Humboldt Redwood™

March 24, 2014

Mr. Matthias St. John
California Regional Water Quality Control Board
North Coast Region
5550 Skylane Blvd, Suite A
Santa Rosa, CA 95403

Subject: Application for Coverage of THP 1-13-088 HUM (Fresh Aire) Under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0041 / Freshwater Creek WWDR, "Tier II" (Units 4-11).

Dear Mr. St. John:

HRC is requesting Tier II enrollment under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0041 for portions (Units 4-11) of THP 1-13-088 HUM. The enrollment is comprised of 137.5 acres of group selection/selection and 0.6 acres of right of way, (78.8 clear-cut equivalent acres). Total acres currently enrolled or proposed for enrollment under Order No. R1-2006-0041 Tier II is shown in the Attached Pre-Harvest Planning Report. The Erosion Control Plan (ECP) was submitted with the THP.

Landslide risks associated with this plan were evaluated in compliance with the Freshwater Creek and Elk River WWDR Permit Acreage Enrollment and Compliance Monitoring Program Quality Assurance Project Plan (Version 2.0, September 1, 2006) approved by the Executive Officer of the North Coast Regional Water Quality Control Board, as part of THP preparation. The Licensed Geologist performed this analysis in the Geology report included in the plan. This approach uses commonly accepted standards for geologic practices in forest management (Sidle et al. 1985, Soeters and Van Western 1996, and Sidle and Ochiai 2006) to assess factors known to contribute to landslides, such as steepness of slope, slope convergence, hydrology, geologic features, and visibly unstable areas. Overlapping and complementary scientific techniques combining state-of-the-art digital elevation model (DEM) slope stability models, field investigation, and terrain analysis were used in this assessment.

The THP area encompasses approximately 270 acres in the Freshwater Creek drainage basin and was laid out following prescriptions developed from watershed analysis for the Freshwater Creek Watershed (Watershed Professionals Network, 2001).

A majority of the project area is underlain by sedimentary bedrock of the late Miocene to Pleistocene age Undifferentiated Wildcat Group, which unconformably overlie Paleocene to Eocene age Yager terrane sediments. Yager terrane sediments are exposed in those portions of the THP that are located west of the Freshwater Fault. Harvest units east of the Freshwater fault are underlain by Cretaceous/ Jurassic aged meta-sedimentary rocks of the Central Belt of the Franciscan Complex. No active faults are mapped passing through the project area, and no part of the plan lies within and/ or adjacent to an Alqnfst-Priolo Earthquake Fault Zone (Hun1boldt Comity GIS hazard maps, accessed April 18, 2013),

Ground movement in the plan area is dominated by hillslope processes affiliated with translational debris slide failure mechanisms and is concentrated along the inner valley slopes of the deeply entrenched Class II watercourses. Open slope landside processes occur less frequently.

We identified 41 recently active to dormant-historic landslides within the THP boundaries (refer to Figures 3 through 6). A brief summary of the characteristics of each failure is contained in Appendix A of the attached report.

No group openings are proposed on slopes identified as unstable with potential to deliver sediment to a watercourse. All of the failures that pose a risk to aquatic resources are encompassed by either limited entry Riparian Management Zones (RMZ) and/ or Special Treatment Zones (STZ).

Silvicutural boundaries were modified under the supervision of the project forester and geologist. No group openings are allowed in STZs (Figures 8 and 9). STZs will maintain 100 square feet of basal area per acre post harvest. HCP prescription standards will be applied to the RMZs, which have been expanded, in some instances, to encompass potentially unstable slopes.

The services of a California State licensed professional geologist were retained during the layout of this THP. A California Geologic Survey Note 45 compliant report was published by the project geologist that documents their consultation on this project.

Greater detail regarding this landslide hazard assessment is provided in the attached *Geologic Evaluation of Fresh Aire 13*. The licensed geologist involved with the Tier 2 landslide risk evaluation has concluded the proposed harvest operation, if implemented as planned and approved, will result in a negligible increase in potential for post-harvest landsliding; and thereby meets the applicable Zero Delivery of landslide related sediment performance standards of NCRWQCB Orders R1-2006-0041 and R1-2008-0071.

While the THP is covered under the watershed wide WDR, the discharger is and will remain in compliance with the Terms and Provisions of this Order. Other portions of the plan will be, or have previously been subsequently enrolled.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information submitted. The information is, to the best of my knowledge and belief true, accurate and complete.

Please do not hesitate to contact me should you have any questions or comments regarding this application for enrollment into WWDR (Order No. R1-2006-0041).

Respectfully,

Tom Schultz

Tom Schultz,
Area Manager, RPF #1910
Humboldt Redwood Company, LLC

Attachments:
Enrollment Map
Pre-harvest Planning Report Table
Professional Certification of Design
Geo Report
Erosion Control Plan
THP Section 1 cover sheet

HRC 2014 PreHarvest Planning Report Addedum #1

25-Mar-14

Table 1. Proposed 2014 Harvest Enrollments for Freshwater Creek.

THP Name	THP Number	Unit Number	Silviculture CC	ROW	shr	SEL	CC Equivalent
Fresh Aire 13	13-055	1 T1				17.8	8.9
Fresh Aire 13	13-055	2 T1				59.9	30.0
Fresh Aire 13	13-055	3 T1				16.9	8.5
Fresh Aire 13	13-055	9 T1				18.8	9.4
Fresh Aire 13	13-055	4 T2				14.3	7.2
Fresh Aire 13	13-055	5 T2				43.5	21.8
Fresh Aire 13	13-055	6 T2				42.1	21.1
Fresh Aire 13	13-055	7 T2		0.3		7.7	4.1
Fresh Aire 13	13-055	8 T2				15.5	7.8
Fresh Aire 13	13-055	10 T2				10.6	5.3
Fresh Aire 13	13-055	11 T2		0.3		3.8	2.1
Next Beck's thing	12-084	1 T2				245	122.5
Next Beck's thing	12-084	ROW T2		8		0	6.0
Double Deuce	13-070	5T2		0.75		120	60.6
Double Deuce	13-071	ROW T2		4.7			3.5
	Total CC Equiv. Acres for 2014 enrollment						318.5

*The acres represented here have been converted to High Hazard Acres by multiplying by 3.8404.

TBD - Planning is either in the approval or preperation stage. Acreages are not finalized yet. They will be finalized prior to enrollment

Highlight indicates a THP and Specific Unit to be enrolled prior to establishing an enforceable Zero Discharge Monitoring Plan (Tier I). Hazard Acreage Totals, in Table 2, are listed below to demonstrate compliance with the Staff Landslide Model **limit of 144 Tier I Harvest Acres in Freshwater Creek**. Other THP Units will be enrolled after approval of the aforementioned Monitoring Plan

No Highlight Indicates a THP and Specific Unit to be enrolled after establishment of an enforcable Zero Discharge Monitoring Plan (Tier II).

Total Clear Cut Equivilant Acres to be enrolled in 2014	318.5

Table 2. Summary of THPs to enrolled prior to establishment of Zero Discharge Monitoring Plan for Freshwater Creek

THP Number	Unit Number	Harvest Acres	Hazard Low	High*
13-055	1 T1	17.8	16.8	3.8
13-055	2 T1	59.9	59	15.4
13-055	3 T1	16.9	14.9	7.7
13-055	9 T1	18.8	16.3	9.6
	Totals	113.4	**143.5**	

Table 3. Summary of THPs by Yarding System and Site Preparation for Freshwater Creek

THP Name	THP Number	Unit Number	Yarding System Ground Based	Yarder	Helicopter	Site Preparation Mechanical	Broadcast
Fresh Aire 13	13-055	1 T1		17.8	0	0	0
Fresh Aire 13	13-055	2 T1	3.1	56.8	0	0	0
Fresh Aire 13	13-055	3 T1		16.6	0	0	0
Fresh Aire 13	13-055	9 T2	0.5	18.3	0	0	0
Fresh Aire 13	13-055	4 T2		14.3	0	0	0
Fresh Aire 13	13-055	5 T2		43.5	0	0	0
Fresh Aire 13	13-055	6 T2	4	38.1	0	0	0
Fresh Aire 13	13-055	7 T2	8		0	0	0
Fresh Aire 13	13-055	8 T2		15.5	0	0	0
Fresh Aire 13	13-055	10 T2	10.6		0	0	0
Fresh Aire 13	13-055	11 T2	0.3	3.8	0	0	0
Next Beck's thing	12-084	T2	80	165	0	0	0
Next Beck's thing	12-084	ROW T2	8		0	0	0
Double Deuce	13-070	5T2	26.35	94.4	0	0	0
Double Deuce	13-071	ROW T2	4.7		0	0	0

Fresh Aire 13 1-13-055H

Road Construction Specifications Map

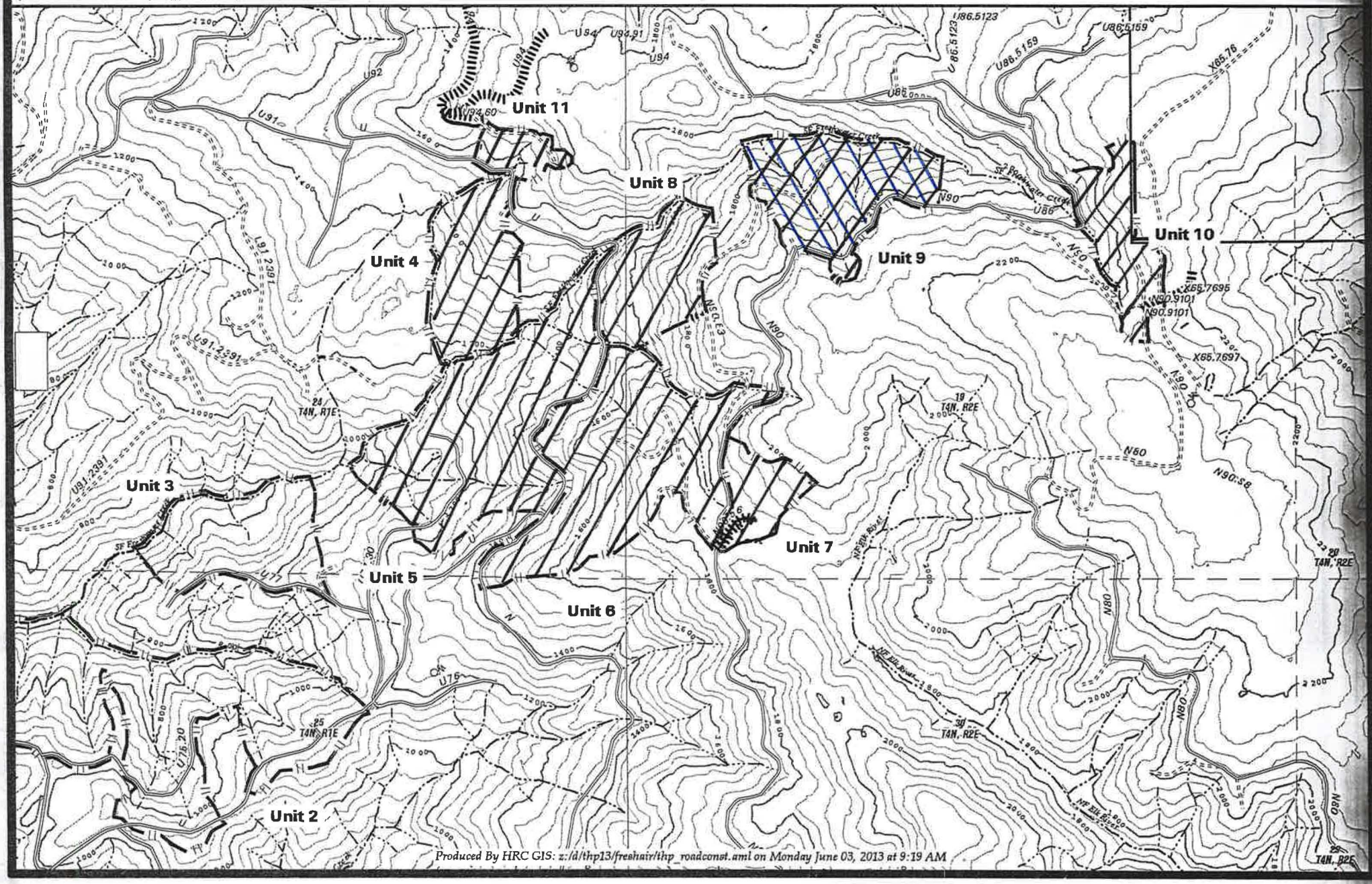
N

T4N R1E Sec. 24, 25, 26 HB&M
T4N R2E Sec. 19 HB&M

USGS Quad(s): IAQUA BUTTES, MCWHINNEY CREEK

Map Scale: 1 inch = 1000 feet
Contour Interval: 40 feet

Property Line
Harvest Boundary
Permanent Road
Seasonal Road
Temporary Road
Class I Watercourse
Class II Watercourse
Class III Watercourse
Class II Waters
Cut and Fill Construction
1/2 Cut and 1/2 Fill
TIER 2
R.O.W.
Unit #9, Tier 1



Produced By HRC GIS: z:/d/thp13/freshair/thp_roadconst.aml on Monday June 03, 2013 at 9:19 AM

FOR ADMIN. USE ONLY Amendments-date & S or M	
1. _____	7. _____
2. _____	8. _____
3. _____	9. _____
4. _____	10. _____
5. _____	11. _____
6. _____	12. _____

TIMBER HARVESTING PLAN

STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY AND
FIRE PROTECTION, RM - 63 (01-00)
(Humboldt Redwood Company HCP THP Form FW, 7/30/08 version)
If this is a Modified THP, check box ☐

Fresh Aire 13

FOR ADMIN. USE ONLY
THP No 1-13-055 HUM
Dates Rec'd JUL - 3 2013
Date Filed JUL 1 3 2013
Date Approved SEP 1 7 2013
Date Expires Sep 16, 2016
Extensions 1) ☐ 2) ☐

Note to THP reviewer: This Timber Harvesting Plan (THP) form, when properly completed, is designed to comply with the Forest Practice Act (FPA) and Board of Forestry and Fire Protection Rules (1/1/2001). See separate instructions for information on completing this form. The THP is divided into six sections. This THP form was modified to include operational elements of the landowner's Habitat Conservation Plan (HCP), and the Watershed Analysis prescriptions for Freshwater Creek. Modifications include check boxes, headings, and HCP item numbers (e.g. HCP 1.1.1.1). Modifications demonstrate HCP compliance and serve as a format to facilitate implementation and compliance tracking. CAL FIRE THP Section I and II form information or questions are stated in non-underlined Arial font. RPF information is underlined Arial font. *HCP language is italicized and underlined.* Occasional non-underlined, underlined, and italicized Arial font text may be in **bold** type or quotation marks.

SECTION I - GENERAL INFORMATION

This THP conforms to my/our plan and upon approval, I/we agree to conduct harvesting in accordance therewith. Consent is hereby given to the Director of Forestry and Fire Protection, and his or her agents and employees, to enter the premises to inspect timber operations for compliance with the Forest Practice Act and Forest Practice Rules.

1. TIMBER OWNER(S) OF RECORD: Humboldt Redwood Company LLC
Address: P.O. Box 712
City: Scotia State: CA Zip: 95565 Phone: (707) 764-4472
Signature: _____, Area Manager Date: 7/2/13

NOTE: The timber owner is responsible for payment of a yield tax. Timber Yield Tax information may be obtained at the Timber Tax Section, MIC: 60, State Board of Equalization, P.O. Box 942879, Sacramento, California 94279-0060, phone 1-800-400-7115. Visit their website at WWW.boe.ca.gov.

2. TIMBERLAND OWNER(S) OF RECORD: Humboldt Redwood Company LLC
Address: P.O. Box 712
City: Scotia State: CA Zip: 95565 Phone: (707) 764-4472
Signature: _____, Area Manager Date: 7/2/13

3. LICENSED TIMBER OPERATOR(S): Humboldt Redwood Company LLC Lic No. A 10782
(If unknown, so state. You must notify CAL FIRE of LTO prior to start of operations)
Address: P. O. Box 712
City: Scotia State: CA Zip: 95565 Phone: (707) 764-4472
Signature: _____, Area Manager Date: 7/2/13

4. PLAN SUBMITTER(S): Humboldt Redwood Company LLC
Address: P.O. Box 712
City: Scotia State: CA Zip: 95565 Phone: (707) 764-4472
(Submitter must be from 1, 2, or 3 above. He/she must sign below. Reference Title 14 CCR 1032.7(a))
Signature: _____, Area Manager Date: 7/2/13

Note: The Humboldt Redwood Company LLC ("HRC") originated on July 30, 2008, following the purchase of The Pacific Lumber Company, and its wholly owned subsidiaries, Scotia Pacific Company LLC, and Salmon Creek Corporation (collectively referred to as "PALCO") in a reorganizational bankruptcy. All references to PALCO in historical documents and guidance materials will be considered to now be the property and responsibility of Humboldt Redwood CompanyLLC.

RECEIVED
JUL 03 2013
COAST AREA OFFICE
RESOURCE MANAGEMENT

Humboldt Redwood
COMPANY, LLC

FOREST
OPERATIONS
P.O. Box 712
125 Main Street
Scotia, CA 95565
(707) 764-4472
www.hrellc.com

EXECUTIVE SUMMARY

Geologic Evaluation of the Fresh Aire 13 Timber Harvesting Plan
Humboldt County, California

The attached report describes the results of a geologic evaluation of the Fresh Aire 13 Timber Harvesting Plan. This investigation was conducted in general accordance with California Geologic Survey Note 45 and included a review and analysis of available data and a reconnaissance of the project area. This report presents specific recommendations relating to the removal of timber from slopes within and adjacent to unstable landforms identified during the assessment. Pertinent elements of the plan, findings, and recommendations from the evaluation include the following:

- The area covers approximately 270 acres in the Freshwater Creek drainage basin and was laid out following prescriptions developed from watershed analysis for the Freshwater Creek Watershed (Watershed Professionals Network, 2001).
- A majority of the project area is underlain by sedimentary bedrock of the late Miocene to Pleistocene age Undifferentiated Wildcat Group, which unconformably overlie Paleocene to Eocene age Yager terrane sediments. Yager terrane sediments are exposed in those portions of the THP that are located west of the Freshwater fault. Harvest units east of the Freshwater fault are underlain by Cretaceous/ Jurassic aged meta-sedimentary rocks of the Central Belt of the Franciscan Complex. No active faults are mapped passing through the project area, and no part of the plan lies within and/ or adjacent to an Alquist-Priolo Earthquake Fault Zone (Humboldt County GIS hazard maps, accessed April 18, 2013).
- Ground movement in the plan area is dominated by hillslope processes affiliated with translational debris slide failure mechanisms and is concentrated along the inner valley slopes of the deeply entrenched Class II watercourses. Open slope landslide processes occur less frequently.
- We identified 41 recently active to dormant-historic landslides within the THP boundaries (refer to Figures 3 through 6). A brief summary of the characteristics of each failure is contained in Appendix A of the attached report.
- No groups are proposed on slopes identified as unstable with potential to deliver sediment to a watercourse. All of the failures that pose a risk to aquatic resources are encompassed by either limited-entry Riparian Management Zones (RMZ) and/ or Special Treatment Zones (STZ) (Figures 8 and 9).
- Silvicultural boundaries were modified under the supervision of the project forester and geologist.

Recommendations

- No group openings are allowed in STZs (Figures 8 and 9).
- STZs will maintain 100 square feet of basal area per acre post harvest.
- HCP prescription standards will be applied to the RMZs, which have been expanded, in some instances, to encompass potentially unstable slopes.

We did not encounter conditions that would preclude the development of the proposed timber harvest plan provided the recommendations contained in our report are implemented in its administration. A full discussion regarding these findings and recommendations are presented in the attached report.

Sincerely,

HRC GeoScience Department

Shane M. Beach, PG #7396
HRC Senior Geologist
707) 764-4224

Spencer Watkins, PG #9081
HRC Project Geologist
(707) 764-4294

Humboldt Redwood
COMPANY, LLC

FOREST
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July 1, 2013

Mr. Dave Rogers R.P.F.
Humboldt Redwood Company LLC
125 Main St.
Scotia, Ca. 95541

Geologic Evaluation of the Fresh Aire 13 Timber Harvesting Plan, Humboldt County, California

INTRODUCTION

This report presents the results of a geologic evaluation of slopes within the Fresh Aire 13 Timber Harvesting Plan (THP) conducted by Humboldt Redwood Company (HRC) LLC GeoScience Department. Our investigation was initiated in response to a request from the HRC Project Forester to asses slope stability within the proposed plan area. This report documents our geologic consultation on this project, which occupies slopes along the South Fork of Freshwater Creek. Ultimately, our investigation and recommended mitigations are meant to minimize the potential impacts to local watercourses and aquatic resources with regard to landslide-derived sediment.

The scope of our investigation includes a review of pertinent and available regional geologic maps and literature, geologic reports and letters attached to adjacent harvest plans, a series of site visits, and the preparation of this report and attached figures. In our report, we use landslide terminology presented in California Geological Survey (CGS) Note 50 (1997) and in Cruden and Varnes (1996). Landslide age classes used herein are based on the scheme presented by Keaton and DeGraff (1996).

This investigation was conducted in general conformance with the work scope outlined in CGS *Note 45: Guidelines for Engineering Geologic Reports for Timber Harvesting Plans* (1999). As such, our study is inherently focused on documenting existing slope failures within and adjacent to the proposed timber harvesting areas, qualitatively evaluating slope stability conditions (to locate potentially unstable sites), and assessing the potential for sediment delivery to watercourses as a result of mass wasting processes. This report discusses geomorphic processes as they relate to landslide activity and delivery of sediment to watercourses.

Our initial reconnaissance of the plan area was on March 13, 2013. We revisited the subject area on several occasions to complete our field evaluation. Our evaluations included surveys of:

- potential high hazard areas as defined in HRC Habitat Conservation Plan (HCP) Prescriptions based on watershed analysis for Freshwater Creek,
- areas of concern identified by the project forester using the "Hillslope Management Check List for the Freshwater Creek Watershed Analysis Unit",
- unstable areas identified by previous investigations (SHN, 2000; SGD, 2003).

Under the Hillslope Management prescriptions for the Freshwater Creek watershed the geologic assessment will follow procedures outlined in CGS Note 45 (1999a). A California state-licensed Professional Geologist must evaluate potentially unstable slopes leading towards a watercourse. Where necessary, when there is potential hazard to down slope resources, the Project Geologist, working with the Project Forester, will propose alternative activities.

Silvicultural boundaries were modified over the course of our site visits in order to mitigate areas of concern. Where necessary, when there is potential hazard to down slope resources, the project geologist, working with the project forester, proposes less aggressive silvicultural' practices as suggested in Section 6.3.3.7 (Hillslope Management) of the Freshwater Creek watershed analysis.

To the best of our knowledge, this THP conforms to the Forest Practice Rules and the Hillslope Management mass-wasting strategy that applies to HRC's ownership under the prescriptions developed based on watershed analysis.

GENERAL SETTING

This THP covers approximately 270 acres on slopes leading towards the South Fork of Freshwater Creek. Freshwater Creek is a northwest-flowing, Class I watercourse that drain into Humboldt Bay approximately 4.5 miles south of the City of Arcata. Freshwater Creek is listed as sediment impaired under Section 303(d) of the Federal Clean Water Act.

Elevations within the proposed plan area range from a minimum of approximately 550 feet above Mean Sea Level (MSL) to a maximum of 2,300 feet above MSL. Refer to Figure 1 for unit boundary locations as currently proposed and their relationship to mapped watercourses, roadways, and property lines. Pertinent regional location information is presented below in Table 1.

TABLE 1
Site Location Information

Legal Description	Township 4 North, Range 1 East, Sections 24, 25, and 26 Township 4 North, Range 2 East, Section 19
USGS 7.5-minute Quadrangle	McWhinney and Iaqua Buttes
Cal Watershed	Little Freshwater Creek (1110.000103)

The proposed logging operations will follow the prescriptions based on watershed analysis for Freshwater Creek (HRC, 2002). Group selection silviculture is proposed within the plan, outside the watercourse buffers and Special Treatment Zones (STZ). Slopes adjacent to watercourses will be managed in accordance with prescriptions required for Class I, II, and III Riparian Mitigation Zones (RMZs).

Refer to Section II item 14 of the THP for a description of the retention standards required for each of the proposed silivcultural practices.

There is a domestic water supply within 1,000 feet of the THP area. The domestic water supply system is located upslope of the proposed harvest operations. It is unlikely the proposed harvest operations will impact the water supply. No public resources or infrastructure facilities are located within 1,000 feet of the plan area, consequently operations as proposed should not pose a significant hazard to public safety.

A majority of the plan area is accessible by existing roadways. Limited amounts of road construction and/ or reconstruction are necessary to access portions of the plan. A majority of the road work will utilize existing road prisms primarily on midland and upland slopes.

GENERAL SITE CONDITIONS AND HISTORY

The dispersed nature of this plan has resulted in the occupation of a broad range of slope aspects and geomorphologies. The upland portions of the THP occupy broad, well-rounded ridges, with moderate to steep (30% and greater) slopes. Typically, the upland slopes retain convex to semi-planar profiles and in some instances have developed into low gradient (5% to 20%) topographic benches. As upland areas approach the valley floors, they often develop steeper orientations. These "inner valley" slopes often retain a planar profile and are inclined at precipitously steep gradients (near vertical along Class I and Class II watercourses). This inner valley wall terrain extends between 50 and 150 feet upslope of the stream edge and is commonly associated with Class I and larger Class II watercourses.

Timber stands encompassed by this THP are not homogeneous and are comprised of various assortments of conifer with limited amounts of hardwood. Slopes support open to dense, single to multi-tiered stands of second and third growth trees. The conifer component is dominated by second growth redwood and Douglas fir, with infrequent Grand fir. Intermixed with these conifers are groups of indigenous hardwoods, principally tan oak and red alder. Hardwoods are typically confined to slopes along watercourse channels and abandoned road alignments. Scattered residuals are also present, although in very low numbers. Underlying the overstory and sub-canopy is a variably thick shrub layer composed of huckleberry, salal, poison oak, and other common groundcover species. These groundcover species can occur in very dense patches.

This THP overlaps or abuts THP 1-00-114 HUM, THP 1-03-125 HUM, THP 1-07-136 HUM, and THP 1-10-012 HUM. Harvest plans approved after 1999 and prior to August 2002 were laid out in accordance with the interim prescriptions presented in PALCO's Habitat Conservation Plan (HCP) (PALCO, 1999). Harvest plans submitted subsequent to August 2002 were laid out in accordance with prescriptions based on watershed analysis for Freshwater Creek (HRC, 2002).

Each of the referenced plans has a geologic report attached. These geologic reports provide discussions regarding slope stability within the THPs, as well as site-specific geologic recommendations meant to minimize the impact of proposed timber operations on the identified unstable areas.

This plan is being submitted following prescriptions developed from Freshwater Creek Watershed Analysis (Watershed Professionals Network, 2001). Under this rules package, trees can be removed from unstable and potentially unstable slopes provided that a California-licensed professional geologist reviews the areas proposed for management. Consequently, a number of the areas of instability identified in pre 2002 THPs may be subject to various levels of harvest under this entry.

GEOLOGIC and GEOMORPHIC SETTING

Geology

CGS (1999b) (Figure 2a) geologic mapping shows the western 1/4 of the plan area underlain by undifferentiated Wildcat Group sediments that unconformably overlying Yager terrane bedrock when situated west of the Freshwater fault. The Yager terrane is mapped within the lower elevations of deeply incised watercourses. Progressing east, splays of the Freshwater fault place Franciscan Complex mélange in contact with Wildcat Group sediments. Farther east the mélange is in fault contact with central belt sedimentary rocks of the Franciscan complex.

CGS (1999b) describes the undifferentiated Wildcat Group as Late Pleistocene to late Pliocene, reddish-yellow, fine- to medium-sandstone containing scattered pebble layers. The Paleocene to Eocene aged Yager terrane is described as early tertiary inter-bedded well consolidated silty shale, sandstones, and conglomerates. The Cretaceous/ Jurassic Franciscan Complex mélange is a highly sheared shale matrix that includes numerous erratic blocks of greenstone, greywacke, conglomerates, mudstone, and schists to name a few. The Costal Belt Franciscan sedimentary rocks include well consolidated siltstones, sandstones, and conglomerate.

Field reconnaissance confirms that the proposed harvest area is underlain by multiple lithologies with characteristics similar to those described by CGS (1999b). Some of the lithologic contacts are expressed by varying morphologies making them easily discernable in the field. For example the Yager, Wildcat contact in the western portion of Unit 2 is expressed as a sharp break in slope adjacent Class I reaches of the South Fork Freshwater Creek. Contacts not highlighted by hill slope morphology are more difficult to locate, principally due to a lack of good exposures.

Refer to the Geology section on pages 7 through 17 of the of the Mass Wasting Assessment module of the Freshwater Creek Watershed Analysis (FCWA) for a more detailed discussion relating to the origin and composition of regional and local geology (http://www.mrc.com/pdf/Watershed_Analysis /HRC/Freshwater%20Creek%20-%20Cumulative%20Effects.pdf).

Seismic

The nearest fault zoned by the state of California as active is the Little Salmon fault (LSF) (Jennings, 1994; Petersen et al., 1996; Hart and Bryant, 1997). The mapped trace of the LSF, which is a northeast-dipping thrust fault, is mapped approximately 8.5 miles southwest of Unit 1. The LSF is considered to be the structure that has the potential, along with Cascadia Subduction Zone, to generate the greatest ground shaking at the site.

The THP overlaps a significant thrust fault zone known as the Freshwater Fault, which has been classified as Quaternary (age undifferentiated) by the state. Faults in this category show evidence of movement within the past 1.6 million years but are not considered active by the state under the provisions of the Alquist-Priolo Earthquake Fault Zone Act. Within the plan area a significant increase in elevation occurs from west to east. This is expressed as a series of steps to the east. Areas underlain by Wildcat Group sediments typically have smooth profiles and are associated with deeply incised prominent watercourses. The drainage patterns, ridge top elevations, and subsequent channel incision suggest a somewhat uniform underlying strata resulting in uniform slope weathering and channel development. Slope inclinations range from moderate to steep. The areas underlain by the mélange exhibit regional, random hummocky surfaces and the occasional hard rock outcrop. Slope inclinations range from roughly flat to nearly vertical in response to the faulting, failing, or irregular weathering that is common to heterogeneous rock matrixes. The easternmost portion of the plan, underlain by the sedimentary rocks of the Franciscan complex, exhibits the greatest relief, moderate to well incised watercourses, and typically more steeply inclined slopes. Due to shearing, slope breaks are typically sharply defined. Observations of the underlying soils typically show variable mixing of the prominent lithologies. It is common in the eastern portions of the plan to observed, greenstone, chert, and moderately- to well-indurated sandstone within a silty sand matrix.

SLOPE STABILITY

Overview

Evidence of landslide activity was apparent throughout the THP, but was principally confined to steep streamside slopes adjacent to Class I and II watercourses. Past land use activities resulted in high levels of ground disturbance and vegetation removal, and had a significant impact on the slope stability adjacent to the steep streamside terrain. In this steep terrain we identified recently active (less than 10 years old) and dormant-historic (less than 100 years old) landslides. Approximately 40 areas of recent/historic instability were identified within this 270-acre plan.

Additional surface geomorphology has been observed due to the ground based dragging of the felled old growth logs to railroads. This has imparted surface alterations that resemble closely spaced hummocks, cross slope furrows, and extensive redistribution of soils where atop swales that were utilized as prominent yarding corridors. Harvest operations conducted during the initial harvest entries altered slope morphology and hydrology, which frequently had a negative effect on slope stability. We encountered shallow failures (historic) principally along streamside slopes. It is evident that the initial harvest entries had negative impacts on slope stability, particularly steep streamside slopes.

Earlier investigations in the general region of the THP noted a similar distribution of landslide activity, in that a bulk of the mass movements initiated on steep slopes along the larger watercourses (SHN, 2000; SGD, 2003; 2007; HRC, 2010). Our ground-based evaluation of previously mapped landslide features that now fall within the operational limits of this plan resulted in the confirmation of their existence, re-mapping of their boundaries as appropriate, or removal if absent. During this investigation, a number of previously unrecognized landslides of various sizes and ages were also identified and mapped.

No post-harvest slope failures were encounter in any portion of the plan that recently underwent selective or clearcut harvest operations. None of the failures identified during the prior geologic investigations appear to have experienced post-operational movement.

Areas of Concern

Ground movement in the plan area, regardless of slope position, is dominated by hillslope processes affiliated with translational, rotational, and earthflow failure mechanisms. We classified a majority of the mass movements in and adjacent to this THP as debris slides and debris slide slopes. Translational/rotational and earthflow-type (compound) failures are commonly larger than their debris slide counter parts, but comprise a smaller percentage of the landslides identified on Figures 3 through 6 of this report.

We have not included site-specific descriptions of individual landslides in the text of this report; rather, we provide a brief summary of characteristics of each failure in tabular form in Appendix A. Our report does, however, include a generalized description of the landslide types identified within the plan area. A brief discussion of the landslide types observed in this THP follows.

Debris Slide/Flow

The majority of the landslides in the plan area have been classified as debris slides (see Appendix A). The surfaces of the recently active (less than 10 years old) failures are commonly lightly vegetated with brush and can be identified by near-vertical scarps. Slide scars associated with these recent events are well-expressed, and are spoon-shaped to roughly triangular in plan view. Tilted and/ or back-filled old growth stumps, downed and leaning second growth conifers and large volumes of downed woody debris were noted in the deposit zones of several of these failures.

The dormant-historic (greater than 10 years old) slides, which make up a majority of the features mapped on Figure 3 through 6, are usually vegetated with regeneration conifer and dense patches of brush. Scarps at the heads and along the lateral margins of these older slides are still steeply inclined but at times have an undercut appearance due to either surface erosion or secondary slide events. Downed woody debris and buried logs are common in the deposit zones of a number of the smaller events. At several locations, we noted where slide debris had back filled or buried the bases of old growth stumps and second growth trees.

Areas observed to have large concentrations of coalescing debris slides are shown on the area of concern figures as either inner gorge or debris slide slopes. Inner gorge slopes incorporate nested groups of slides that appear triggered by active stream erosion. Regional areas of instability initiated by mechanisms unrelated to fluvial processes are mapped as debris slide slopes.

Compound Slide

These slide complexes are typically larger in size and exhibit slope characteristics attributable to both recent and dormant-young movement. The surface expressions of these complexes alternate between smooth and well rounded, to hummocky and broken, depending on age and magnitude of ground movement. Hummocky and broken profiles are commonly associated with areas that have been altered by recent movement. Near-vertical, raw, unvegetated scarps often dissected these irregular hill slopes. The active areas also typically support warped and jackstrawed trees, as well as tilted stumps.

Small scale debris slide/ inner gorge slopes are common along the distal portions of these slides where they intercept down slope watercourses. Encroachment of these slides into the stream channels has resulted in the activation of a number of shallow debris slides along their distal margins as well as on the

surfaces of the adjacent stream bank. Slides in these areas range from active suspended to dormant-historic in age.

Inactive (dormant-young and older) complexes have muted and subdued surface expression but retain recognizable slide morphology. There is a general absence of deformed trees and distressed skid trails on these dormant areas. Old growth stumps are in natural growth positions and we did not observed evidence of recent or historic ground movement in these regions.

PREVIOUSLY MAPPED LANDSLIDE-RELATED LANDFORMS

Debris slides and debris slide slopes

Previous geomorphic mapping within the proposed units is limited, however, several debris slides and debris slide slopes have been mapped on adjacent slopes for earlier THPs (SHN, 2000; SGD, 2003; SGD, 2007; HRC, 2010). CGS Note 50 (1997) defines a debris slide slope as a geomorphic landform with a surface that has been sculpted over time by numerous debris slide events. Hillsides mapped as debris slide slopes typically have slope gradients greater than 65% and support an aggregate of variously-aged slide paths and debris masses. Mass movement on these slopes typically is translational in origin and occurs in unconsolidated colluvium and poorly indurated bedrock.

Our evaluation revealed that the majority of the previously mapped debris slides and debris slide slopes were accurately characterized and these areas have been subject to localized landslide activity, either recently or in the historic past. We observed scarps (fresh and weathered), slide scars, disturbed soils, deformed trees, and patches of irregular ground in these areas. Slopes within the mapped boundaries of these landforms typically have disrupted surface expressions. Previously mapped slides that deliver or have potential to deliver are within either Class II RMZs or STZs. The origin of the previous mapping is listed in the comments column of Appendix A.

These hillsides support widely spaced second growth conifer with minimal amounts hardwoods (principally tan oak). In the field, timber type, age, and density are fairly consistent. These slopes were selectively harvested in the middle to late 1990s and, in many locations, underwent re-entry in the early 2000s. The limited amount of recently active (less than 10 years old) landslides indicates these slopes perform well under selection silviculture. The recently active ground movement we did observe is overwhelmingly associated with fill prisms along existing roadways. It appears likely that the construction of the existing road grades incorporated excessive amounts of fill that was not compacted and possibly incorporated organic material in some locations. Past management strategies that contributed to fill slope instability are not proposed under this harvest plan.

Deep-seated Landslides

A number of deep-seated landslides identified on Map A-5, in the Mass Wasting Assessment module of the Freshwater Creek Watershed Analysis (MWAFCWA) report (Watershed Professionals Network, 2001) are within the operational limits of this THP (Figure 7). Deep-Seated landslides identified within the MWAFCWA were categorized based on qualitative hazard ratings. "These hazard ratings varied from very low to very high potential for reactivation or acceleration of movement" (Watershed Professionals Network, 2001). The Watershed Professionals Network (2001) goes on to explain the criteria used for each hazard class and describes their interpretations as conservative and the ratings likely overestimate the associated hazard.

All deep-seated landslides mapped within or adjacent the proposed units as part of the MWAFCWA have been given a hazard rating of low, low to moderate, or moderate (Figure 7). No areas of high or very high hazard ratings have been identified in the plan area. We found strong correlation between our mapping from field reconnaissance, review of previous mapping, and the deep-seated landslides identified for the MWAFCWA. We consider these landforms to be dormant-young or older based on site morphology, vegetation, and the well developed watercourse network that drains there surfaces.

UNCATEGORIZED SLOPES

Areas previously mapped as potentially unstable or as landslide-related landforms (such as dormant, deep-seated landslides) not identified on Figures 3 through 6 lacked evidence of having been altered by mass wasting processes either historically or in the recent past. We conclude, based on our field evaluation, that some of the areas of instability noted by prior investigators were not actually present or are significantly old (dormant-mature). Landforms considered dormant-young or older are of such age and magnitude that operations currently proposed on their surfaces should not have significant influences on their overall stability. This conclusion is supported by their lack of response to past land use activities, which were commonly aggressive in nature (clearcut, excessive ground-based yarding, burning, etc.) compared to those currently proposed. Consequently, we did not classify these landforms as unstable and did not restrict timber operations from occurring on them.

Slopes that did exhibit evidence of having a negative response to past management activities or are prone to landslide processes are shown on Figures 3 through 6 of this report as unstable areas. When appropriate, recommendations regarding land use activities on those areas of recent and/ or historic instability were provided and can be reviewed in the "Recommendations" section of this report.

DISCUSSION

Overview

Land use activities proposed under this THP include the removal of timber from the surfaces of a percentage of the landslides identified on Figures 3 through 6. Harvesting levels on these landslides will vary from site to site depending on the slope position of the failure, its potential for delivering sediment to down slope watercourses, and the management strategy proposed upslope. Logging operations on slopes adjoining slide areas that have recently or historically contributed sediment to a down slope watercourse will be restricted. Whereas timber stands on and around areas of concern that have not been a source of sediment will undergo standard uneven-age practices in accordance with group selection and single tree selection.

A majority of the areas of instability that have experienced and/ or are predisposed to future sediment delivery fall within a Class I or II RMZ and will be subject to limited harvest levels affiliated with the specific watercourse types. Where limited entry watercourse protection zones do not afford an adequate enough buffer or where not present due to site conditions, we established special treatment zones. Harvesting activities inside the special treatment zones will be single tree selection with the exclusion of group openings. Refer to the "Recommendation" section of this report for specific retention standards.

Several landslides identified on Figures 3 through 6 will be subjected to uneven-age management associated with group selection silviculturial practices. These particular landslide areas were identified as having a negligible probability of delivering sediment to a watercourse subsequent to timber operations. Although the rate of ground movement on these slopes could increase in response to the proposed land uses, there should be no net increase of landslide-derived sediment to the Freshwater Creek basin. Refer to Appendix A for land use practices currently proposed on each individual landslide.

Recent and Historic Landslides

Approximately 60% of the landslides identified during this assessment fall within RMZs and/ or Special Treatment Zones (STZs). RMZs and STZs encompass a wide range of timber types, including brush patches, open hardwood stands, and moderately to densely stocked stands of conifer. The project forester estimates that about 20% of the merchantable timber in areas that support ample amounts of canopy will be removed from the RMZs. There is a low probability that reducing the conifer component by this amount will adversely affect the hydrologic regime of the slopes in the RMZs or significantly reduce the resisting (cohesive) forces afforded by roots. Unharvested conifers (approximately 80% retained) and hardwoods (all) within these watercourse-protection zones will continue to provide canopy coverage, root strength properties, and evaporation and transpiration mechanisms to the managed and adjoining slopes.

Timber stands on landslides with potential for sediment delivery positioned outside the watercourse buffers will be managed in accordance with single tree selection siliviculture and limited harvest levels (100 sq ft basal area per acre). No group openings will be placed on or directly adjacent to landslides identified as being potential sources of sediment to down slope watercourses.

Vegetation retention areas (such as the ones proposed in this THP) have been found to be an effective management strategy for minimizing the impact of harvest operations on and around unstable slopes (Sidle, 1992; Sidle and Wu, 2001). Where applicable, the boundaries of limited harvest areas were positioned in a manner that would, in our professional opinion, mitigate and buffer against the anticipated changes in slope hydrology due to upslope land-use activities.

Our survey of the slopes within the RMZs/ STZs also revealed that a significant number of the trees marked for harvest are situated along the upper margins of the watercourse buffers and are frequently associated with stump sprouts. Harvesting timber from the upper edge of the protection zones will minimize the amount of ground disturbance within the buffer as well as reduce the amount of collateral damage to un-harvested timber. In addition, because many of the trees proposed for harvest in these zones are affiliated with dense pockets of timber and brush, we expect that there will be only a minimal impact on canopy coverage and root strength properties.

Because the slopes in the single-tree selection portions of the plan support fairly irregular stands of timber, harvesting levels on the slides in these areas will vary. In the areas where conifers are in limited numbers (less than the required basal area), we anticipate that little to no harvest operations will occur. In the denser conifer stands that support ample amounts of timber, the project forester estimates that between 20 and 40% of the merchantable timber will be harvested. Although these activities will diminish local interception, evaporation, and transpiration rates, they should not significantly influence slope stability (that is, result in landslides). The performance of recently managed slopes outside the THP suggests that a reduction in stand density and canopy coverage can occur without destabilizing the underlying hillside.

A percentage of the canopy coverage and root mass on slopes within the buffer areas is being provided by the under-story conifer, and the groundcover components of the stands proposed for entry under this harvest. The ground coverage and under-story foliage at times makes up more than half of the total canopy within the partial cut zones and is perceived to be a contributor to root strength values in these areas. Decreasing the biomass in the STZs by removing selected portions of the merchantable conifer element should not have a drastic impact on local or down-slope stability. The mid-story and understory foliage that remains following operations will continue to provide root strength, canopy, and evaporation and transpiration mechanisms. Even though these physical mechanisms will experience a short-term decrease as a result of harvesting operations, it should not exacerbate the rate of landsliding on the areas of instability.

Studies in Casper Creek suggest that the removal of vegetation alone typically does not trigger new landslides or reactivate dormant features (Bawcom, 2003; Cafferata and Spittler, 1998) but that disturbances associated with ground-based operations and road building tend to have a more significant impact. Because the yarding method proposed for most of the slopes in and around the landslides does not require the construction of new roadways or skid trails, we expect minimal amounts of ground disturbance to occur in or around the mapped areas of instability under this harvest entry. Therefore, we do not anticipate that operations, as proposed, will alter overland flow patterns or substantially change existing mass-balance forces (resisting and driving) that could significantly decrease a slope's resistance to landslide processes.

We do not anticipate that the removal of timber from landslides outside the STZs will have a significantly negative impact on local water quality as it relates to landslide process. The slope position of these failures and/ or the configuration of hillsides adjoining them are not readily conducive to the delivery of debris to down slope watercourses. If post-operational landslides were to occur, debris would have to overrun local benches, steep pitches, unmanaged stands, and/or enhanced RMZs prior to entering a watercourse. There is no evidence that past activity at these sites resulted in the degradation of local watercourses. Therefore, considering the physical constraints of the individual sites, we conclude that even if upslope operations have a destabilizing effect on the slide area, the probability of future events contributing a significant volume of sediment to nearby watercourses is negligible.

RECOMMENDATIONS

- No group openings are allowed within special treatment zones (STZ) (Figure 8 and 9). After discussion with the project forester, it was determined it would be appropriate to apply 100 square feet of conifer basal area retention per acre to those stands of timber encompassed by special treatment zones.
- The project geologist worked with the forester to mark timber proposed for harvest within the STZs.
- Refer to Figures 8 and 9 for general location of these STZs.

TIER II EVALUATION

As part of our assessment, we evaluated a series of maps that represent the minimum data review required to harvest in the Elk River watershed under the California Regional Water Quality Control Board, North Coast Region (RWQCB) permits. The RWQCB uses a model to estimate the effect of timber harvesting on peak flows in the Elk River Watershed. This model is based on the instigation of clear cut silvicultural practices and is used to determine allowable harvest limits in the watershed. Because the current landowner is only implementing selective silvicultural practices in the watershed, the previously determined harvest limits are considered conservative.

The following items were reviewed to evaluate slope stability in the plan area.

- 10-foot LIDAR contour map
- SHALSTAB model results
- Mass Wasting Potential (MWP) model results
- Geologic and Geomorphic Features Related to Landsliding, Freshwater Creek Watershed (CGS, 1999)
- Orthophotoquad imagery
- Watershed Analysis Deep-Seated Landslide Inventory (HRC, 2001)
- THP Operational maps with unit boundaries, creeks, and roads

A significant percentage of the steeper streamside slopes within the plan area were previously classified by CGS (1999b) as debris slide slopes (Figure 3). Intermixed with and underlying many of the debris slide slopes are large to moderate-sized, geomorphic features characterized as dormant, deep-seated, landslide-related landforms. Many of these landforms are multi-acre in size and extend from ridge crest to valley floor. The landslide map attached to the Mass Wasting Assessment module of Freshwater Creek Watershed Analysis (Watershed Professionals Network, 2001) also identifies features in the general vicinity of the landforms mapped by CGS (1999b).

The Hazard for Reactivation or Acceleration of Movement model used to evaluate these large-scale landslides (Watershed Professionals Network, 2001) classified deep-seated movement hazards in the plan area as "Low" to "Low to Moderate", except in Unit 4 where it was modeled as "Moderate". The stability of the landslide-related landforms (Figure 3) identified by CGS (1999b) does not appear to have been adversely impacted by past land use activities. We did not observe evidence of post-harvest adjustment associated with these features and there was an absence of morphology relating to recent or historic movement in these areas. Recent and historically active features on the surface of these larger landforms identified as having potentially negative responses to the proposed management strategies are identified as landslides on Figures 3 through 6.

The Mass Wasting Potential (MWP) model applied to the plan area identified a majority of the slopes as having "Low" to "Moderate" landslide potential. "High" potential polygons typically overlap the sidewalls of incised waterways that were previously mapped as debris slide slopes by CGS (1999b). We also noted that the location of the deep-seated landslides (Figure 6) correlate reasonable well with

locations of the "Moderate" and "High" MWP. No areas of "Very High" or "Extreme" MWP are modeled within the proposed units.

A relatively significant percentage of the slopes within the plan area were assigned "High" (2) to "Extreme" (1) landslide potential value by the SHALSTAB model. Pixels with "High" and "Extreme" (elevated) ratings were generally concentrated along waterways and/or directly overlap or abutted mapped watercourse channels. We observed moderate to good correlation between our landslide mapping and elevated SHALSTAB pixels.

Those regions identified by these models that correspond to areas of recent or historic instability are mapped as unstable landforms on Figures 3 through 6. A majority of the high hazard areas overlap slopes devoid of morphology indicative of recent or historic instability. As such, these areas were compared to adjacent lower hazard modeled slopes with similar slope inclination, convergence, and vegetative coverage to determine if unstable conditions existed. Where field observation suggested that the model was incorrect in assessing the potential for mass wasting, especially in response to selective silviculture, the modeled areas were not considered potentially unstable and are not identified on the landslide maps.

CONCLUSION

Logging operations, as presently proposed under Fresh Aire 13 THP, have a low probability of accelerating the contribution of sediment to down slope bodies of water. Our recommendations are intended to minimize the impact the proposed timber operation could have on the delivery rate of landslide-derived sediment to local watercourses.

Increased retention of timber will be implemented on those slopes identified as being unstable and potential sources of sediment to downstream watercourses. The restrictive practices proposed on these slopes will result in the retention of a variably thick assemblage of conifers, hardwoods, and shrubs following the completion of operations. Timber retained on the slopes will continue to provide canopy coverage, root strength, and transpiration and interception mechanisms. Even though the stabilizing effects provided by canopy coverage and root strength will decrease as a result of harvest operations, the overall reduction should be minor and, in our professional opinion, have a low probability of increasing the rate of landslide-derived sediment to down slope watercourses. This plan appears to conform to the hill slope-management strategy that applies to HRC ownership under the prescription of the HCP. Impacts to sediment delivery are not anticipated to exceed offsetting sediment mitigation required under the terms of HRC's HCP.

Although intermediate harvest methods are proposed for all those unstable areas that could produce sediment delivering events, future failures cannot be prevented from occurring on these slopes. For example, debris-slide slopes and inner-gorge slopes are inherently prone to mass-wasting events; therefore, it is reasonable to assume that the dynamic hill slope process affiliated with these geomorphic features will continue regardless of whether management activities occur or not. It has been demonstrated that unseasonably high intensity/ long-duration rainfall events or large magnitude earthquakes can trigger landslides in these types of geologic environments, whether the ground is forested or not. Consequently, restricting logging operations on these slopes does not preclude ground movement from occurring.

LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on site conditions that we observed at the time of our investigation, our current understanding of proposed project, and our experience with similar projects in similar geologic environments. We have assumed that the information obtained from our observation is representative of conditions throughout the plan area. If differing conditions are encountered during operations, our department should be notified immediately so that we can reevaluate the applicability of our conclusions and recommendations. Such an evaluation may result in reconsidered and/ or amended recommendations. If proposed harvest unit locations and intended uses change from those described in this report, our recommendations should also be reviewed.

In addition, because the project area is located in a dynamic environment that is subject to large scale, catastrophic events (great earthquakes, large storms, etc.), we cannot preclude changes that may occur in the future that could alter site conditions. Consequently, we reserve the right to make such adjustments to our report that may be required by passage of time, change in condition, or in the consideration of additional or more pertinent data that may become available in the future.

Figures contained within this report are for illustrative proposes only and the location of the landslides and their dimensions are approximate. Any differences that may be noted in dimensions, locations, etc., are not likely to affect the conclusions contained within this report significantly.

The GeoScience Department has prepared this report for exclusive use on this project in substantial accordance with the generally accepted practice as it exists in the site area at the time of our study, including time and budget constraints. No warranty is expressed or implied.

Lastly, this report applies only to the sites described above. Because of the high degree of variability in geology in this region, it is not possible to extrapolate the results described herein to any other site. This report is to be considered in its entirety. No part, section, paragraph, sentence, or phrase is to be quoted, evaluated, or otherwise used without considering its context and relationship to the entire report.

ATTACHED FIGURES

Figure 1:	Location Map
Figure 2a:	Geologic Map modified from CGS (1999b).
Figure 2b:	Key to Geologic Map modified from CGS (1999b).
Figure 3:	Areas of Concern Map; Units 1 and 2
Figure 4:	Areas of Concern Map Units 3, 4, 5, and 11
Figure 5:	Areas of Concern Map Units 6, 7, 8, and 9
Figure 6:	Areas of Concern Map Units 8, 9, and 10
Figure 7:	Deep-Seated Landslide Inventory from Freshwater Creek WA
Figure 8:	Special Treatment Zones Map, southwestern portion
Figure 9:	Special Treatment Zones Map, northeastern portion
Appendix A:	Landslide Inventory Table

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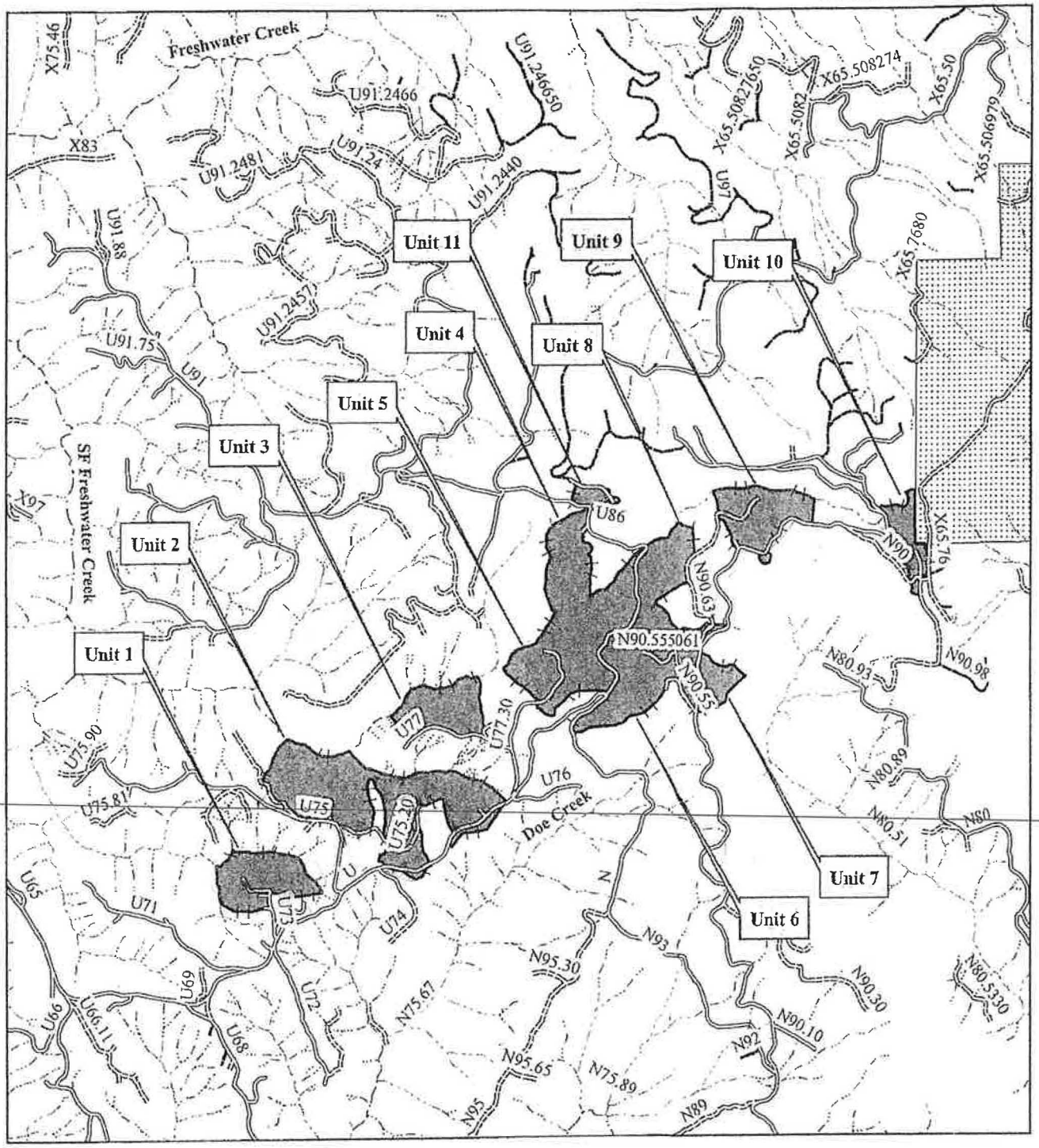
FIGURES

Fresh Aire 13 THP



Watercourses	Roads	Ownership	THP Boundary
Class 1	Rocked Roads	Other	Fresh Aire 13
Class 2	Dirt Roads	HRC	
Class 3	Proposed Roads		

Humboldt Redwood Company	N	Feet 2,000 1,000 0 2,000	Figure 1: Location Map
Drawn by: swatkins			
Date: 6/14/2013			

Watercourses	Roads	Ownership	THP Boundary
Class 1	Rocked Roads	Other	Fresh Aire 13
Class 2	Dirt Roads	HRC	
Class 3	Proposed Roads		

Humboldt Redwood Company	N	Feet 2,000 1,000 0 2,000	Figure 2a: Geologic Map
Drawn by: swatkins			modified from CGS (1999b)
Date: 6/14/2013			

CGS Freshwater LS pts

air photo. observed

- 1942
- 1948
- 1954
- 1962
- 1966
- 1974
- 1984
- 1996
- 1997
- 1998
- 1999

CGS Freshwater structure

structure

- anticline, approx. loc.
- fault, approx. loc.
- fault, concealed
- thrust fault, approx. loc.
- thrust fault, concealed
- ?thrust fault, queried
- lineament

CGS Freshwater lines

- inner gorge
- torrent track

CGS Freshwater LS

failure mode, activity

- debris flow, historic
- debris slide, dormant
- debris slide, historic
- earthflow, dormant
- earthflow, historic
- translational/rotational, dormant
- translational/roatational, historic
- debris slide slopes

CGS Freshwater symbols

LS line

- active to historically active
- dormant

CGS Freshwater contacts

Contact

- approimately located
- certain location
- queried location

CGS Freshwater geology

Q Recent Alluvium: Holocene (less than 10,000 years old). Interbedded gravel, sand, silt and clay within active stream channel and adjoining flood plain. Dike-protected pastures may be underlain by bay mud at northwestern end of flood plain.

Qfa Falor Formation (Knudsen, 1993): Late Pleistocene to late Pliocene (approximately 0.4 to 1.6 m.y.). Reddish-yellow pebbly conglomerate, sandstone and silt. Contains abundant animal and plant remains locally. May lie in gradational contact with Wildcat Group Upper Unit of Knudsen (1993). Fluvial and shallow marine depositional environment.

Qrt Alluvial Terrace Deposits: Probably late Pleistocene (more than 10,000 years old). Poorly consolidated flat-lying deposits of gravel, sand, silt and clay elevated above present streams.

TWu Wildcat Group- Upper Unit (Knudsen, 1993): Late Pleistocene to Late Pliocene (approximately 0.4 to 1.6 m.y.). Reddish-yellow fine- to medium-grained sandstone containing scattered pebble layers (<10%). Previously mapped as Hookton Formation in the southwest portion of the drainage and Falor Formation in the northeast. Depositional environment is generally shallow marine.

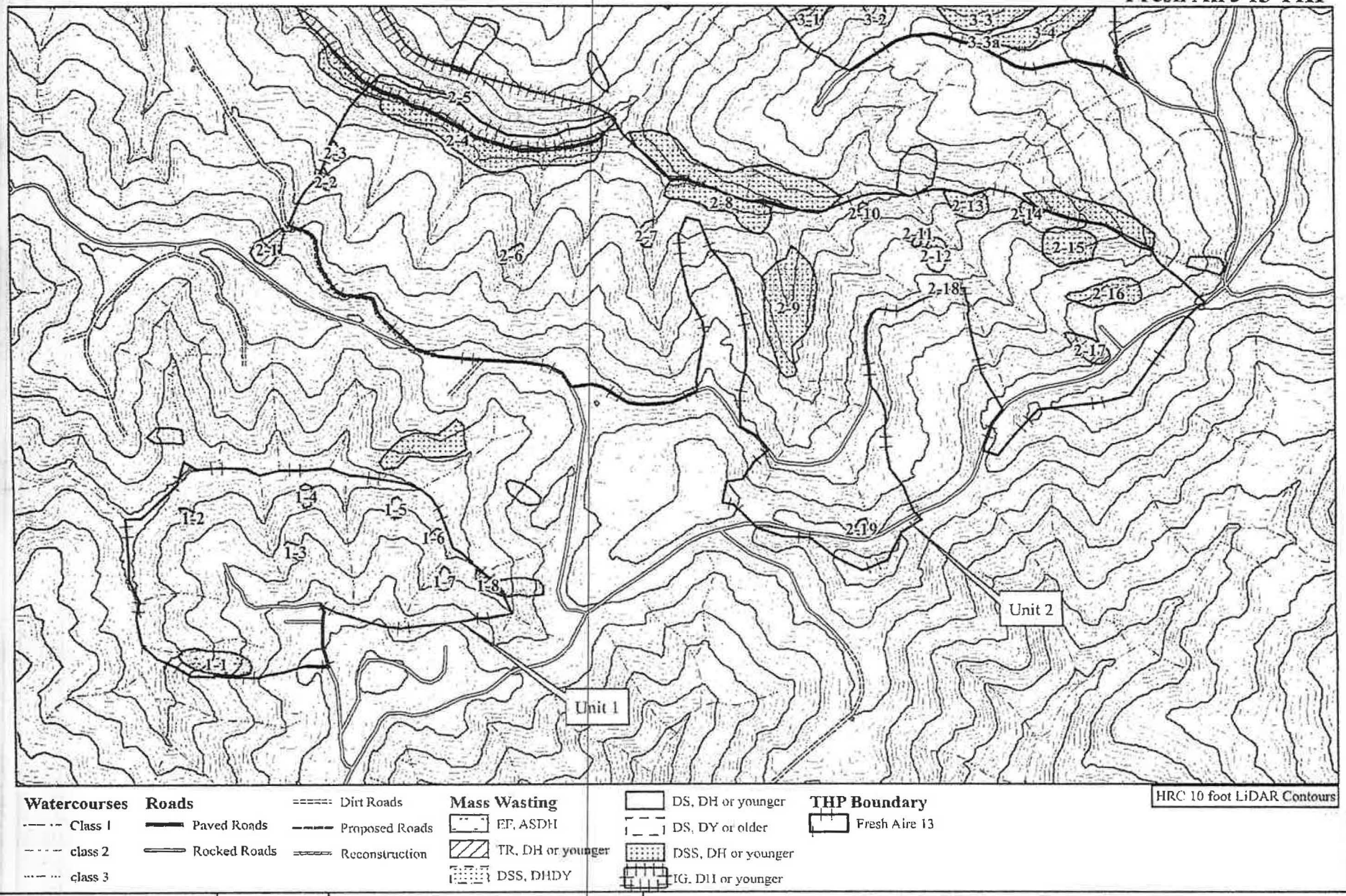
Twl Wildcat Group-Lower Unit (Knudsen, 1993): Middle Miocene to Late Pliocene (approximately 1.6 to 13 m.y.). Interbedded mudstone, silty, very fine sandstone and sandy siltstone. Upper portions of the unit are typically reddish-yellow, lower portions are gray to dark gray. Lower protions sandier and contain occasional pebble and conglomerate lenses.

Ty Yager Formation: Early Tertiary (approximately 50 to 60 m.y.) Interbedded well-consolidated silty shale, siltstone, sandstone, mudstone and conglomerate. Clasts of the shale and mudstone disaggregate over the course of several seasons by repeated wetting and dryig cycles. Sandstone units are generally massive (no visible bedding) and contain detrital muscovite. Medium gray where fresh. Finer grained materials are often well bedded. The unit in this locality is mapped as dipping steeply to the northeast.

Kjfs Central Belt of the Franciscan Complex, Sedimentary Rocks: Cretaceous/Jurassic (approximately 145 m.y.). Well consolidated sandstone, siltstone, and shale with minor amounts of conglomerate. Medium to dark gray where fresh. This unit is described as moderately to highly deformed and highly sheared locally.

Kjfm Melange: Highly sheared shale matrix containing individual blocks of graywacke, mudtone, conglomerate, greenstone, chert, blueschist, greenschist, actinolite, talc and serpentinite.

HRC Geology Department			**Figure 2b: Key to Geologic and Geomorphic Features Related to Landsliding**
Drawn By: swatkins			modified from CGS (1999b)
Date: 6/14/2013			



HRC Geology Department	
Drawn by: swatkins	
Date: 6/14/2013	

N

Feet

500 250 0 500

Figure 3: Areas of Concern Map, Units 1 and 2

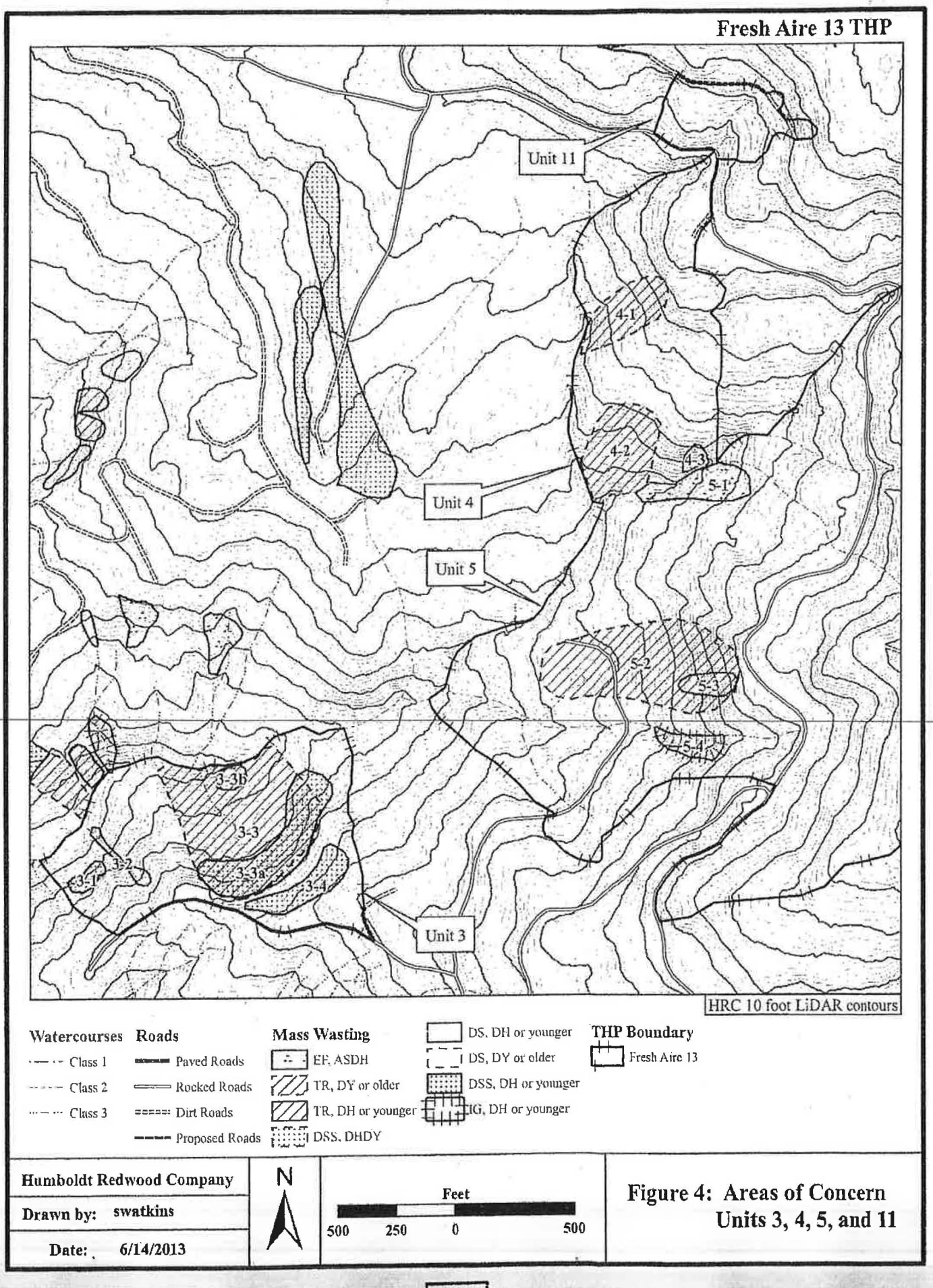
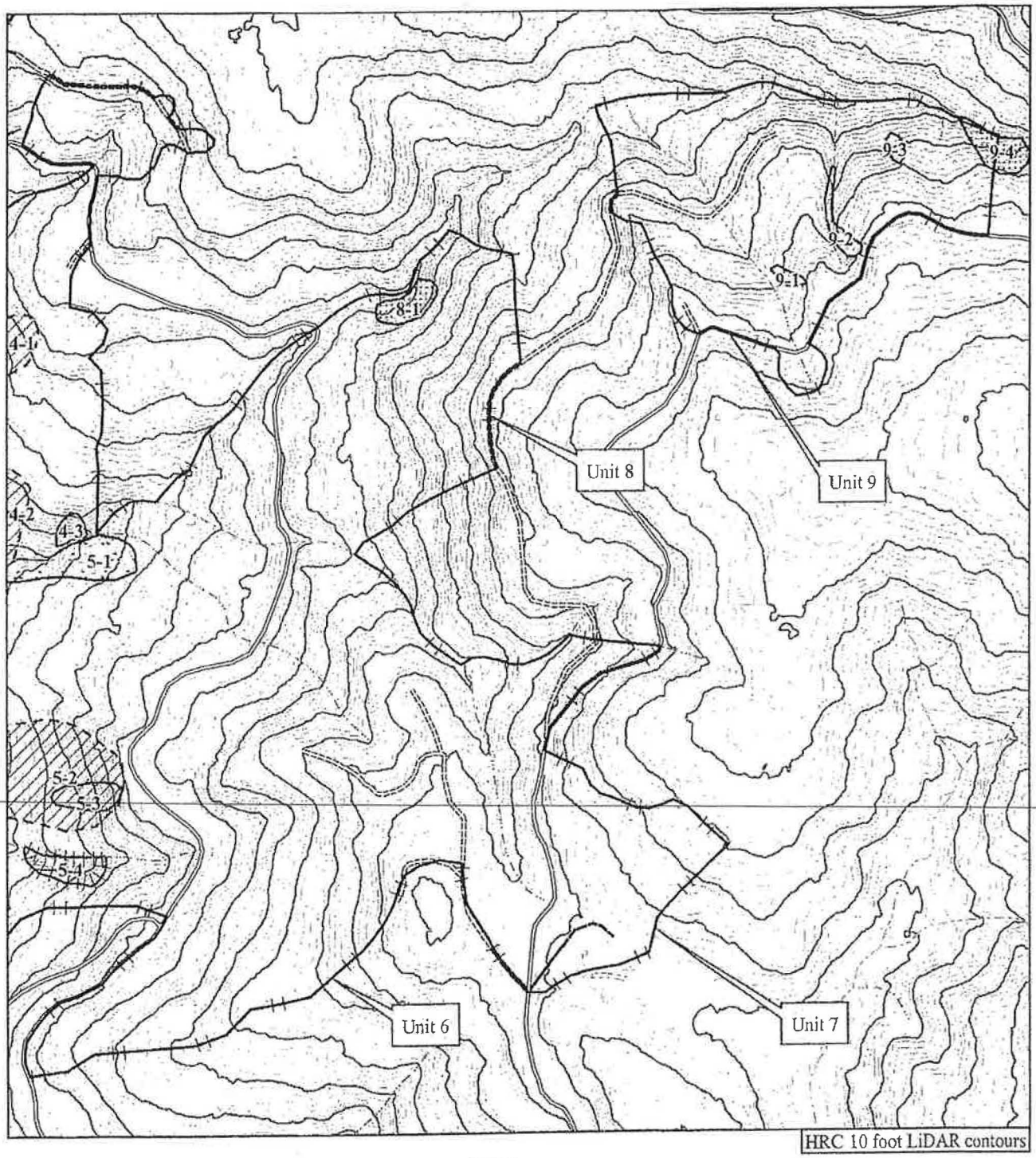


Figure 4: Areas of Concern
Units 3, 4, 5, and 11



Watercourses
- Class 1
- Class 2
- Class 3

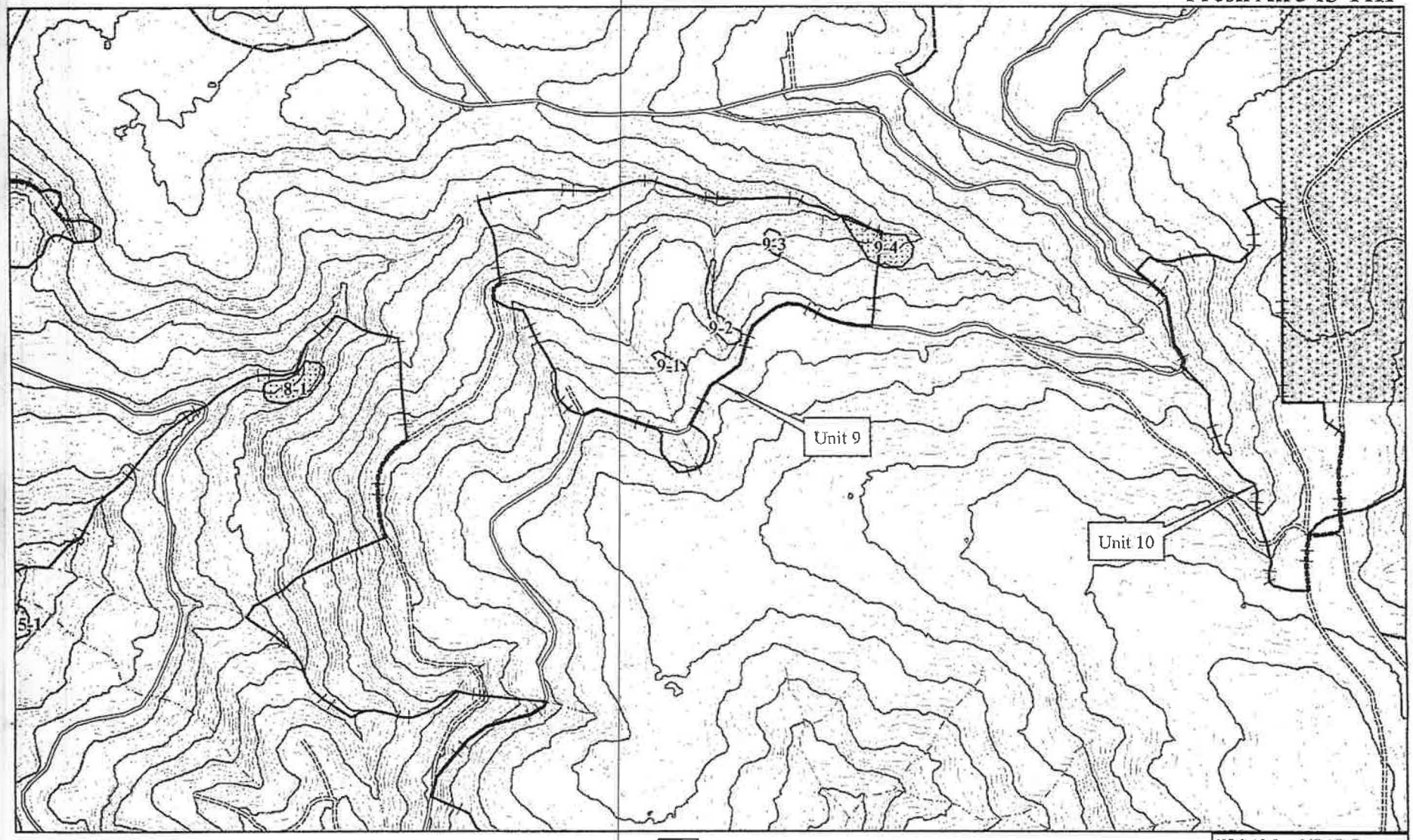
Roads
- Paved Roads
- Rocked Roads
- Dirt Roads
- Proposed Roads

Mass Wasting
- EF, ASDH
- TR, DY or older
- TR, DH or younger
- DSS, DHDY
- DS, DH or younger
- DS, DY or older
- DSS, DH or younger
- IG, DH or younger

THP Boundary
- Fresh Aire 13

Humboldt Redwood Company	N	Feet: 500 250 0 500
Drawn by: swatkins		
Date: 6/14/2013		

Figure 5: Areas of Concern Units 6, 7, 8, and 9



Watercourses
- Class 1
- class 2
- class 3

Roads
- Paved Roads
- Rocked Roads
- Dirt Roads
- Proposed Roads
- Reconstruction

Mass Wasting
- EF, ASDH
- TR, DH or younger
- DSS, DHDY
- DS, DH or younger
- DS, DY or older
- DSS, DH or younger
- IG, DH or younger

THP Boundary
- Fresh Aire 13

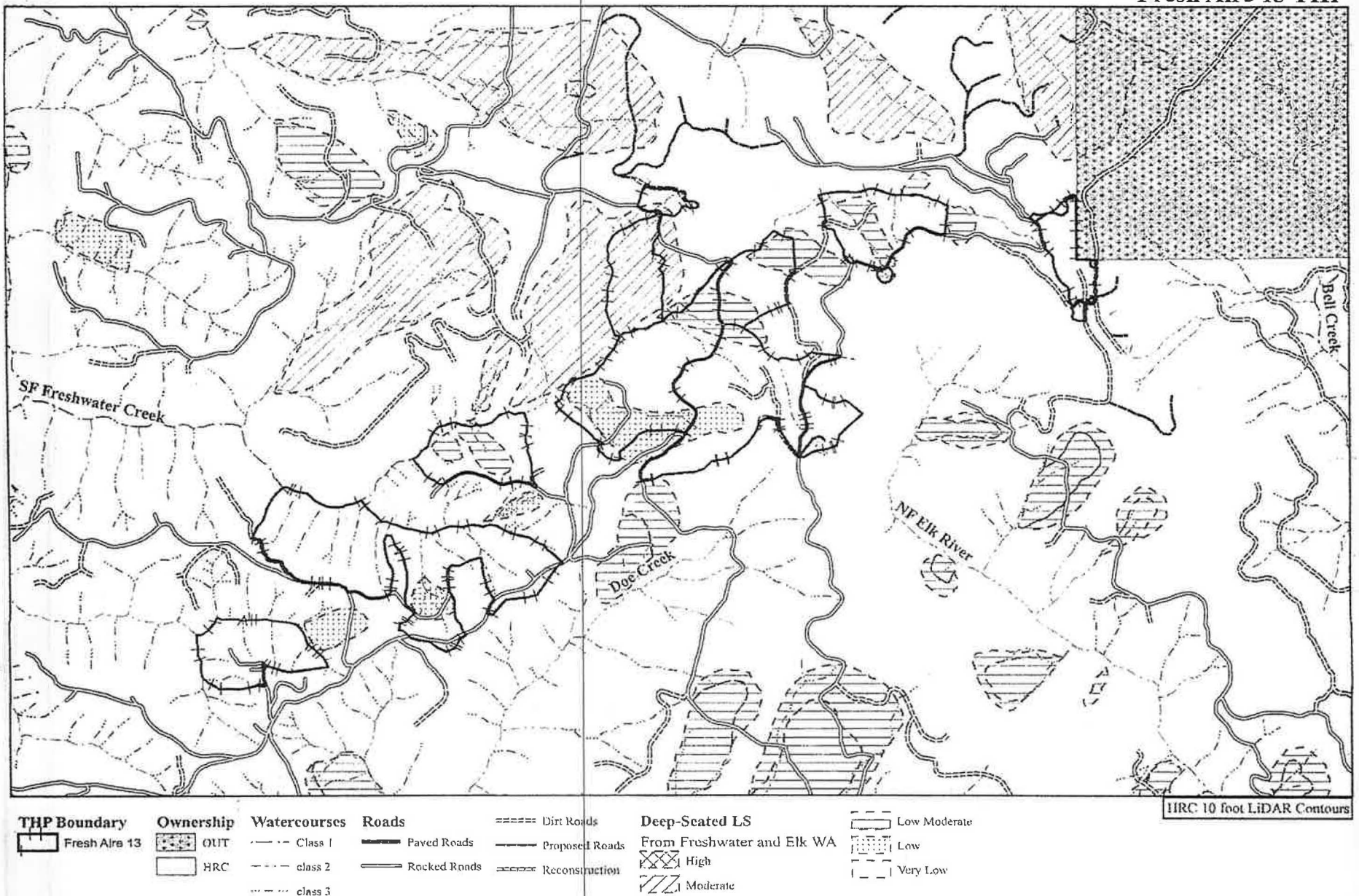
HRC Geology Department	
Drawn by:	**swatkins**
Date:	**6/14/2013**

N

Feet

500 250 0 500

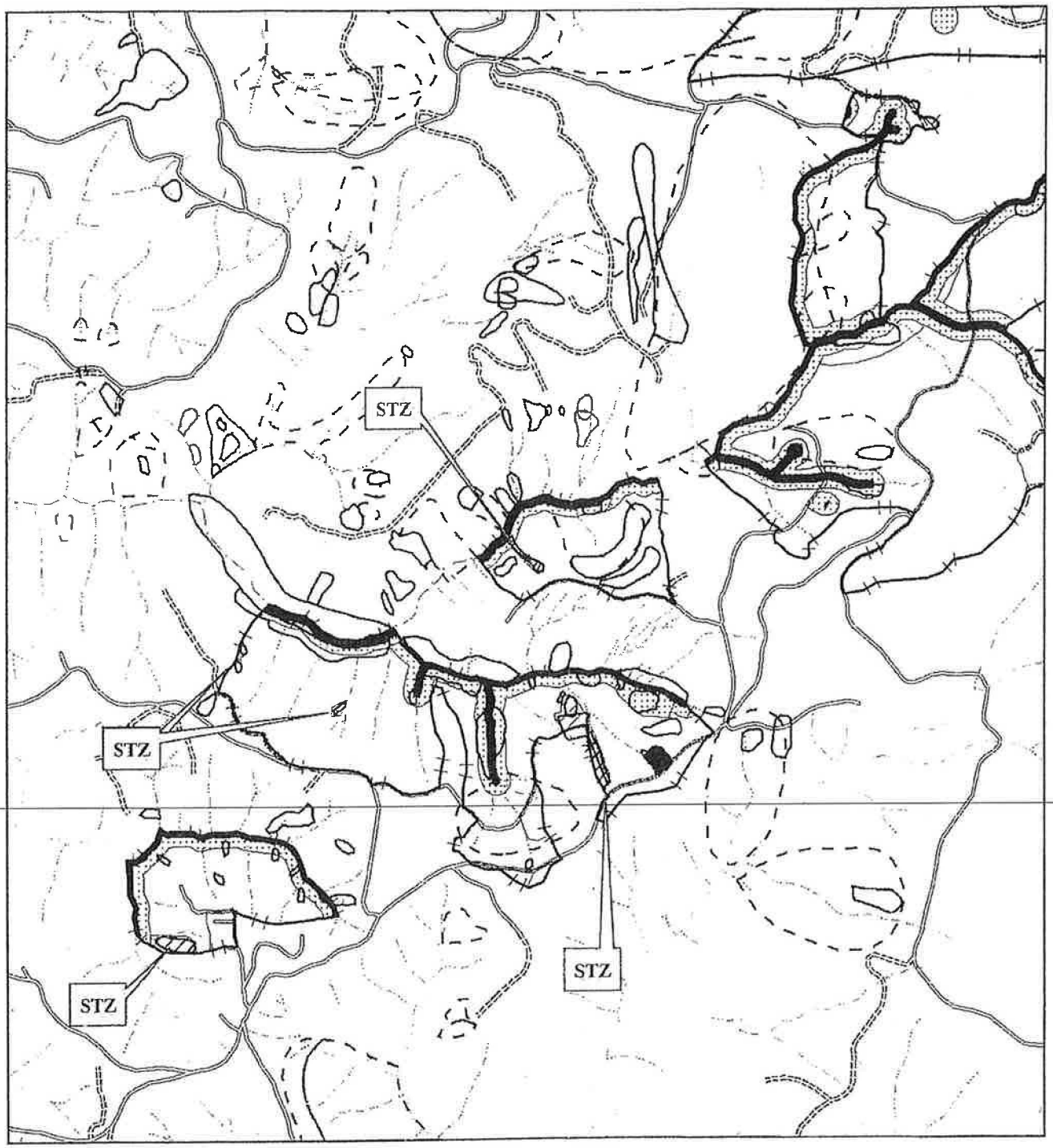
Figure 6: Areas of Concern Map, Units 9 and 10



HRC Geology Department
Drawn by: smw
Date: 6/14/2013

Figure 7: Freshwater and Elk R. Deep-Seated Landslide Inventory and Hazards

modified from Freshwater Creek and Elk River Watershed Analysis



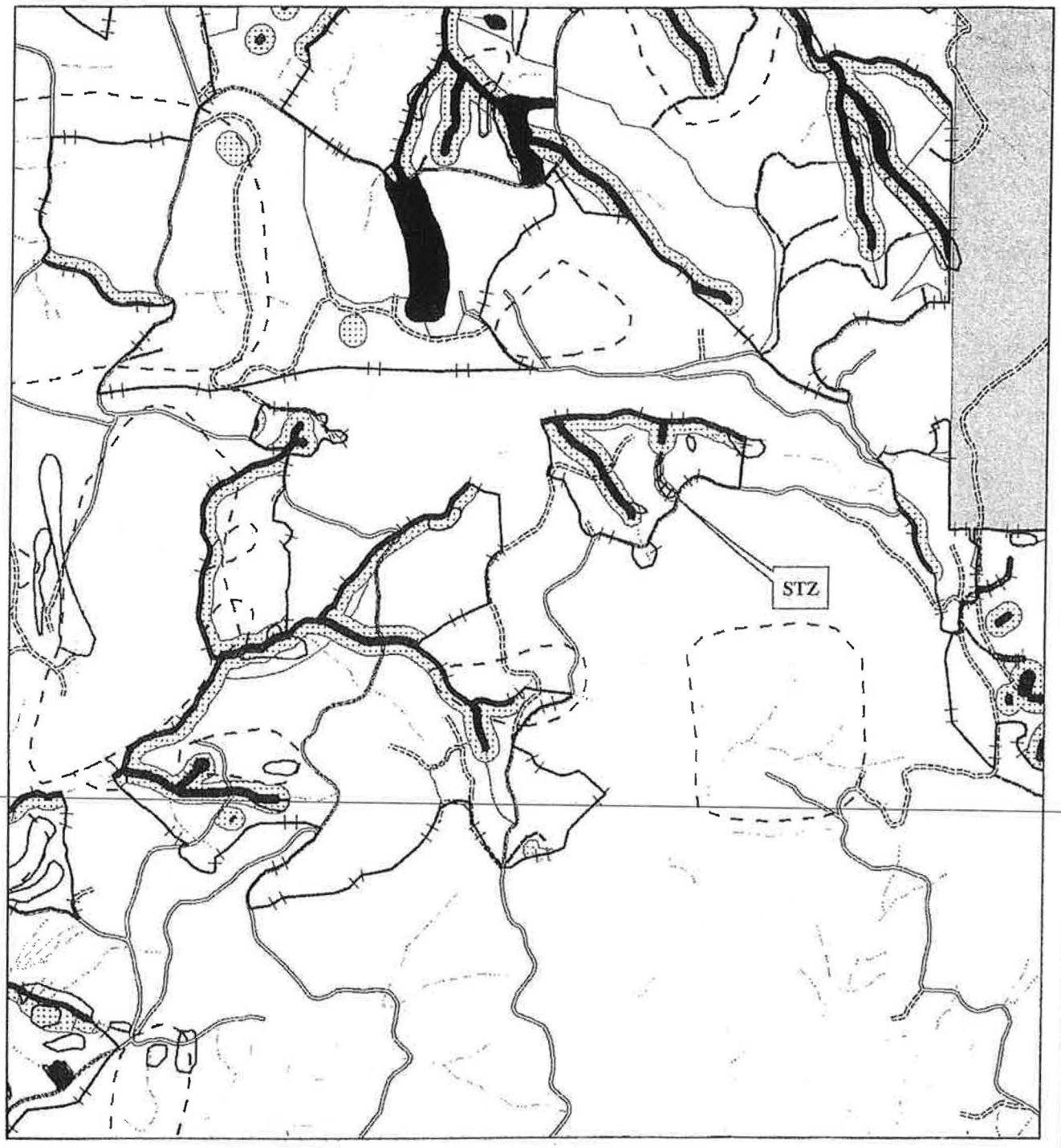
Roads
- Paved Roads
- Rocked Roads
- Dirt Roads
- Proposed Roads

Watercourses
- Class 1
- Class 2
- Class 3

MassWastingInv
- DH or younger
- DY or older

RMZ / STZ
- GSEL
- NOCUT
- SEL
- STZ

Humboldt Redwood Company	N	Feet: 1,000 500 0 1,000	**Figure 8: Special Treatment Zones Map, southwestern portion**
Drawn by: swatkins			
Date: 6/26/2013			



Roads	Watercourses	MassWastingInv	RMZ / STZ
Paved Roads	Class 1	DH or younger	GSEL
Rocked Roads	Class 2	DY or older	NOCUT
Dirt Roads	Class 3		SEL
Proposed Roads			STZ

Humboldt Redwood Company	N	Feet 1,000 500 0 1,000	Figure 9: Special Treatment Zones Map, northeastern portion
Drawn by: swatkins			
Date: 6/26/2013			

APPENDIX A

Landslide Inventory Table

Appendix A
Areas of Concern Characteristics
Fresh Aire 13 THP

ID #	Landslide type	Age	Dimensions (W x L x D) (ft.)	Depletion/ Accumulation Zone Characteristics	Del.	Proposed Silviculture	Comments	Rec.
1-1	earthflow	active-suspended to dormant-historic	80 x 250 x 6	Weathered and vegetated scarps at distinct break in slope, hummocky slopes adjacent Class III	potentially	STZ	previously mapped by SHN (2000)	no groups, 100 sq ft BA/acre post harvest
1-2	debris slide	dormant-historic	40 x 90 x 5	brush with few merchantable trees on or adjacent to slide	potentially	Class II RMZ protection	previously mapped by SHN (2000)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
1-3	debris slide	dormant-historic	40 x 80 x 4	initiated on steep streamside slope, few merchantable trees	no	group selection	unlikely to deliver based on low gradient bench capturing deposit, previously mapped by SHN (2000)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
1-4	debris slide	dormant-historic	40 x 100 x 4	young regenerating timber with few mature 2nd growth	potentially	Class II RMZ protection	previously mapped by SHN (2000)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
1-5	debris slide	dormant-historic	40 x 75 x 4	young regenerating timber with few mature 2nd growth	potentially	Class II RMZ protection	forester expanded RMZ to encompass landslide	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
1-6	translational/ rotational	dormant-historic	70 x 30 x 5	steep streamside slopes extending approximately 100 feet upslope from Class II watercourse	yes	Class II RMZ protection	forester expanded RMZ to encompass landslide	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
1-7	debris slide	dormant-historic	45 x 80 x 5	dense brush, few merchanable trees in vicinity	yes	Class II RMZ protection	forester expanded RMZ to encompass landslide	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
1-8	debris slide slope	dormant-historic	120 x 45 x 4	dense brush, few merchanable trees in vicinity	yes	Class II RMZ protection	forester expanded RMZ to encompass landslide	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-1	translational/ rotational	active-suspended to dormant-historic	100 x 170 x 6	initiated in road fill, displaced skid trail crossed body, depostited on down slope road	yes	outside unit boundary	initiated after 2000 and prior to 2003 based on air photo review, previously mapped by SGD (2007)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-2	translational/ rotational	dormant-historic	40 x 100 x 5	dense brush, no merchantable timber on slide	yes	STZ	there are no trees to harvest from this landslide	no groups, 100 sq ft BA/acre post harvest

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Appendix A
Areas of Concern Characteristics
Fresh Aire 13 THP

ID #	Landslide type	Age	Dimensions (W x L x D) (ft.)	Depletion/ Accumulation Zone Characteristics	Del.	Proposed Silviculture	Comments	Rec.
2-3	translational/ rotational	dormant-historic	40 x 75 x 6	dense brush, no merchantable timber	yes	STZ	there are no trees to harvest from this landslide	no groups, 100 sq ft BA/acre post harvest
2-4	debris slide slope	active-suspended to dormant-historic	1200 x 100 x 4	occurs at distinct break-in-slope that may coincides with lithologic contact	potentially	Class I RMZ protection	numerous in situ old growth stumps and striaght growing second growth between vegetated debris slides scars	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-5	inner gorge	active-suspended to dormant-historic	1700 x 150 x 5	steep streamside slopes leading towards confined Class I watercourse	yes	inner band Class I RMZ, no harvest proposed	previously mapped by SGD (2003)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-6	debris slide	dormant-historic	40 x 100 x 4	dense brush, no merchantable timber on slide	yes	STZ	there are no trees to harvest from this landslide	no groups, 100 sq ft BA/acre post harvests
2-7	translational/ rotational	dormant-historic	40 x 60 x 6	rotated old growth stump on slide mass	yes	Class II RMZ protection	slump along stream bank	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-8	debris slide slope	dormant-historic	400 x 90 x 4	hummocky ground down slope of distinct break-in-slope	yes	Class II RMZ protection	numerous in situ old growth stumps and striaght growing second growth between vegetated debris slides scars	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-9	debris slide slope	dormant-historic	500 x 120 x 4	steep streamside slopes	yes	Class II RMZ protection	slopes preformed well following previous selection harvest	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-10	debris slide	dormant-historic	40 x 80 x 4	swept and leaning 2nd growth on body of slide	yes	Class II RMZ protection	unlikely trees will be harvested at this location due to reduced existing canopy and canopy retention standards required for Class II RMZ	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-11	debris slide (embankment failure)	dormant-historic	30 x 75 x 4	initiated in fill prism of skid trail	no	group selection	deposit on low gradient bench ~ 50' upslope from nearest watercourse	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-12	earthflow (embankment failure)	active-suspended to dormant-historic	75 x 140 x 5	slash and LWD exposed in deposit, sharp sparsely vegetated head scarp, no merchantable trees on slide	potentially	STZ	initiated at outboard edge of landing, numerous skids leading towards landing	no groups, 100 sq ft BA/acre post harvest
2-13	debris slide slope	dormant-historic	140 x 100 x 5	muted slide morphology on steep streamside slopes	yes	Class II RMZ protection	straight growing second growth on body	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources

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Appendix A
Areas of Concern Characteristics
Fresh Aire 13 THP

ID #	Landslide type	Age	Dimensions (W x L x D) (ft.)	Depletion/ Accumulation Zone Characteristics	Del.	Proposed Silviculture	Comments	Rec.
2-14	debris slide	dormant-historic	50 x 100 x 5	distinct slide morphology on steep streamside slopes	yes	Class II RMZ protection	unlikely trees will be harvested at this location due to reduced existing canopy and canopy retention standards required for Class II RMZ	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-15	debris slide slope	dormant-historic	200 x 135 x 6	bedrock exposed in head scarps beneath dense vegetative cover	yes	Class II RMZ protection	forester expanded Class II RMZ to encompass landform	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-16	debris slide slope	dormant-historic	250 x 100 x 5	landig and skid trail fill contributed to instability	no	group selection	most recent failure initiated at western edge of landform esposing bedrock in head scarp	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
2-17	translational/ rotational (embankment failure)	dormant-historic	85 x 175 x 8	initiated at outboard edge of mainline haul road where head of Class III watercourse terminates	yes	STZ	head scarp laid back and road realigned inboard (full bench), surface water drains away, no merchantable trees on slide	no groups, 100 sq ft BA/acre post harvest
2-18	disrupted ground	dormant-historic	175 x 180 x 4	skid trail down Class III watercourse leads towards landing where numerous skids converg	yes	STZ	no merchatable trees on landing where LS 2-12 initiated, skid down Class III does not appear unstable, minor down cutting has occurred	no groups, 100 sq ft BA/acre post harvest
2-19	debris slide (embankment failure)	dormant-historic	50 x 100 x 5	dense brush on slide, no merchatable timber	no	group selection	initiated at outboard edge of mainline haul road	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
3-1	debris slide slope	dormant-historic	180 x 70 x 5	initiated on small bluff feature with deposit forming talus slope	no	group selection	slope performed well after previous partial harvest	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
3-2	debris slide	dormant-historic	50 x 325 x 5	hummocky morphology with dense brush cover, Class III channel is poorly developed	yes	STZ	no merchatable timber on landslide	no groups, 100 sq ft BA/acre post harvest
3-3	translational/ rotational	dormant-young to dormant-mature	500 x 600 x 12	step-riser morphology indicative of rotational slide plane	no	group selection	previously mapped by SGD (2003)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
3-3a	debris slide slope	dormant-historic	650 x 130 x 5	shallow raveling of dormant head scarp	no	group selection	abrupt break in slope possiblly related to Freshwater fault mapped in close proximity by Falls (1999)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources

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Appendix A
Areas of Concern Characteristics
Fresh Aire 13 THP

ID #	Landslide type	Age	Dimensions (W x L x D) (ft.)	Depletion/ Accumulation Zone Characteristics	Del.	Proposed Silviculture	Comments	Rec.
3-3b	translationsl/ rotational	dormant-historic	120 x 150 x 6	swept and leaning trees down slope of distinct head scarp	yes	Class II RMZ protection	initiated in deposit of dormant landslide	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
3-4	debris slide slope	dormant-historic	445 x 115 x 4	shallow raveling along steep slope	no	group selection	abrupt break in slope possible related to Freshwater fault mapped in close proximity by Falls (1999)	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
4-1	translationsl/ rotational	dormant-young to dormant-mature	200 x 400 x 10	swale has step-riser morphology which is indicative of rotational failure	no	group selection	muted slide morphology with straight growing conifer and in situ old growth stumps	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
4-2	translationsl/ rotational	dormant-young to dormant-mature	280 x 400 x 10	swale has step-riser morphology which is indicative of rotational failure	no	group selection	muted slide morphology with straight growing conifer and in situ old growth stumps	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
4-3	debris slide	dormant-historic	75 x 120 x 5	initiated on steep streamside slopes	yes	Class II RMZ protection	steep streamside slopes on outside of gentle meander	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
5-1	earthflow	active-suspended to dormant-historic	175 x 290 x 6	distinct head scarp on moderately inclined slopes (~40%), hummocky morphology on body	yes	Class II RMZ protedtion	Falls (1999) maps Freshwater fault in close proximity to earthflow	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
5-2	translational/ rotational	dormant-young to dormant-old	350 x 850 x 12	step-riser morphology, highly muted lateral extents of slide	no	group selection	topographic expression indicative of dormant deep-seated landslide	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
5-3	debris slide	dormant-historic	100 x 245 x 6	swept and leaning second growth conifer, rotated old growth stumps, deposit is hummocky and backfills stumps and trees	no	group selection	landslide deposits on gently inclined bench approximately 400 feet upslope of nearest watercourse	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
5-4	inner gorge	dormant-historic	270 x 100 x 4	slopes are densely vegetated with brush and few swept and leaning conifer	yes	Class II RMZ protedtion	steep streamside slopes leading towards confined Class II watercourse	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources

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Appendix A
Areas of Concern Characteristics
Fresh Aire 13 THP

ID #	Landslide type	Age	Dimensions (W x L x D) (ft.)	Depletion/ Accumulation Zone Characteristics	Del.	Proposed Silviculture	Comments	Rec.
8-1	debris slide slope	dormant-historic	260 x 135 x 6	dense brush and few merchantable trees on steep streamside slopes	yes	Class II RMZ protection	this slope was selectively harvested in 1989	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
9-1	debris slide	dormant-historic	45 x 120 x 4	dense brush and few merchatable trees, slide appears related to landing fill at head and displaced skid trail across body	no	group selection at upslope portion, mid and down slope portions within Class II RMZ protection	visible in 1997 aerial photographs	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
9-2	debris slide (embankment failure)	dormant-historic	50 x 350 x 6	initiated at outboard edge of road near upslope extent of Class III watercourse	yes	STZ	no merchatable trees on slide, vegetated with alder and brush	no groups, 100 sq ft BA/acre post harvest
9-3	debris slide	dormant-historic	55 x 110 x 5	numerous skid trails in area	no	group selection	vegetated with hardwoods and young conifer ~12 inches DBH	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources
9-4	debris slide slope	active-suspended to dormant-historic	250 x 120 x 6	initiated on steep streamside slopes	yes	Class II RMZ protection	half of landform outside unit, no merchatable timber, vegetated with alders	none; proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic resources

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Humboldt Redwood Company LLC

Erosion Control Plan (ECP) for the " Fresh Aire 13" THP

This plan is being included in the THP to partially meet the requirements of the North Coast Regional Water Quality Control Board Watershed-wide Discharge Requirements. (**WWDRs**)

All operational portions of this ECP that are to be enforced through the Forest Practice Rules have been included in Section II of the THP.

Version **20080819**

Humboldt Redwood Company LLC Erosion Control Plan (ECP)

This document addresses the requirements of the California Regional Water Quality Control Board, North Coast Region Order No. R1-2006-0039 (Elk River) for an Erosion Control Plan (ECP) related to timber harvest activities on Non-Federal lands in the North Coast Region (Sec. III D2 and D3). The responsible party for this ECP is Humboldt Redwood Company LLC, P.O. Box 712 Scotia, CA 95565 (707) 764-2330.

This ECP is submitted for: THP Name: **Fresh Aire 13**
Contact Person: **Jon Woessner, North Area Manager** Phone: **(707) 764-4376**

The landowner is committed to a wide variety of measures to prevent and minimize the discharge or threatened discharge of sediment from controllable sediment discharge sources as part of this project into the waters of the state in violation of applicable water quality requirements. Prevention and Minimization of Controllable Sediment Discharge Sources associated with this project are identified in the *Controllable Sediment Sources* table. The specific conditions of sediment discharge sources and a summary of prevention and minimization measures (Section I) are identified in the table. General prevention and minimization measures for the project (Section II) are incorporated in the ECP by reference.

The RPF and/or the RPF Designee have conducted an inventory of potential "controllable sediment discharge sources" within the project area. As defined in California Regional Water Quality Control Board Order No. R1-2006-0041 (Freshwater Creek).

> "Controllable sediment discharge source" means sites or locations, both existing and those created by proposed timber harvest activities, within the Project area that meet all the following conditions:
>
> 1. is discharging or has the potential to discharge sediment to waters of the state in violation of applicable water quality requirements or other provisions of these WWDRs,
> 2. was caused or affected by human activity, and
> 3. may feasibly and reasonably respond to prevention."

Upon guidance of the North Coast Regional Water Quality Control Board (NCRWQCB) staff, discharge from the source must be likely to occur during the life of the Timber Harvesting Plan (THP) and WWDR. (Holly Lundborg, personal communication)

The inventory method consisted of an appurtenant road survey, aerial photos and ground assessments of the harvest units, and a complete ground assessment of all watercourses and associated stream protection zones.

The schedule for implementing the prevention and minimization management measures for the controllable sediment sources will be consistent with the duration of the THP. These measures will be implemented in accordance with the priority level assigned to each site. High priority sites will be addressed first with low priority sites to follow. Work at all sites will be accomplished prior to THP expiration. The general prevention and minimization measures will be implemented concurrent with operations.

I. Inventory and Treatment of Controllable Sediment Sources

All controllable sediment sources are listed in the attached "Erosion Control Plan" table. These sources have been assigned a treatment priority of low, medium or high based on: 1) potential for significant sediment delivery to a Class I, II or III channel; 2) treatment immediacy (a subjective combination of event probability and sediment delivery); and 3) treatment cost-effectiveness.

The Prioritization for implementing prevention and minimization measures for road-related and non road-related controllable sediment sources is based upon guidance provided in Order No. R1-2006-0041 (Freshwater Creek) Highest priority is assigned to the largest sediment discharge sources that discharge to waters that support domestic water supplies or fish. The landowner's prioritization method considers this guidance, and combines it with consideration for accessibility and level of imminent risk of significant sediment discharge. Sources that receive a high priority rating will be treated by a date certain as noted in the Controllable Sediment Sources table. Sources that receive a low or medium rating are determined to have a low to moderate risk of imminent discharge and will be treated prior to completion of the THP, or as otherwise indicated.

Non-road related controllable sediment sources can include skid road crossings, yarding furrow, skid road in watercourse, perched skid road fill, skid road rutting, landslide, layouts, railroad grade, incline, etc.

Information specific to Controllable Sediment Discharge Sources is listed in the Controllable Sediment Sources Table, below. An explanation of information provided in that table is provided below.

II. General Prevention and Minimization Measures for Controllable Sediment Discharge

In addition to the site specific measures detailed above, the general measures proposed in this project, either as required by another State or Federal regulating agency, or as a matter of Humboldt Redwood Company policy, will prevent or minimize future sediment delivery. These measures include, but are not limited to measures incorporated in the THP Section Items as follows:

THP Section II:

- Item 14 – Describes silvicultural prescriptions
  - (i) Site Preparation – Disclosure of selected site preparation treatments and mitigation measures
- Item 16 – Harvesting Practices – Describes yarding systems, equipment utilized, equipment limitations, and drainage facility installation timing
  - Inclusive through (m) – equipment use limitations and mitigation
- Item 18 – Soil Stabilization – waterbreak requirements, mitigation to minimize soil disturbance and sediment transport
- Item 20 – Ground Based Equipment Use Location
- Item 21 – Ground Based Equipment Use in Sensitive Areas – locations, descriptions of operations, limitations and mitigation measures
- Item 22 – Alternative Practices to Harvesting and Erosion Control
- Item 23 – Winter Operations – Provides descriptions of limitations and mitigation measures required during winter period operations and Winter Operating Plan
- Item 24 – Roads and Landings – Describes road and landing construction and re-construction operations, limitations, drainage relief structure installation, mitigation measures, road maintenance, inspections and wet weather road use restrictions
- Item 25 – Site Specific Measures to Reduce Adverse Impacts and Special Instructions to the LTO
- Item 26 – Watercourse and Lake Protection (WLPZ)
- Item 27 – "In Lieu" WLPZ Practice(s)
- Item 28 – Downstream Water Users Notification and Domestic Water Supply Protection Description of protection measures
- Item 29 – Sensitive Watershed – Identifies whether the plan is located in a designated sensitive watershed and mitigation measures
- Item 29 – 1 Hillslope Management (HCP 6.3.3.7) – Describes HCP hillslope management measures required as per watershed analysis

THP Section V:

- Sediment Reduction from Roads and THP Sediment Production--Including Table 1 – "Sediment Delivery for Units and Roads for this THP," references, letter regarding Road related sediment assessment for this THP with the calculations of deliverable net cubic yards of sediment, calculations and PWA information related to the THP project area when available

Maps attached:

- **Road Construction Locations/ECP Site Locator Map**
- **Appurtenant Road**

Fresh Aire 13
Road Construction Specifications Map

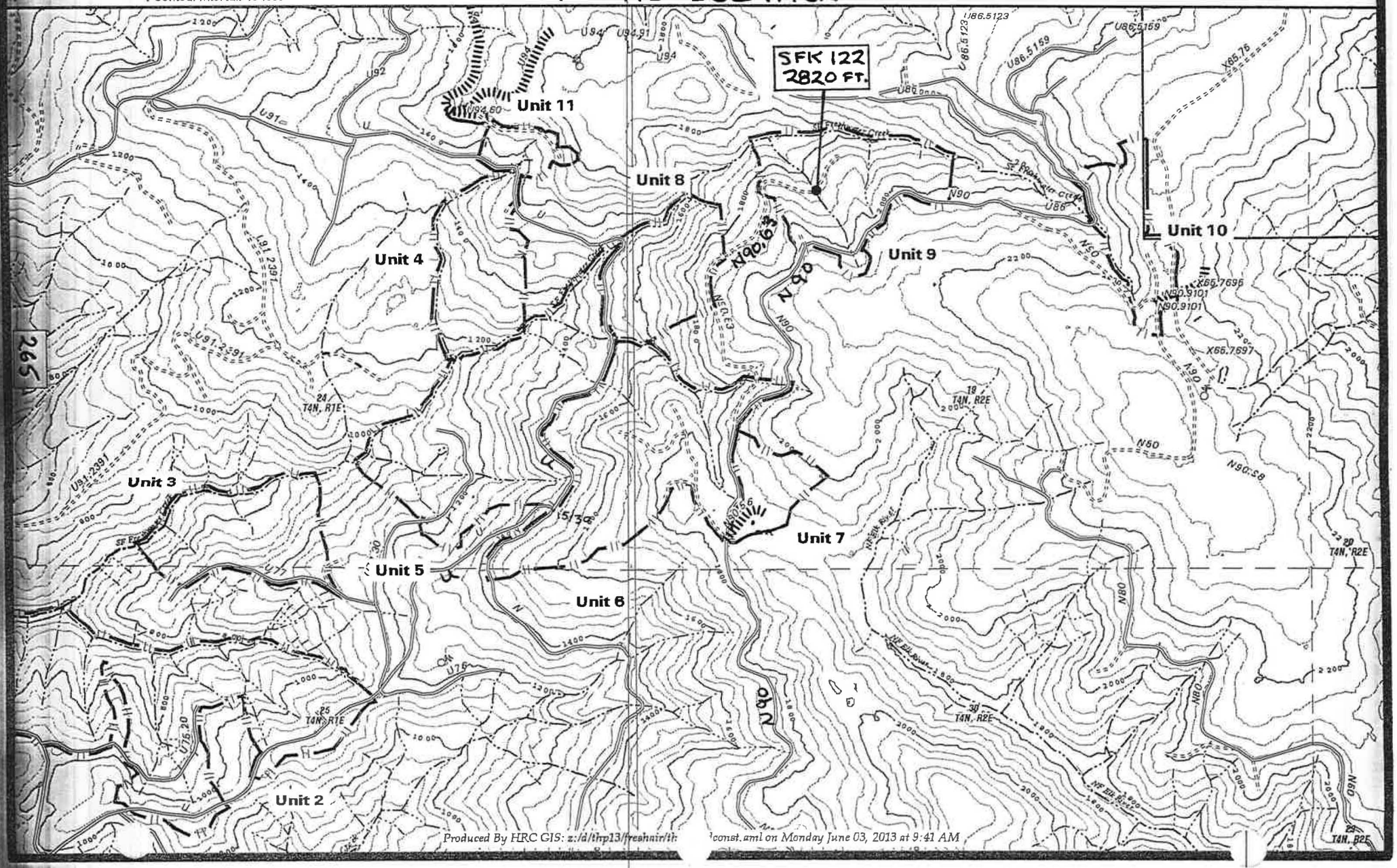
T4N R1E Sec. 24, 25, 26 HB&M
T4N R2E Sec. 19 HB&M

USGS Quad (s): IAQUA BUTTES, MCWHINNEY CREEK

Map Scale: 1 inch = 1000 feet
Contour Interval: 40 feet

Property Line
Harvest Boundary
Permanent Road
Seasonal Road
Temporary Road
Class I Watercourse
Class II Watercourse
Class III Watercourse
Class II Waters
Cut and Fill Construction
1/2 Cut and 1/2 Fill

ECP SITE LOCATION



N **Fresh Aire 13**

Appurtenant Road Map

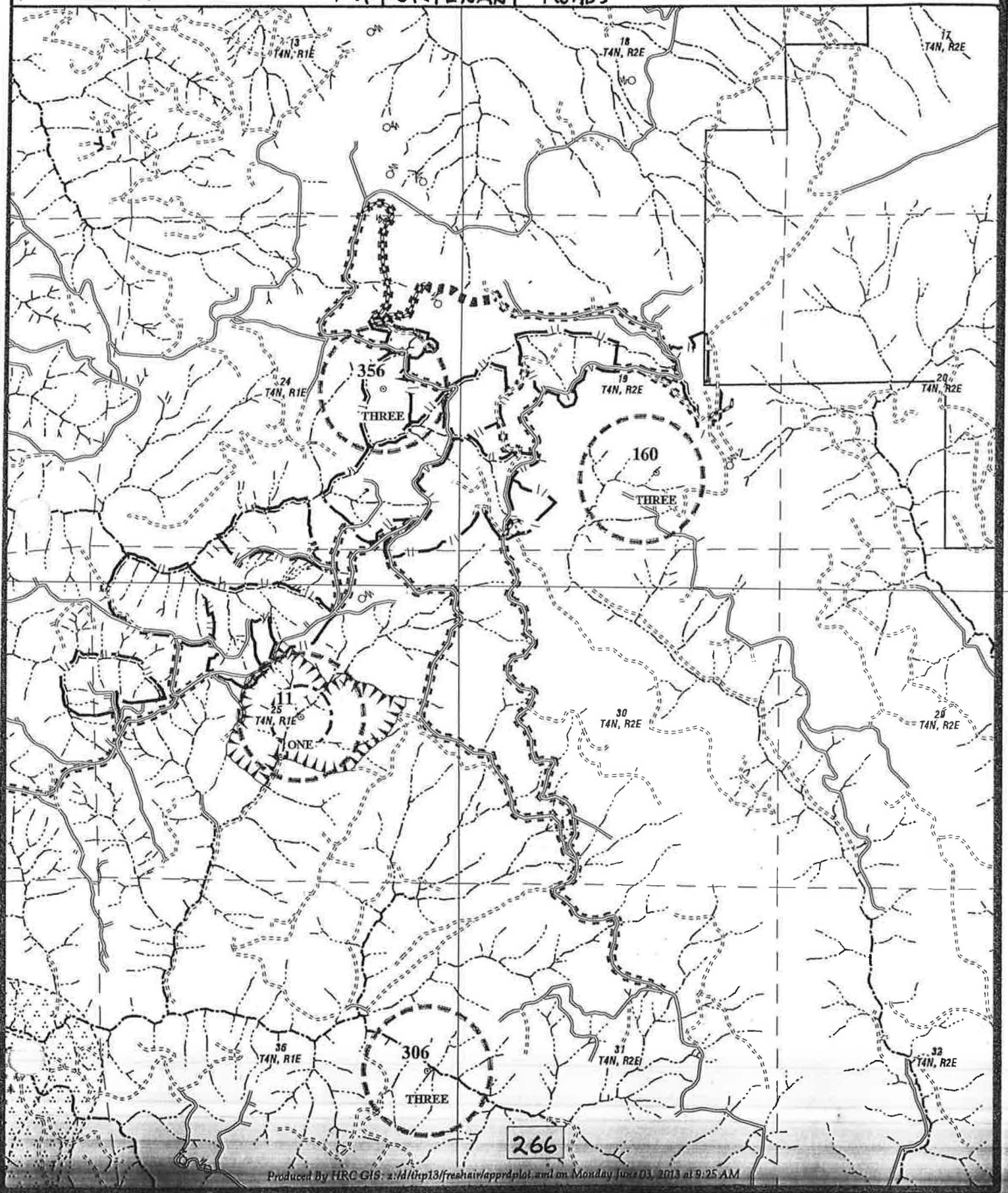
T4N R1E Sec. 24, 25, 26 HB&M
T4N R2E Sec. 19 HB&M

USGS Quad (s): IAQUA BUTTES, MCWHINNEY CREEK

Appurtenant (Private Road)
Property Line
Permanent Road
Seasonal Road
Temporary Road
Proposed Seasonal Road
NSO Site
500' NSO Buffer
1000' NSO Buffer
HRA

Scale: 1 inch = 2000 feet

APPURTENANT ROADS 1 OF 3



Produced by HRC GIS: z:/d/tkp13/freshair/apprdplot.aml on Monday June 03, 2013 at 9:25 AM

N **Fresh Aire 13**

Appurtenant Road Map

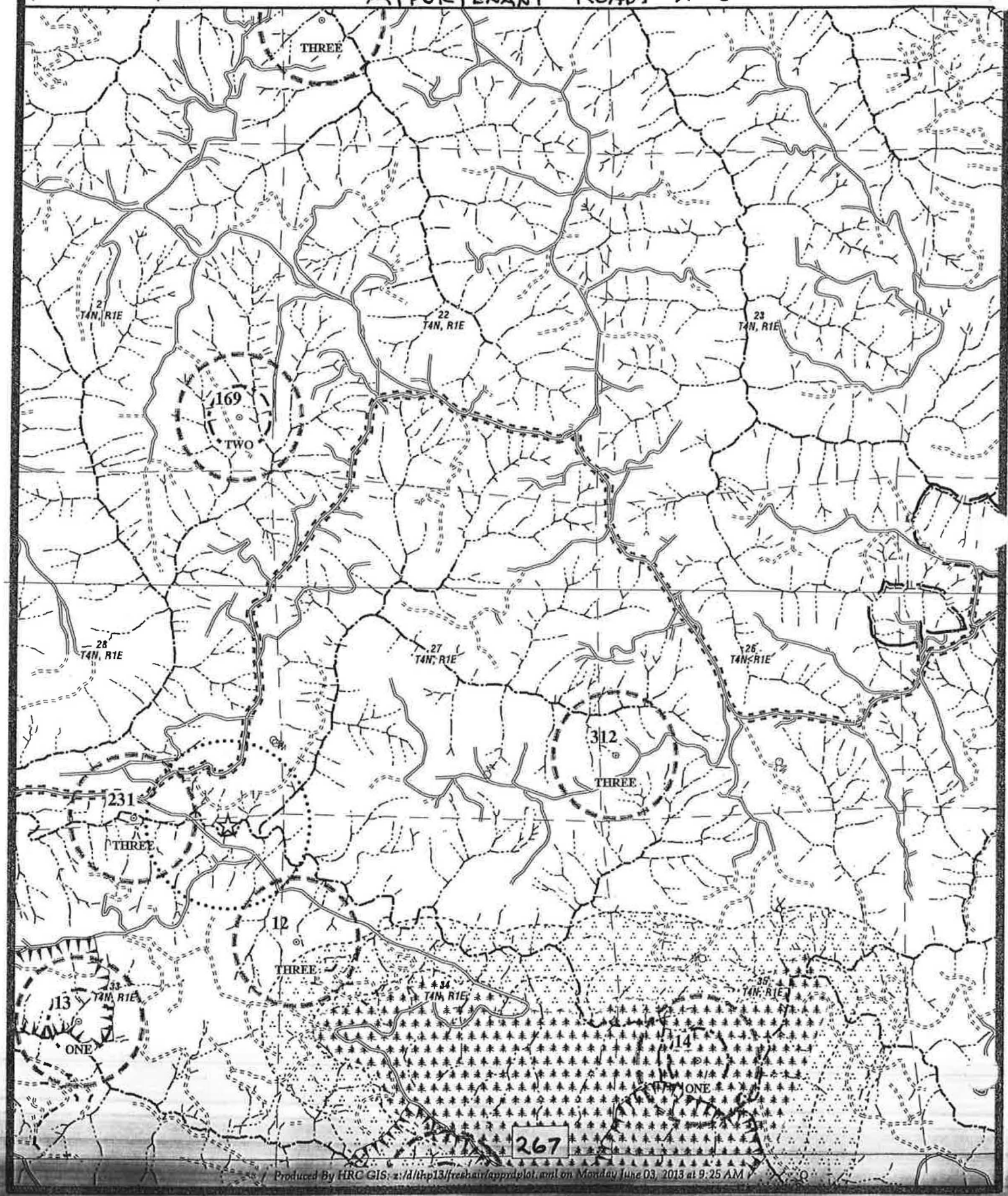
T4N R1E Sec. 24, 25, 26 HB&M
T4N R2E Sec. 19 HB&M

USGS Quad (s): IAQUA BUTTES, MCWHINNEY CREEK

Appurtenant (Private Road)
Property Line
Permanent Road
Seasonal Road
Temporary Road
NSO Site
500' NSO Buffer
1000' NSO Buffer
HRA
Osprey Site

Map Scale: 1 inch = 2000 feet

APPURTENANT ROADS 2 of 3



Produced By HRC GIS: z:/d/thp13/freshair/appredplot.mxl on Monday June 03, 2013 at 9:25 AM

Fresh Aire 13
Appurtenant Road Map

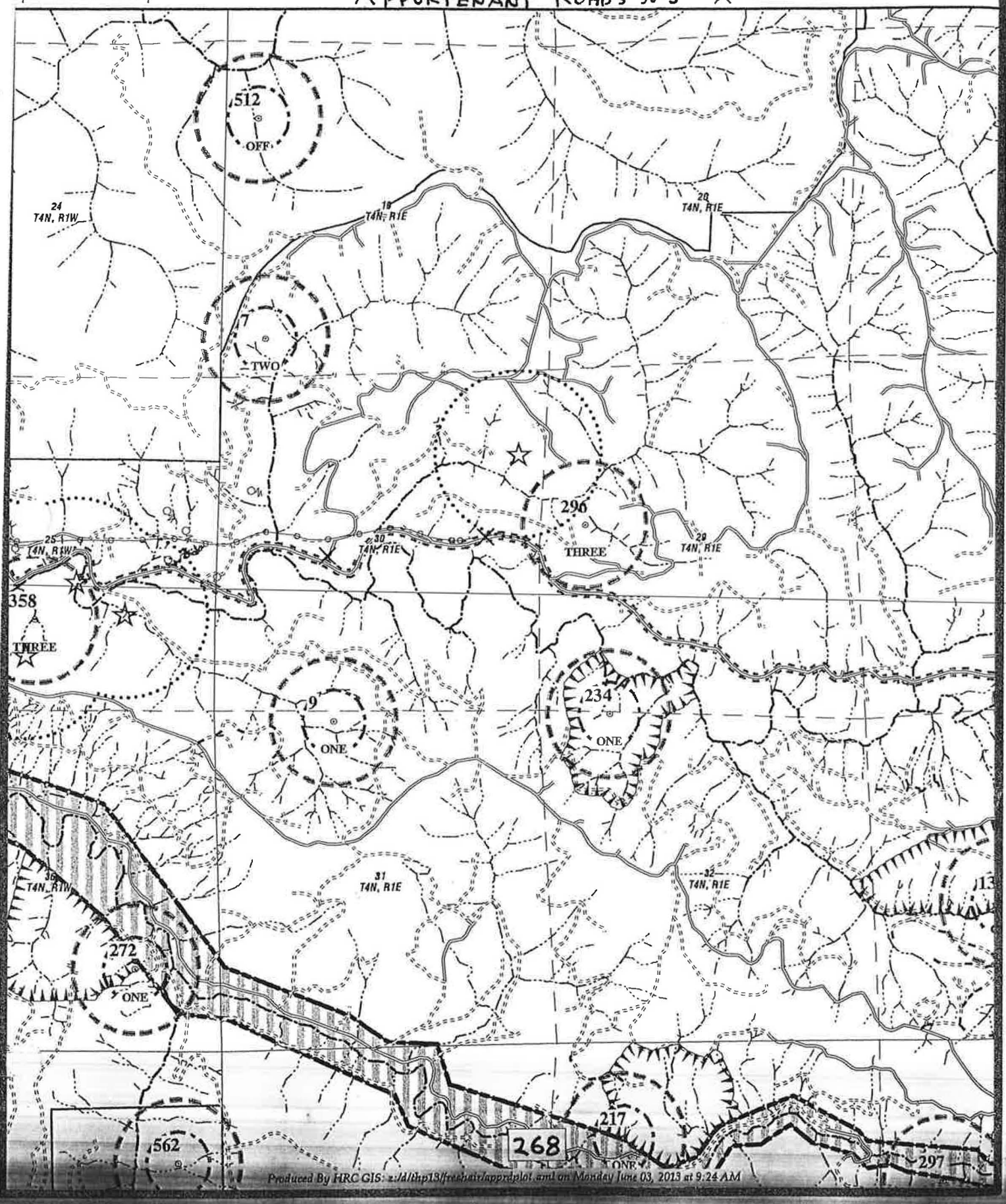
T4N R1E Sec. 24, 25, 26 HB&M
T4N R2E Sec. 19 HB&M

USGS Quad(s): IAQUA BUTTES, MCWHINNEY CREEK

Appurtenant (Private Road)
Property Line
Permanent Road
Seasonal Road
Temporary Road
Power Line
NSO Site
500' NSO Buffer
1000' NSO Buffer
HRA
Osprey Site
Gate

Scale: 1 inch = 2000 feet

APPURTENANT ROADS 3 of 3



III Inspection Plan and Reporting Requirements

A. Inspection Plan
The Inspection Plan is designed to ensure that all required management measures are installed and functioning prior to rainfall events; that the management measures are effective in controlling sediment discharge sources throughout the winter period; and that no new controllable sediment discharge sources developed.

B. Qualified and trained professionals will conduct all specified inspections of the project site to identify areas causing or contributing to a violation of the applicable water quality requirements or other provisions of these WWDRs. The responsible party for inspection and reporting is **Jon Woessner (707) 764-4376**.

C. No inspections are required in Project Areas where Timber Harvest Activities have not yet commenced.

D. Project Areas where Timber Harvest Activities have commenced and no winter period Timber Harvest Activities have occurred inspections will be conducted each year and throughout the duration of the Project while Timber Harvest Activities occur.

a. The Project is covered under WWDRs and the following inspection requirements will begin at the startup of timber harvest activities within the Project area:
   i. By November 15 to assure Project Areas are secure for the winter period;
   ii. Once following ten (10) inches of cumulative rainfall commencing on November 15 and prior to March 1, as worker safety and access allows; and
   iii. After April 1 and before June 15 to assess the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment discharges sources have developed.

b. Project Areas with Winter Period Timber Harvest Activities will conduct inspections of such Project Areas while Timber Harvesting Activities occur and the Project is covered under the WWDRs as follows:
   i. Immediately following cessation of winter period Timber Harvest Activities to assure areas with winter Timber Harvest Activities are secure for the winter;
   ii. Once following ten (10) inches of cumulative rainfall commencing on November 15 and prior to March 1, as worker safety and access allows; and
   iii. After April 1 and before June 15 to assess the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment discharges sources have developed.

c. Inspection reports will identify where management measures have been ineffective and when repairs and design changes will be implemented to correct management measure failures.

d. After completing the required inspections, and when it has been determined new controllable sediment discharges sources have developed, the ECP, implementation schedule, and inspection plan will be updated, if required, consistent with the WWDRs and submit the updated documents to the Regional Water Board to maintain coverage under the WWDRs. If the approved amendment is found to be out of compliance with the WWDRs, the Project will be amended to be consistent with the provisions of the WWDR within 30 days, or coverage under the WWDRs will be terminated. The Project will then be required to seek Project coverage under an individual WDR.

e. Equipment, materials, and workers will be available for rapid response to failures and emergencies, implement, as feasible, emergency management measures depending upon field conditions and worker safety for access.

D. If during the inspection or during the course of conducting timber harvest activities, a violation of an applicable water quality requirement or conditions of WWDRs is discovered, the following procedures will be followed:

a. When it has been determined that discharges are causing or contributing to a violation or an exceedence of an applicable water quality requirement or a violation of a WWDR prohibition:
   i. Corrective measures will be implemented immediately following the discovery that applicable water quality requirements were exceeded or a prohibition violated, followed by notification to the Regional Board by telephone as soon as possible but no later than 48 hours after the discharge has been discovered. The notification will be followed by a report within 14 days to the Regional Board, unless otherwise directed by the Executive Officer, that includes:
      1. the date the violation was discovered;
      2. the name and title of the person(s) discovering the violation;
      3. a map showing the location of the violation site;
      4. a description of recent weather conditions prior to discovering the violation;

5. the nature and cause of the water quality requirement violation or exceedence or WWDR prohibition violation;
6. photos of the site characterizing the violation;
7. the management measure(s) currently being implemented;
8. any maintenance or repair of management measures;
9. any additional management measures which will be implemented to prevent or reduce discharges that are causing or contributing to the violation or exceedence of applicable water quality requirements or WWDR prohibition violation; and,
10. The signature and title of the person preparing the report.
11. The report will include an implementation schedule for corrective actions and describe the actions taken to reduce the discharges causing or contributing to violation or exceedence of applicable water quality requirements or WWDR prohibition violation.

E. For other inspections conducted where violations are not discovered, a summary report will be submitted to Executive Officer by June 30th for each year of coverage under the WWDRs or upon termination of coverage. The summary report, at a minimum will include the date of inspections, the inspector's name, the location of each inspection, and the title and name of the person submitting the summary report.

If helicopter operations are proposed for this project, please find attached a Columbia Helicopters, Inc. (CHI) Fuel Spill Prevention and Cleanup Plan For Columbia Helicopters Field Operations. No helicopter operations are on this plan.

Explanation of Information Included in the Controllable Sediment Sources Table	
Column Heading	Explanation
Site No.	Site identification unique to project area
Site Type	A description of the existing site. Example: Humboldt Crossing; Culvert Crossing; Unstable Fill; Unstable Cut Slope; Diversion Potential.
Estimate of Potential Erosion	A quantitative estimate of the volume, in cubic yards, of the total amount of potential erosion/displacement of soil that will occur should the site entirely fail. The landowner often uses a methodology developed by Pacific Watershed Associates to estimate erosion, which assumes 100% delivery of calculated volume—use of this method for individual sites is noted in Site Description.
Potential Sediment Delivery Percent	An estimate of the relative potential for sediment delivery expressed as a percent of the total amount of Potential Erosion that will be discharged to waters of the State should the site fail.
Sediment Prevention Volume	The volume, in cubic yards, of sediment discharge estimated to be prevented by implementation of the prescribed treatment. Volume represents the Estimate of Potential Erosion multiplied by the Potential Sediment Delivery Percent.
Priority for Treatment	Treatment priority reflects the immediacy of sediment discharge and the relative risk to the receptor, should the site fail. Low priority sites are ones that will not likely deliver significant amounts of sediment during the life of the WWDR permit, and will be treated prior to filing of THP work completion report, which does not exceed 5-years following THP approval date. Medium or high priority sites indicate potentially imminent discharge, and the timing of treatment is indicted in Implementation Schedule column.
Implementation Schedule	Indicates the timing of implementing the prevention and minimization measures listed in the Treatment column.
Site Description	Provides sufficient information that describes the existing condition of the site and factors that inform the chosen treatment methods and implementation schedule. This information will include a description of how the existing condition of the site (ie. stable or unstable) will be affected by different storm events, and whether sediment discharge is imminent. For example, an unstable site could easily discharge significant amounts of sediment in a small storm, thus the treatment priority should be higher. Conversely, a stable site that may take one or more very large storms to trigger discharge could be lower treatment priority. If PWA method is used to calculate erosion/delivery volumes, it will noted here.
Treatment	Sediment discharge prevention and minimization measures that will be implemented at the site, including treatment specifications if necessary.

Attachments:

- **ECP Table**

Erosion Control Plan

Site	Site Type	Est. Potential Erosion (Cu.Yards)	Est. Potential Delivery (Cu.Yards & %)		Priority for Treatment	Implementation Schedule	Site Description	Treatment
Project Fresh Aire 13								
RD: N90.63 STATION: 2820 SITE: SFK122 WOID: 1751912039 SEDID: 20018 REPAIRED: NO	Permanent Crossing	128	128	100%	Low	Prior to THP Final Completion.	Functional Class II crossing with 18" pipe. Crossing is at the end of a long road, and is not needed.	18" CMP on a Class II stream with a landing and skid on the left bank. Channel is skidded upon and filled with slash and debris. Channel is stable and future erosion is minimal. Remove the existing culvert. Excavate from TOP to BOT, grading above TOP as needed to establish a smooth transition. Stockpile spoils locally.
Total Estimated Yards		128	128					

272