to allow it, and all hardwoods will be retained.
   c) All species and size classes represented in pretreatment stands will be represented post-harvest where feasible
   d) There will be only one harvesting entry in headwall swales during the term of the AHCP.
   e) Green Diamond may fall trees on a field verified headwall swale for worker safety and to create cable yarding corridors of up to 25 feet in width
   f) Green Diamond's new road construction will avoid field-verified headwall swales where feasible. Where such areas cannot be avoided or where road reconstruction is required, the terrain will be evaluated by a PG and RPF with experience in road construction in steep forested terrain. In addition, Green Diamond will submit to the Services an explanation, justification, and a map of the proposed exception as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2)

3) <u>Deep-Seated Landslides</u>:
   a) No cut within the boundaries of the deep-seated landslide and 25-foot no cut buffer upslope of the main scarp of the slide.
   b) Green Diamond will not construct new roads across active deep-seated landslide toes or scarps, or on steep (greater than 50% gradient) areas of dormant slides, without approval by a PG and a RPF with experience in road construction in steep forested terrain.

4) Shallow Rapid Landslides:
   a) The following measures will apply to field-verified shallow rapid landslides that are at least 200 square feet in plan-view and that observably deliver sediment to a watercourse or exhibit indicators of instability with the potential to deliver sediment directly to a watercourse:
      - No cut within the boundaries of the landslide.
      - 50-foot buffer above the slide with at least 70% overstory retention.
      - 25-foot buffer along the sides of the slide with at least 70% overstory retention.
      - Avoid new road construction on shallow rapid landslide where feasible. Where such areas cannot be avoided or where major road reconstruction is required, the terrain will be evaluated by a PG and RPF with experience in road construction in steep forested terrain. In addition, Green Diamond will submit to the Services an explanation, justification, and a map of the proposed exception as part of the informational copy of the THP notice of filing (see AHCP Section 6.2.7.2).

C. Harvesting, Yarding and Hauling Prescriptions

The following prescriptions have been developed to ensure that Green Diamond's logging operations are designed and implemented to minimize overall ground disturbance that could generate and cause sediment delivery into watercourses.

1) Green Diamond will adhere to a 4-year harvest adjacency versus the 3- year adjacency requirement in the California FPRs. This extension of the harvest adjacency in this watershed will serve to further reduce potential impacts from harvest activities and will distribute them over greater time and space. This will avoid concentrating harvest units over a short period into individual sub-basins within Green Diamond's South Fork Elk River ownership.

2) Green Diamond will limit the rate of harvest in South Fork Elk River to approximately 75 acres per year, calculated on a 3-year rolling average. The 3-year rolling average provides operational flexibility while maintaining a low annual harvest rate.

3) Skyline cable yarding systems will be the preferred harvest method on slopes averaging greater than 35%.

4) In areas where road construction would require building across steep slopes with large amounts of endhaul construction, long cable skyline yarding (average yarding distance >1000 feet) will be prescribed in areas with long continuous steeper slopes, therefore eliminating the need for additional roads. Emphasizing both short and long skyline cable yarding systems will reduce the overall road mileage and site impacts that are associated with road building as well as reduce impacts associated with ground based yarding systems.

5) Green Diamond intends to use shovel logging in ground based harvest areas. Ground based yarding will be limited to slopes less than 35%. Shovel logging has been shown to minimize ground disturbance due to low ground pressure, no need to construct skid trails, operating on top of slash rather than bare soil, and the opportunity to utilize residual vegetation to slash pack temporary constructed haul roads to minimize raindrop impact and surface erosion. Exceptions to shovel logging will be confined to isolated areas where

topographic conditions or other circumstances would require excessive road construction to utilize cable yarding. In these circumstances other ground based equipment may be required and its use will be explained and justified during the THP approval process.

6) Newly constructed temporary roads located in shovel logging areas will be decommissioned by removing temporary crossings, draining the road (waterbars and rolling dips) and slash packing the road surface prior to closure.

7) Helicopter yarding will be considered and prescribed in areas that would require the construction of roads across steep slopes with high hazard topography (i.e. unstable slopes). Although this harvesting method is expected to have limited use within the watershed, its application if required, will be explained and justified in the THP.

8) See seasonal restrictions below for harvesting, yarding and hauling activities.

9) No broadcast burning will be conducted in South Fork Elk River. Burning of piles accumulated during harvesting operations, may occur.

D. Road Management Prescriptions

A full road assessment within Green Diamond's South Fork Elk River ownership was completed in 2006. Green Diamond developed and has been following a South Fork Elk River Road Management Plan that prioritized all assessment sites located within the drainage and proposed recommendations for treatment by the end of 2015. As of the end of 2011, Green Diamond has completed 84% of the sites representing approximately 77% of the sediment volume that could potentially deliver to a watercourse. Green Diamond will treat the remaining 16% of the controllable sediment discharge sites by the end of 2015.

Taking into consideration the location of these roads and associated sites, relative condition, potential future risk of failure (due to location), and the location for long term future use, specific roads and road segments have been identified to be either upgraded or decommissioned. Some roads will be decommissioned permanently, and others will be temporarily decommissioned (ear marked for eventual reconstruction and upgrading in the future (20-30 years) when the surrounding young plantations are ready for harvest and road access is again needed. In either case, the goal of the decommissioning process is to remove the need for continued maintenance as well as removing the risk of road related sediment input from crossing failures, diversions, and side cast failures. Roads chosen for decommissioning will be essentially hydrologically disconnected from the stream network so that the potential for future road related sediment delivery into watercourses would be minimal. Roads not designated for decommissioning will be upgraded to the "Road Upgrading" procedures outlined in Green Diamond's Road Management Waste Discharge Requirements (WDR) and Master Agreement for Timber Operations (MATO). These roads as well as newly constructed roads in the future will be part of our permanent transportation system and consist of roads that are properly located, hydrologically disconnected and well maintained. Operational procedures have been developed for all road types so that, after treatment, sediment delivery into watercourses will be mitigated.

I. Road Decommissioning

Over the past 10 years of decommissioning experience, Green Diamond has learned that there is value in insuring that the project is implemented correctly and efficiently the first time. By insuring that all reasonable and feasible operational procedures are site specifically identified and carried out during

the decommission process, efficiency is maximized and the risk of unacceptable future failures or significant streambed adjustments is minimized. Green Diamond will adhere to the following site-specific Operational Procedures for road decommissioning in addition to those outlined in the Road Management WDRs, MATO and AHCP:

a) To further guard against road surface rilling and sheet erosion associated with erodible Wildcat soil types, Green Diamond will treat all decommissioned road surfaces with grass seed and straw mulch at 2" depth and 90% coverage.

b) All designated waste disposal sites will be compacted with a tractor or excavator packed in lifts and treated with straw mulch and grass seeded.

c) An emphasis and priority will be made to initiate and finish all pull back sites and stream crossing removals on a specific road during the same summer season if feasible. If the road to be decommissioned can not be completed in one season due to weather or operational constraints, the following procedure will be initiated to minimize any additional sediment contribution from erosion control points (ECPs) until final site completion occurs:

   Sites not treated by the pull back, disconnect, and mulch/seed protocol, will be left in a "no further disturbance" condition. This means partially failing stream crossings will have the holes and depressions of the fills temporarily filled and packed with hay bails and/or clean wood chunks and covered with a layer of soil for short term minimal equipment access to lower sites. These temporary sites will be constructed to be easily pulled back out without the need for refilling a fill with soil. The intent of this practice is to ensure that operations do not introduce any additional sediment into watercourses and that these sites that can not feasibly be treated via permanent pull back of all soil and organics in one season will be prepared for "over wintering" with clean materials that can be retrieved the next operating season. At that time, the temporary fill structure can be utilized to access equipment to achieve necessary decommissioning past the site and/or pulled out correctly that final season

d) Some roads have been abandoned and are in a condition where no treatment would be required because they are completely revegetated, no longer pose a threat to aquatic systems, and are in a condition that would render the disturbance inherent in decommissioning counter-productive. The road assessment process will determine whether treating certain roads or road segments would be counter-productive.

e) Green Diamond field personnel will work cooperatively with water quality staff to ensure that the final decommissioning product meets the expectations and mutual goals.

II. Road Upgrading

It is Green Diamond's goal to ensure that all roads designated for upgrading will be improved in such a way as to minimize future risk for failure and resulting sediment delivery to watercourses. Green Diamond will adhere to the following site-specific Operational Procedures for road upgrading in addition to those outlined in the Road Management WDRs, MATO and the AHCP:

a) Ditch relief culverts will be installed to meet the following specifications**:

Road Grade	Maximum Spacing (Feet) for Ditch Relief Culverts
2%	600
4%	530
6%	355
8%	265
10%	210
12%	180
14%	155
16%	135
18%	115

** Additional ditch relief culverts will be installed if site specific erosion indicators continue to exist.

b) Procedures designed to ensure sediment is not mobilized during winter quad use and delivered to watercourses is provided in the Road Sediment Reduction Plan (See Section D. IV.).

III. New Road and Landing Construction

As part of THP preparation, RPFs perform a detailed field reconnaissance to identify and locate the best access between topographic control points that are critical to a harvesting operation. When designing, locating, and constructing roads and landings, Green Diamond will adhere to the following site-specific Operational Procedures in addition to those outlined in the MATO and AHCP:

a) In areas located on steep slopes or adjacent to watercourses where management of sidecast is not feasible, the practice of endhauling will be employed. A dump truck will transport the excavated material to a stable disposal area where sediment cannot deliver to any watercourses. Waste material will be seeded and mulched prior to October 15th of the same year.
b) Where feasible, and within the limits of safety considerations, all new seasonal secondary and spur roads will be constructed with an outsloped surface rather than a crowned road with an inside ditch. Outsloped roads can reduce potential maintenance problems caused by bank sloughing, ditch plugging, and drainage diversion.
Ditch relief culverts will be installed according to the specifications outlined in the Road Upgrading section (See Section D. II. a). Additional ditch relief culverts and rolling dips will be installed where appropriate to adequately disconnect the roads from the watercourses and to minimize ditch water accumulation on slide prone landforms such as inner gorges.

i. Erosion Control for New Roads

a) Procedures designed to ensure sediment is not mobilized and delivered to watercourses during winter quad use is provided in the Road Sediment Reduction Plan (See Section D. IV.)
b) All watercourse crossings and cross drains will be installed and functional prior to the winter period as defined below. In addition, by the beginning of the winter period, all waterbars, rolling dips, and road and landing construction associated with straw mulching and grass seeding will be completed in order to minimize suspended or mobilized sediment delivery to a watercourse.
c) All running surfaces of seasonal unsurfaced roads will be straw mulched and seeded prior to the first winter season following initial construction. This practice will protect against significant rain drop, sheet, and rill erosion on newly constructed, non-compacted, and unseasoned road surfaces.

IV. Road Sediment Reduction Plan

In recognition of the sensitive geology and the erodible nature of the soils within large areas of the South Fork Elk River Watershed, Green Diamond has developed a watershed plan incorporating measures designed to reduce sediment production from existing roads. This plan addresses the erodible nature of the soils within existing roadbeds and provides a mechanism to ensure that reasonable and feasible measures are undertaken to disconnect roadways from watercourses so that significant sediment delivery to aquatic habitat does not occur. The majority of operational activities occur during the summer season because of the lack of suitable rock nearby for road surfacing. Winter access on these erodible native surface roads with heavy equipment and pickups is not feasible. “Quad only” limited winter operations will be allowed for in THPs in this watershed. Winter quad use will ensure that Green Diamond continues to have the needed access to property within the watershed so that THP layout, tree planting, and cutting activities, as well as other administrative functions can occur year round. The persistent use of quads on unsurfaced dirt roads during the winter months (in areas with erodible Wildcat soils) can mobilize sediments from the exposed road surface unless specific measures and procedures are undertaken to minimize these potential sediment sources, and they are disconnected from watercourses.

The following measures will be implemented to ensure sediment is not mobilized from existing roadways and deposited into aquatic habitat resources. Priority will be placed upon higher use roads and more vulnerable stream crossings. Practices proposed in this plan will also be utilized on new roads as they are developed in the future.

a) Ensure that all existing watercourse crossings have a properly designed “critical dip” installed at or immediately adjacent to the crossing to reduce diversion potential.

b) A disconnect rolling dip or water bar will be installed up grade from the crossing and designed to deposit on the forest floor. RPF’s or their designees will be responsible for identifying in the field the location for permanent rolling dips used to disconnect the road from the watercourse crossings.

c) Identify the main-line administrative roads that will be utilized via quads on a more consistent basis during the winter months (e.g. S-1000, S-2000, S-2500 up to road point MC21road). All watercourse crossings will have a permanent rolling dip disconnect installed up grade from the crossing and designed to deposit on the forest floor. The disconnect rolling dip as well as a minimum of 75’ of road way leading into and including the crossing will be rocked. Filter fabric in conjunction with an average depth of 6” of

clean rock will be used. If the roadway parallels a RMZ, the distance to be rocked will be the length of the RMZ road or 75 feet whichever is longer.

d) Main-line administrative roads will also be assessed to identify chronic erosion problems associated with isolated steeper road gradients. These sections of road will also be treated with an average depth of 6" of clean rock with filter fabric.

e) Where secondary roads are identified that are occasionally used during winter months for quad access, all watercourse crossings will be straw mulched and grass seeded for a minimum of 75 feet including the disconnect rolling dip. If the roadway parallels a RMZ, the distance to be mulched will be the length of the RMZ road or 75 feet whichever is longer. This measure has proven to be an effective erosion prevention method utilized extensively in the past on new roads within drainages with similar soil types. This option will allow Green Diamond to effectively treat roads and crossings commensurate with their anticipated use (and risk of sediment mobilization).

f) Where extended segments of roadway are located in a through-cut or outside bermed condition, a permanent tractor or excavator constructed ditch-out will be built to further minimize the distance between rolling dips and water bars.

g) The interval of strategically placed rolling dips and waterbars will be installed according to the standards provided below to ensure that ditch line and surface road water from storm events is efficiently dispersed onto the forest floor. Additional rolling dips and waterbars will be installed if site specific erosion indicators continue to exist.

Road Grade	**Maximum Spacing (feet) for Rolling Dips and Waterbars**
2%	500
4%	400
6%	300
8%	250
10%	200
12%	175
14%	150
16%	125
18%	100

h) Other erosion prevention methods such as silt fences or sediment settling basins will be utilized in site specific places where measures described above may not be adequate to prevent sediment input into watercourses.

i) All roads maintained for consistent or occasional winter quad use (See Road Sediment Reduction Plan) will be signed "Consistent Winter ATV Use OK" or "Occasional Winter ATV Use OK", respectively. All other roads within the watershed will have no quad use during the winter period.

The measures provided above will not only aid in significantly reducing sediments mobilized from winter quad use, but also dramatically reduce the potential for sediment introduction into streams

from normal sheet erosion and rilling that can occur on unsurfaced roads located in the Wildcat geology type that experience no winter ATV traffic.

V. Road Maintenance

As previously described, Green Diamond will treat the remaining road sites identified in the 2006 road inventory by the end of 2015. Roads upgraded prior to 2011 will be maintained as described below. The remaining road sites to be treated in South Fork Elk River, will also be maintained as described below following their treatment.

a) Green Diamond will inspect all mainline roads annually for needed maintenance.

b) Roads appurtenant to THPs will be inspected annually through the maintenance period of the THP. This inspection will assess the effectiveness and condition of all erosion control and drainage structures.

c) Secondary roads will be inspected and treated according to Green Diamond's Routine Road Maintenance Program and Road Management WDRs.

d) After the maintenance period of the THP expires, secondary roads will inspected and treated according to Green Diamond's Routine Road Maintenance Program and Road Management WDRs.

e) Road maintenance activities include brushing, waterbarring, constructing rolling dips, culvert replacement, grading (including berm removal or maintenance where appropriate), installation of critical dips at watercourse crossings to reduce diversion potential, outsloping roads, patch rocking, dust abatement, resurface rocking, cleaning ditches, and cleaning inlets and outlets of culverts.

f) Road maintenance activities, other than by hand labor, will only be conducted during the non-winter period due to equipment access limitations.

g) Grading will not be used to blade off wet soil to provide conditions for extended periods of operation on a deteriorated road surface.

h) Road maintenance inspections will assess the following:
   - Adequate waterbar and/or rolling dip spacing, depth, interception of the ditch line, and complete diversion of water flow onto undisturbed soil.
   - Adequate road surface drainage and all outside berms are breached.
   - Ditches are open and properly functioning, free of debris that could plug the ditch or a culvert and cause a diversion of water onto the road surface.
   - Culverts are functioning properly (e.g., the culvert is not rusted out or separated at a joint; water is flowing through the pipe and not underneath; sediment and debris is not reducing the pipe capacity).

i) The road maintenance assessment will be completed with enough time to initiate and complete all necessary repairs prior to winter period.

j) Landing debris associated with harvesting operations will be evaluated to determine the need for either burning or pull-back to reduce any potential for landing failure and debris avalanches associated with overloading the landing with slash.

k) Upon completion of timber operations, landings will be drained to prevent water accumulation. Concentrated flows will not be channeled over fills and will only be discharged onto stable areas. Discharge points will be located on stable landforms and where stable discharge points are absent, adequate erosion protection and energy dissipation will be employed.

E. Seasonal Restrictions

As previously described in this Management Plan, the South Fork Elk River has a uniquely erodible soil type that is not only easily mobilized with vehicular traffic but tire traction is completely lost with the slightest amount of road surface moisture. This situation coupled with lack of rock for road surfacing and the remoteness of the watershed results in a shorted operating window. The following measures reflect these conditions and the need to appropriately address them to minimize impacts to aquatic resources.

1. The winter period for this management plan is from Oct.15th, to May 15th. An exception to this will be limited to the brief time frame from Oct. 15th to Nov.1st, and from May 1st to May 15th when the potential for extended seasonal dry periods exist. This exception will be implemented only when the “Early Spring Drying” or “Dry Fall” conditions exist, as described in the AHCP. This stipulation acknowledges the sensitivity of the watershed and associated soils, while providing flexibility to achieve harvest and road repairs/upgrading goals in a “short season, limited access” area when conditions warrant.

2. Yarding (except helicopter yarding with no heavy equipment), hauling, or road construction activities will not occur during the winter period (as defined above). Timber falling, site preparation (pile burning), and administrative access (THP preparation, planting, monitoring) can be conducted year round.

3. Log hauling will be suspended, regardless of the time of year, if a storm event causes saturated soil conditions on haul roads. Hauling will not be resumed until the RPF or his designee determines that the road can withstand truck traffic without causing deterioration of the road surface and subsequent loss of surface material. Operation of trucks and heavy equipment on roads and landings will be limited to those with a stable operating surface.

4. Access during the winter period for activities such as timber falling, site preparation burning, maintenance inspections, reforestation, or timber harvesting plan layout will be restricted to the use of low ground pressure ATVs operating on designated signed roads only (See Road Sediment Reduction Plan, Section D. IV.).