Humboldt Redwood™

March 21, 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 1-13-070 HUM (Double Deuce) Under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0041 / Freshwater Creek WWDR, "Tier II" (Unit 5 & ROW)

Dear Mr. St. John:

HRC is requesting Tier II enrollment under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0041 for portions (Unit 5 & ROW) of THP 1-13-070 HUM. The enrollment is comprised of 120 acres of group selection/selection and 5.45 acres of right of way, (65.5 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) has already been submitted for this 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 Double Deuce THP encompasses approximately 449 acres in the upper reaches of the Freshwater Creek and Grahams Gulch. The plan follows prescriptions developed from the watershed analysis for the Freshwater Creek Watershed. The project area is underlain by bedrock associated with the Cretaceous to Jurassic age Central belt and the Miocene to Late Pliocene age Undifferentiated Wildcat Group. No active faults are mapped passing through or within 5 miles of the project area. Traces of the Freshwater Fault do dissect the plan area. Less than 50 landslides where identified within the plan. Ground movement in the plan area is dominated by hillslope processes affiliated with translational and block slide failure mechanisms. Landslides are principally confined to slopes along the inner valley walls of the larger watercourses. Several large, dormant-historic or older earthflow landforms are also present in the plan area.

Silvicutural practices associated with group selection will not be applied to those stands of timber on or directly adjacent to unstable landforms identified as being potential sediment sources. We do not anticipate that the removal of timber from slides within the group- selection portions of the THP will have a negative impact on local water quality as it relates to landslide processes.

Failures that pose a high risk to water quality or aquatic resources are encompassed by Riparian Management Zones (RMZ) and Special Treatment Zones (STZ). The boundaries of limited harvest areas (RMZ/ STZ) 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. A minimum of 75 sq. ft. of conifer basal area per acre must be retained post-harvest in STZ 1 and STZ 2.

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 *THP Unit Review for Tier 2 Enrollment*. 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,
Area Manager, RPF #1910
Humboldt Redwood Company, LLC

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

**Double Deuce** 1-13-070 HWM

Silviculture

MN R1E Sec. 11, 12, 13, 14 HB&M
MN R2E Sec. 7, 18 HB&M

USGS Quad (s): ARCATA SOUTH, IAQUA BUTTES
USGS Quad (s): MCWHINNEY CREEK

Scale: 1 inch = 1320 feet
Contour Interval: 40 feet

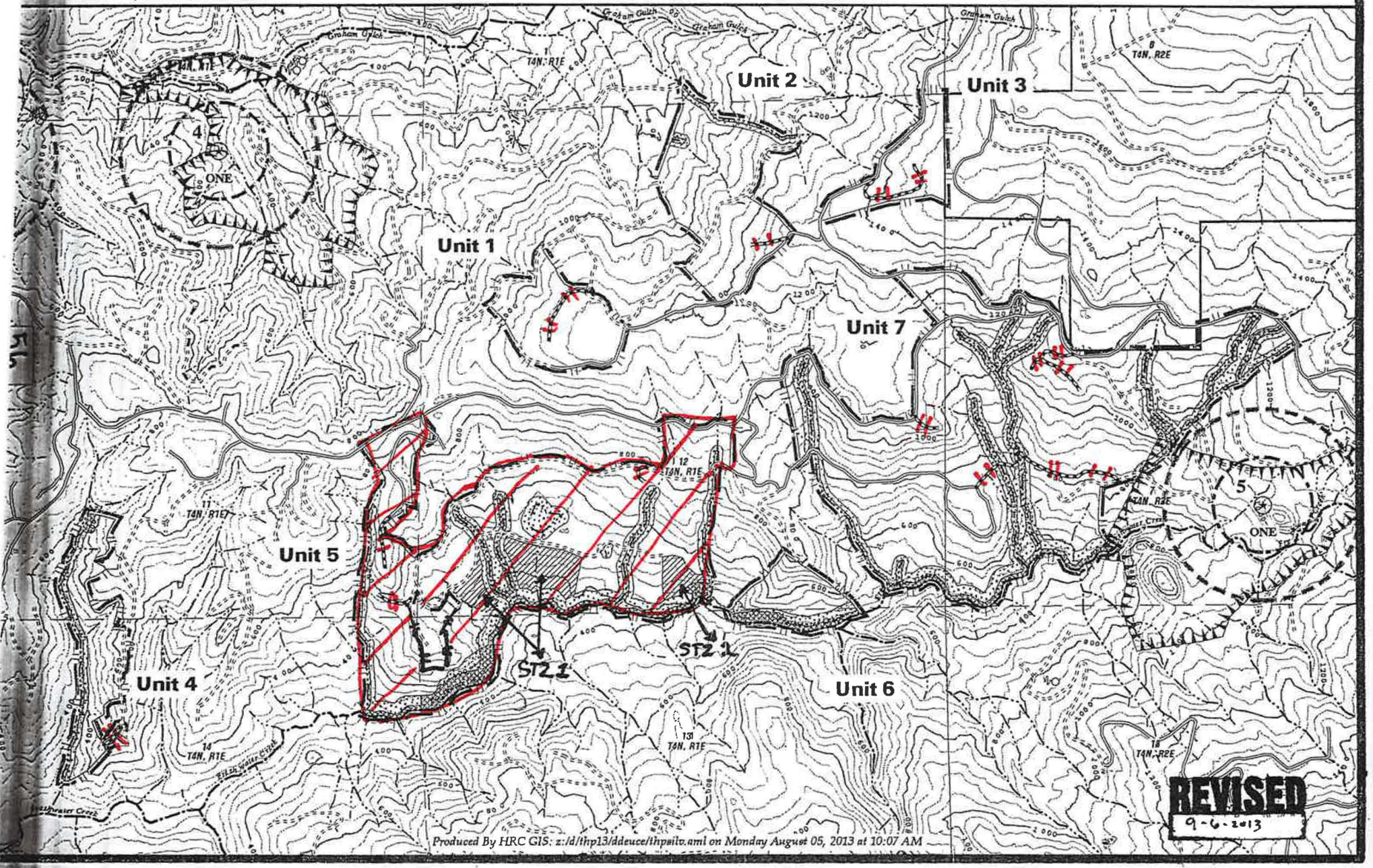
Property Line
Harvest Boundary
Permanent Road
Seasonal Road
Temporary Road
Proposed Seasonal Road TIER 2 ROW

Class I Watercourse
Class II Watercourse
Class III Watercourse
Class II Waters

NSO Site
0' NSO Buffer
1000' NSO Buffer
HRA

No Harvest
Selection
Group Selection
Special Hillslope Prescription, Geology STZ

TIER 2 HARVEST ACRES




Produced By HRC GIS: z:/d/thp13/ddeuce/thpsilv.aml on Monday August 05, 2013 at 10:07 AM

# 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 |
| | | | | | | | |
| | | | | | | | |

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)**

SEP 11 2013

If this is a Modified THP, check box ☐

## DOUBLE DEUCE

FOR ADMIN. USE ONLY
THP No 1-13-070 HUM
Dates Rec'd August 20, 2013
Date Filed SEP 21 2013
Date Approved DEC 13 2013
Date Expires DEC 12 2018
Extensions 1) ☐ ~~2) ☐~~
One 2-year extension possible

**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: _____, Forest Manager Date: 8/15/13

   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: _____, Forest Manager Date: 8/15/13

3. LICENSED TIMBER OPERATOR(S): Humboldt Redwood Co. 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: _____, Forest Manager Date: 8/15/13

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: _____, Forest Manager Date: 8/15/13

**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 Company LLC.

RECEIVED SEP 11 2013 COAST AREA OFFICE RESOURCE MANAGEMENT

RECEIVED AUG 20 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.hrcllc.com

# EXECUTIVE SUMMARY

## Geologic Evaluation of the Double Deuce Timber Harvesting Plan
## Humboldt County, California

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

- This THP covers approximately 449 acres in the upper reaches of the Freshwater Creek and Grahams Gulch. The plan follows prescriptions developed from the watershed analysis for the Freshwater Creek Watershed.
- The project area is underlain by bedrock associated with the Cretaceous to Jurassic age Central belt and the Miocene to Late Pliocene age Undifferentiated Wildcat Group. No active faults are mapped passing through or within 5 miles of the project area. Traces of the Freshwater Fault do dissect the plan area.
- Less than 50 landslides where identified within the plan (refer to Figures 3 through 6). A brief summary of the characteristics of each failure is contained in Appendix A.
- Ground movement in the plan area is dominated by hillslope processes affiliated with translational and block slide failure mechanisms. Landslides are principally confined to slopes along the inner valley walls of the larger watercourses. Several large, dormant-historic or older earthflow landforms are also present in the plan area.

- Silvicultural practices associated with group selection will not be applied to those stands of timber on or directly adjacent to unstable landforms identified as being potential sediment sources. We do not anticipate that the removal of timber from slides within the group-selection portions of the THP will have a negative impact on local water quality as it relates to landslide processes.

  Failures that pose a high risk to water quality or aquatic resources are encompassed by Riparian Management Zones (RMZ) and Special Treatment Zones (STZ). The boundaries of limited harvest areas (RMZ/ STZ) 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.

## Recommendations

- A minimum of 75 sq. ft. of conifer basal area per acre must be retained post-harvest in STZ 1 and STZ 2. No group openings are allowed.

Full discussion regarding our findings and recommendations are presented in the attached report.

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 design.

**HRC GeoScience Department**

Shane M. Beach, P G #7396
HRC Senior Geologist

Enclosure: Geologic Evaluation Report

Humboldt Redwood
COMPANY, LLC

FOREST
OPERATIONS
P.O. Box 712
125 Main Street
Scotia, CA 95565
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August 2, 2013

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

# Geologic Evaluation of Double Deuce Timber Harvesting Plan, Humboldt County, California

## Introduction

This report presents the results of a geologic evaluation of slopes within Double Deuce Timber Harvesting Plan (THP) conducted by Humboldt Redwood Company (HRC) LLC GeoScience Department. This report documents our geologic consultation on this project, which occupies slopes in the upper reaches 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 included a review of pertinent and available regional geologic maps and literature, geologic reports and letters attached to nearby harvest plans, a series of site visits, and the preparation of this report and attached figures. In our report, we use the 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 in 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 that we believe are pertinent to delivery of sediment to watercourses.

Our initial reconnaissance of the plan area occurred on May 21, 2013. We revisited the plan area on eight additional occasions to complete our field assessment. Our evaluation consisted of a comprehensive review of

- special riparian and hill slope prescription areas as defined in Humboldt Redwood Company (HRC) Habitat Conservation Plan (HCP) prescriptions for the Freshwater Creek Watershed (HRC, 2002)
- potentially unstable areas identified by
  - the project forester,
  - slope modeling (Mass Wasting Potential, SHALSTAB, etcetera);
  - and previous investigations (Falls, 1999a and 1999b; Kelly, 1984; Kilbourne, 1985; BGC, 2001).

To the best of our knowledge, this THP conforms to the Forest Practice Rules and the hillslope management mass-wasting strategy applied to HRC's ownership under the prescriptions developed based on the Freshwater Creek watershed analysis.

## Setting

This THP consists of seven (7) cut blocks that covers approximately 449 acres in the upper reaches of the Freshwater Creek watershed. Units 4, 5, 6, and 7 occupy the northern valley wall of Freshwater Creek, upstream of the South Fork Freshwater Creek confluence. The remaining three harvest units (1, 2, and 3) are along the X65.44 Road in the southeastern portion of the Grahams Gulch basin. A number of unnamed, moderate-sized Class II streams and associated tributaries (Class II and III watercourses) are also present within the plan area.

Graham Gulch is a westward-flowing Class I tributary to Freshwater Creek, which is a fish-bearing watercourse that drains directly into the North Bay region of Humboldt Bay. Freshwater Creek is listed as sediment impaired under Section 303(d) of the Clean Water Act.

Elevations within the proposed plan area range from a minimum of approximately 240 feet above Mean Sea Level (MSL) to a maximum of 1,500 feet above MSL. Refer to Figure 1 for unit boundary locations as currently proposed and their relationship to mapped watercourses and roadways. Pertinent regional location information is presented below in Table 1.

**TABLE 1**
**Site Location Information**

| | |
|---|---|
| **Legal Description** | Township 4 North, Range 1East, Sections1, 11-14 West, and Township 4 North Range 2 East Sections 7 and 18 |
| **USGS 7.5-minute Quadrangle** | Arcata South and McWhinney, Iaqua Buttes |
| **Cal Watershed** | Freshwater Creek (#1110.000101) |

Silvicultural practices associated with single tree selection and group selection are proposed in this harvest plan. Stands directly adjacent to waterways will be managed in accordance with Class I, II, and III Riparian Mitigation Zones (RMZs) prescriptions. Unstable areas not encompassed by RMZs that are considered potential sources of sediment to nearby bodies of water and support an ample volume of timber for harvest will be encompassed by special treatment zones (STZ). Refer to

Section II item 14 of the THP for a description of the retention standards required for each of the proposed silivcultural practices and watercourse buffer zones.

There are no reported domestic water supplies within 1,000 feet of the THP area. No public resources or infrastructure facilities are located within 1,000 feet of the plan area, consequently operations as proposed do not pose a significant hazard to public safety.

A majority of the plan area is accessible by existing roadways. Under this plan, approximately 7,000 feet of road is proposed for construction, with a majority of the new segments being confined to a broad mid-slope topographic flats and ridge crests. In general the current road/skid trail network within the plan area is in good condition and is not affiliated with a heightened rate of landslide activity.

## Site Conditions

Those portions of the Freshwater Creek watershed occupied by this THP are characterized by incised, moderate to steep sided, v-shaped draws/valleys that contain well-developed dendritic drainage systems. The upland portions of these drainages consist of broad, well-rounded ridges, and moderate- to steep-gradient (40% to 60%) midslopes. Typically, the upland slopes retain convex to semi-planar profiles and in some instances have developed into low-gradient (10% to 40%) topographic benches. Many of the lower-gradient slopes have rolling profiles composed of localized topographic bulges and depressions.

As the upland slopes approach the valley floors, they often develop steep orientations. These "inner valley" slopes often retain a planar profile and are inclined at moderate to precipitously steep gradients (up to 120%). This inner valley wall terrain generally extends between 15 to 100 feet upslope of the adjoining valley/ draw floor, and at times includes bluffs and precipitously steep faced rock exposures.

Timber stands encompassed by this THP are not homogeneous and are comprised of various assortments of conifer and 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, Douglas fir, and Grand fir. Intermixed with these conifers are groups of indigenous hardwoods, principally tan oak and alder. Scattered residuals are also present, although in low numbers.

Douglas fir and alder saplings dominate the understory component. These regeneration stands are often densely stocked and concentrated along old roadways, skid trails, and railroad grades. 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 dense patches.

Due to the abundance of groundcover in selected portions of the THP area, our ability to conduct a thorough geomorphic reconnaissance was limited. Prior to the commencement of our site reconnaissance, we acquired information from existing topographic maps, LIDAR maps, geologic maps, SHALSTAB modeling, and aerial photographs to help direct and assist our field effort in these particular areas. It is unlikely that we overlooked large failures that could have a significantly adverse impact on water quality, but we acknowledge that additional small-scale failures (such as, cut bank/fill failures) that are not identified or discussed in this report may be present.

As presently laid out, the Double Duce THP overlaps or abuts portions of THP 1-96-086 HUM; THP 1-97-113 HUM; and THP 1-01-453. Plans submitted prior to 2011 were developed in accordance with interim prescriptions presented in PALCO's Habitat Conservation Plan (HCP) (PALCO, 1999). Each of the THPs submitted between 1997 and 2011 have a geologic report attached to Section 5. These geologic reports provided detailed discussions regarding slope stability within the project areas as well as site-specific recommendations intended to minimize the impact of proposed timber operations on the identified unstable areas.

Under the interim rules outlined in Section 6.3.3.7 (Hillslope Management) of PALCO's HCP, no-cut areas were required around all those slopes identified as being unstable or that attained a Factor Total value in excess of 15 points. Factor Totals is a quantitative ranking system (Watershed Sensitivity Factor Total System) that is based on four parameters: slope gradient, bedrock, soil type, and mass wasting landforms. Each parameter has a predetermined range of values, which are then mathematically combined to provide a preliminary estimate of the geomorphic sensitivity of an area. If the summation of these values for a certain slope exceeds 15 points, then the hillside is considered a Mass Wasting Area of Concern (MWAC) and will be excluded from timber operations.

This harvest plan is being submitted under the guidelines of the Freshwater Watershed Analysis (PALCO, 2002). Under the current rules package, trees can be removed from unstable and potentially unstable slopes provided that a California-licensed geologist reviews the areas proposed for management. Consequently, a number of the areas of instability previously identified and omitted from the operational limits of earlier plans will now be subject to various levels of harvest.

## Geologic and Seismic Setting

### Geology

Published geologic maps of the region indicate that the plan area is underlain by bedrock associated with the Cretaceous to Jurassic age Central belt and the Miocene to Late Pliocene age Wildcat Group (specifically Undifferncaited) (Figure 2). The Central belt consists of a tectonic mélange composed of penetratively sheared, metamorphosed (pumpellyite grade) argillite matrix. This matrix envelops blocks of bedrock that range from outcrop size to miles in diameter. These rock masses consist of coherent and folded sequences of sandstone and shale as well as exotic blocks composed of glaucophane schist, eclogite, and other high pressure metamorphic assemblages.

The physical properties of the Central belt bedrock materials have a significant influence on the topographic expression of a hillside and the mass wasting processes that alters its surface. Steep terrain is most often associated with areas underlain by blocks of coherent meta-sandstone, which are generally modified by translational and debris slide type mass wasting processes. Slopes underlain by the highly sheared, poorly consolidated matrix material typically have a low relief and are susceptible to deeper ground movement. This fine-grain component of the Central Belt is commonly associated with earthflow terrains and is well documented as being predisposed to failure mechanism associated with soil creep. The distribution of earthflow terrain is relative to the amount of sheared matrix material; in areas containing large amounts of matrix, landslide-related landforms can cover most of the landscape. This "earthflow" terrain (rolling landscape), which is ubiquitous to the Central belt mélange of northern California, is well represented in the general area of this THP.

Ogle (1953) mapped Wildcat sediments northeast of the Little Salmon fault as undifferentiated due to the poor exposures and general lack of distinctive lithologies and fossils in this area. Knudsen (1993) separated "undifferentiated" Wildcat Group sediments in the Freshwater drainage into two units, the

Wildcat upper and lower. These units were differentiated from one another based on sedimentological differences, faunal data, and topographic and stratigraphic positions. Geologic maps of the basin (Falls, 1999a) indicate that western edge of the plan area is underlain by Knudsen's (1993) lower unit of the Wildcat Group ($Tw_1$) (Figure 2). These sediments are described as being composed chiefly of mudstone and sandstone with minor, cobble-bearing diamictite. Wildcat sediments in the project area are contact with Central belt bedrock by way of faulting and depositional unconformities

Refer to Section 2.3 (Geology and Soils) of the Freshwater Creek Watershed Analysis Cumulative Watershed Effects (CWE) report for additional discussion relating to the origin and composition of these sediments. The CWE module is located a http://www.mrc.com/pdf/Watershed_Analysis/HRC/Freshwater%20Creek%20-%20Cumulative%20Effects.pdf

## Seismic

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. The nearest fault zoned by the State of California as active is the Little Salmon fault (Hart and Bryant, 1997). This particular fault is a northwest-trending, northeast-dipping thrust fault that dissects slopes along the northern valley wall of the Van Duzen River basin. This fault is part of a broad, 25-kilometer (km) wide fold and thrust belt (Mad River Fault Zone) that accommodates onshore deformation associated with the Cascadia Subduction Zone. The mapped trace of the Little Salmon fault is located approximately 5 miles north of the project area (McLaughlin and others, 2000).

A number of inferred traces of the Freshwater fault zone dissect slopes occupied by this THP. The Freshwater fault zone is composed of the Freshwater and Greenwood Heights faults (Knudsen, 1993), which are inferred to be parallel northwest-trending, northeast-dipping, high angle thrust faults. These faults place undifferentiated Wildcat and Yager Formation sediments into contact with Central belt bedrock. Fault displacement in Wildcat Group sediments along the Freshwater fault indicates that this structure was active at least into the Late Pliocene (Clarke, 1992). This series of faults is not considered active by the State of California under the provisions of the Alquist-Priolo Earthquake Fault Zoning Act.

Considering the location of the project, it is possible that slopes proposed for timber operations will be subject to ground shaking. Ground motion affiliated with a large seismic event in this semi-mountainous/steep terrain would likely trigger or reactivate landslides within and adjacent to the plan area. It is well documented that earthquake-induced landslides often occur at localities where slopes are naturally unstable under nonseismic conditions (Keefer, 1984; McPherson and Dengler, 1992; Dunklin, 1992). Consequently, there is the potential that some landslides could be triggered on slopes within and/or immediately adjacent to the plan area following a significant seismic event, regardless of whether management activities occur.

## Structure

Wildcat Group sediments underlying the project area have been subjected to compressional deformation as a result of faulting along the Freshwater fault. Bedding attitudes recorded on the geologic and geomorphic map of that McWhinney 7.5 minute quadrangles suggest that the Wildcat sediments in the general vicinity of Unit 4 have a northwest dip that may range from 20° to 31°. Therefore, some of the steeper slopes in Unit 4 could be subject to bedding plane failures, thus caution was taken when determining harvesting levels on slopes with aspects parallel to the mapped bedding attitudes.

## North Coast Regional Water Quality Control Board Tier 2

As part of our assessment, we evaluated a series of maps that represent the minimum data review required to harvest in Freshwater Creek 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 Freshwater 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 (Falls, 1999a)
- Relative Landslide Potential Map, Freshwater Creek (Falls, 1999b)
- Orthophotoquad imagery
- Watershed Analysis Deep-Seated Landslide Inventory (HRC, 2001)
- THP Operational maps with unit boundaries, creeks, and roads

Our review of CGS maps (Falls, 1999a and 1999b) and the Deep-Seated Landslide Inventory Map reveal that a majority of the mass wasting features portrayed on these maps were not present or of such age as to not be impacted by current land use activities. Those features identified as having potentially negative responses to aggressive (clear-cut) management strategies are illustrated on landslide maps attached to this report.

A number of regions in the plan area were identified by MWP and SHALSTAB models as having high and extreme landslide hazard potential. The MWP model assesses streamside slopes and is designed around slope gradients, while the SHALSTAB model accounts for gradient and slope convergence. The results of these models can be provided upon request.

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. Several modeled high hazard areas occur in the plan where we did not find existing instabilities. 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 a potentially unstable area and were omitted from the landslide maps contained in this report.

## Slope Stability

### Overview

Our evaluation of the project area resulted in the identification of just under 50 failures, a majority of which occurred within 100 feet of Freshwater Creek and several of its' larger Class II tributaries. These failures, most of which are dormant-historic in age, occurred in areas with slope gradients equal to greater than 55%. Ground movement outside the stream corridors is much less frequent and generally associated with large scale earthflow complexes.

No active or historic landslides were observed within or adjacent to those units that occupy slopes in the Graham Gulch basin.

Ground movement in the plan area, regardless of the slope position, is dominated by hillslope processes affiliated with shallow, translational failure mechanisms. We classified a majority of the mass movements in and adjacent to this THP as block slides, debris slides, and flows. Compound-type failures (translational/rotational and earthflow) comprise of a very small component of the landslides identified on Figures 3 through 6.

Earlier investigations in the general region of the THP noted a similar distribution of landslide type and activity, in that a bulk of the mass movements initiated on steep slopes adjacent to watercourses, while upland failures were appreciably less frequent but larger in scale (Falls, 1999a and 1999b; Kelly, 1984; Kilbourne, 1985; BGC, 2001). Our ground–based evaluation of previously identified features resulted in a number of instances in the re-mapping of their boundaries as appropriate, or removal if absent. During our investigation, we also identified a number of previously unrecognized landslides. No new slides appear to have initiated in those areas reviewed during the last geologic evaluation or subsequent to recent upslope logging operations.

We have not included site-specific descriptions of individual landslide 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 in this THP follows.

## Debris Slide

Nearly all of the landslides in the plan area have been classified as some type of debris slide (refer to Appendix A). Debris slides in the project areas are usually associated with roughly u-shaped (map view), well-defined depletion zones. Scarps at the heads and along the lateral margins of the depletion zones (slide scars) range from 2 to 8 feet in height and are often steeply inclined. The surfaces of the slide scars, in many instances, have become re-vegetated with groundcover species, young second growth conifers, and/ or blue blossom.

Slopes that supported coalescing groups of debris slides and debris flows are classified on Figures 3 through 6 as debris slide slopes or inner gorges. Debris slide slopes include those aggregates of shallow landslides that were triggered by mechanisms unrelated to fluvial processes. Inner gorge slopes consist of steep, planar slopes that support a large number of various aged landslides induced by fluvial processes. This unstable terrain commonly extends 20 to 100 feet upslope of the adjoining watercourse and is separated from upland areas by clearly defined slope breaks. These steep gradient hillsides have been the site of numerous mass wasting events over the passage of time and have consequently become distinctive landforms.

## Compound Failures

These slide complexes range from ¼ to 2 acres in size and exhibit slope characteristics attributable to both historic 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. The hummocky and broken profiles are commonly associated with areas that have been altered by recent/historic movement. Sub-vertical, unvegetated scarps often dissected these irregular hill slopes. These historically active areas typically support leaning and slightly swept conifers.

Steep slopes at the foot of historically active features were they intercept large order watercourses are being modified by active translational and rotational slide events. These mass wasting events are triggered by creep in the slide body and undermining of the toe by active stream incision and impinging water currents. In general, movement in the mid-section and upper regions of these slow-moving slides has not resulted in the delivery of debris to local watercourses.

Inactive (dormant-young) areas have muted and subdued surface expression but retain recognizable slide morphology. There is a general absence of deformed trees and displaced old growth stumps on these inactive slopes. We did not observed evidence of historic ground movement in these regions.

## Landslide-Related Landforms

The THP area overlaps or abuts several very large geomorphic landforms identified by previous investigators as being potentially landslide-related (Kelly, 1984; Kilbourne, 1985; Falls, 1999, BGC, 2001). These geomorphic features were classified as dormant translational/ rotational failures, earthflows, and large debris slide complexes that in all instances are multi-acre in size and at times extend from the ridgeline to the valley floor (Figure 2). It is our understanding that these features were differentiated from adjacent slopes using standard aerial photographic interpretation techniques. The amount of field review conducted for the verification of these features is uncertain. Therefore, the classification of a hillside as an unstable landform during previous investigations does not necessarily indicate that it has experienced recent or historic ground movement or is inherently unstable.

During our review of regional aerial photographs we noted several tear-dropped, and/or tongue shaped landforms abutting/ underlying the project area. The upper margins of these features are defined by poorly expressed disk- and arcuate-shaped depressions. On aerial photographs the crowns of these slide complexes retain well-rounded textures and are difficult to distinguish from adjacent hillsides. The distal margins of these features are very vague and when recognizable are truncated by the sidewalls of well-establish draws and/or valleys containing Class I and II watercourses.

In the field, these features are composed of variously sized and spaced slope pitches, flats, and closed depressions that support open stands of timber. Although these hillsides do have sinuous profiles, they generally have smooth and well-rounded expressions. The level of modification by surface erosion and the discontinuous nature of these landforms suggest that the processes that contributed to their development have been inactive for an extended period of time (dormant-mature). Timber supported by these landforms is generally upright and undeformed, while stumps produced during the last harvest entry still retain horizontal back cuts and are in natural growth positions.

The even distribution and condition of old growth stumps on the surfaces of these landforms, in conjunction with the pattern of drainages on their surfaces, implies that most of these potentially landslide-related landforms have not experienced significant pulses in ground movement since establishment of the old growth forest on their surfaces.

Based on our site evaluation, we concluded that a majority of the large –scale features mapped by others are dormant-mature in age, if present at all. Areas within these complexes that have historically experienced ground movement are identified on the area concern maps attached to this report.

## Unclassified Slopes

Subsequent to our assessment of hillside stability in the plan area, and based on slope conditions observed in the field and on regional aerial photographs and past performance, we have concluded that some of the landslides mapped by prior investigators were not actually present. For example, Falls (1999) classified a majority of the steep hill slopes in the project area as debris slide slopes. Examination of these hillsides revealed only a limited amount of geomorphic and/or vegetative irregularities indicative of landslide activity. Although steep, a majority of the slopes were void of landslide characteristics that would imply that they have been subject to wide spread or localized landslide activity, either recently or in the distant past. We did not encounter any scarps (fresh or weathered), slide scars, disturbed soils, deformed trees, or patches of irregular ground in these areas. In the field, there was no distinguishable break in timber type, age, or density between the pre-identified debris slide slopes and adjacent hillsides.

Consequently, we omitted these pre-identified landslide/ landforms, as well as others, which did not express geomorphic characteristics indicative of recent or historic ground movement. Those slopes that exhibited evidence of having a negative response to past management activities or are prone to landslide processes were mapped and are identified on Figures 3 through 6 of this report.

# Discussion

## General

Land use activities proposed under this THP include the removal of timber from slopes near and within a number of the areas of instability mapped on Figures 3 through 6. Prior to our site visit, the project forester had placed a majority of the larger slide areas within expanded RMZs. Those failures that extend beyond the limits of the RMZs, and support ample enough timber to harvest and could feasibly discharge sediment into down slope watercourses are surrounded/ buffered by STZs. Of the 449 acres proposed for operation more than 25% of this acreage is encompassed by RMZs and STZ. The remaining acreage will be subject to single tree and group selection (337). The areas of concern that have not directly delivered sediment to a waterway by means of landslide processes will undergo uneven age management in accordance with silvicultural practices associated with group selection.

Refer to Appendix A for land use practices proposed on each individual landslide.

## Riparian Management Zone

Over 60% of the landslides identified during this assessment fall within watercourse buffer zones (RMZs). The project forester estimates about 20% of the merchantable timber within the outer bands of the RMZs will be harvested (inner bands are designated as no-cut areas). There is a low probability that reducing the stand densities in the outer band by this percentage will adversely affect the hydrologic regime of the slopes in the RMZs or significantly reduce the resisting (cohesive) forces afforded by roots. Un-harvested conifers (approximately 90% retained) and hardwoods (all) within these watercourse-protection zones will continue to provide substantial amounts of canopy, root strength properties, and evaporation and transpiration mechanisms to the managed slopes.

Our survey of the slopes within the RMZs also revealed that there are a limited number of trees marked for harvest, all of which are situated along the edges of the out band of the RMZs. Harvesting timber from the upper edge of the RMZ 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 total canopy coverage and existing root strength properties.

## Special Treatment Zone

Harvesting levels on and adjacent to slides within the STZ will be restricted but will vary in intensity depending on the slope position, potential sediment delivery, and the management strategy proposed upslope of the buffer. 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 harvesting 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.

Because the unstable slopes in the STZ 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 harvesting operations will occur. In the denser conifer stands that support ample amounts of timber, the project forester estimates that between 20% and 60% of the timber will be removed. Although these activities will

diminish local interception, evaporation, and transpiration rates, they should not significantly influence slope stability (that is, trigger landslides). The performance of recently managed slopes outside the THP suggests that a reduction in stand density (clearcut) and canopy coverage can occur without destabilizing the underlying hillside.

A percentage of the canopy coverage and root mass on slopes within the STZs are being provided by the hardwood, mid-story conifer, and the groundcover components of the stands proposed for entry under this harvest. This ground- and mid-level 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 special management areas 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 factors 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.

### Group Selection

We do not anticipate that the removal of timber from slides within the group-selection portions of the THP will have a negative impact on local water quality as it relates to landslide processes. The slope position of these failures and/or the configuration of hillsides adjoining them are not readily conducive to the delivery of sediment to down slope waterways. If post-operational landslides were to occur, debris would have to overrun local benches, steep pitches, unmanaged stands, and RMZs prior to entering a watercourse. Therefore, considering the physical constraints of these individual sites, we conclude that even if upslope operations have a destabilizing effect on the slide areas, the probability of future events contributing a significant volume of sediment to nearby watercourses is negligible.

## Recommendations

- A minimum of 75 sq. ft. of conifer basal area per acre must be retained post-harvest in STZ 1 and STZ 2. No group openings are allowed. Refer to Figure 4 for locations.

## Conclusion

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

Partial-cut and no-cut silviculture methods will be implemented on slopes identified as unstable and potential sources of sediment to down slope 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 remaining in the no-cut and partial-cut areas will continue to provide canopy coverage, root strength, 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 from 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 limited observation is representative of conditions throughout each of the harvest units. 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.

## ATTACHMENTS

| | |
|---|---|
| Figure 1: | Location Map |
| Figure 2: | Geologic Map |
| Figure 3: | Areas of Concern Map |
| Figure 4: | Areas of Concern Map |
| Figure 5: | Areas of Concern Map |
| Figure 6: | Areas of Concern Map |
| Figure 7: | Areas of Concern Symbol Explanation Key |
| Appendix A: | Landslide Inventory Table |

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# FIGURES

**Legend**

- Harvest Unit Boundaries

**Land Ownership**

- HRC
- Other
- Federal, State, County Parks

**Water**

- Ocean, Bay, or Lake

**Watercourse**

- Class 1
- Class 2
- Class 3

**HRC 2005 LiDAR Elevation**

- 50-foot Contour
- 10-foot Contour

**Roads**

- Paved Roads
- Rocked Roads
- Dirt Roads
- Jeep Trail
- Proposed Roads
- Reconstruction
- Decommissioned Roads
- Closed Dirt Roads
- Closed Rocked Roads

Note: All symbols may not appear on map.

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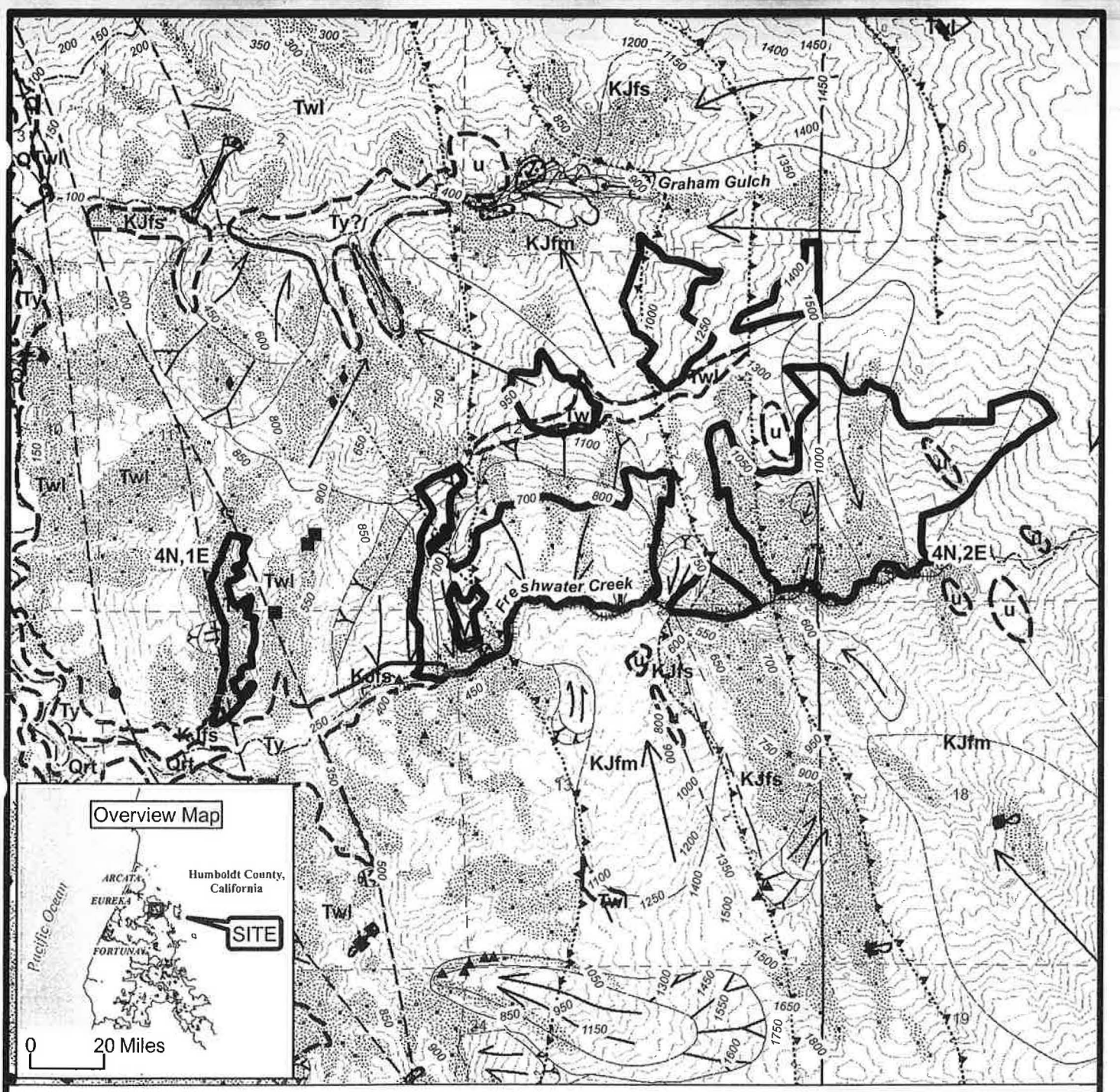
| Date: Jul. 2013 | | | 277 | |




## Legend

- Harvest Unit Boundaries

**Land Ownership**

- HRC
- Other
- Federal, State, County Parks

**Water**

- Ocean, Bay, or Lake

**Watercourse**

- Class 1
- Class 2
- Class 3

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- 50-foot Contour
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**Roads**

- Paved Roads
- Rocked Roads
- Dirt Roads
- Jeep Trail
- Proposed Roads
- Reconstruction
- Decommissioned Roads
- Closed Dirt Roads
- Closed Rocked Roads

Refer to following Explanation Page for symbod definitions

Note: All symbols may not appear on map.

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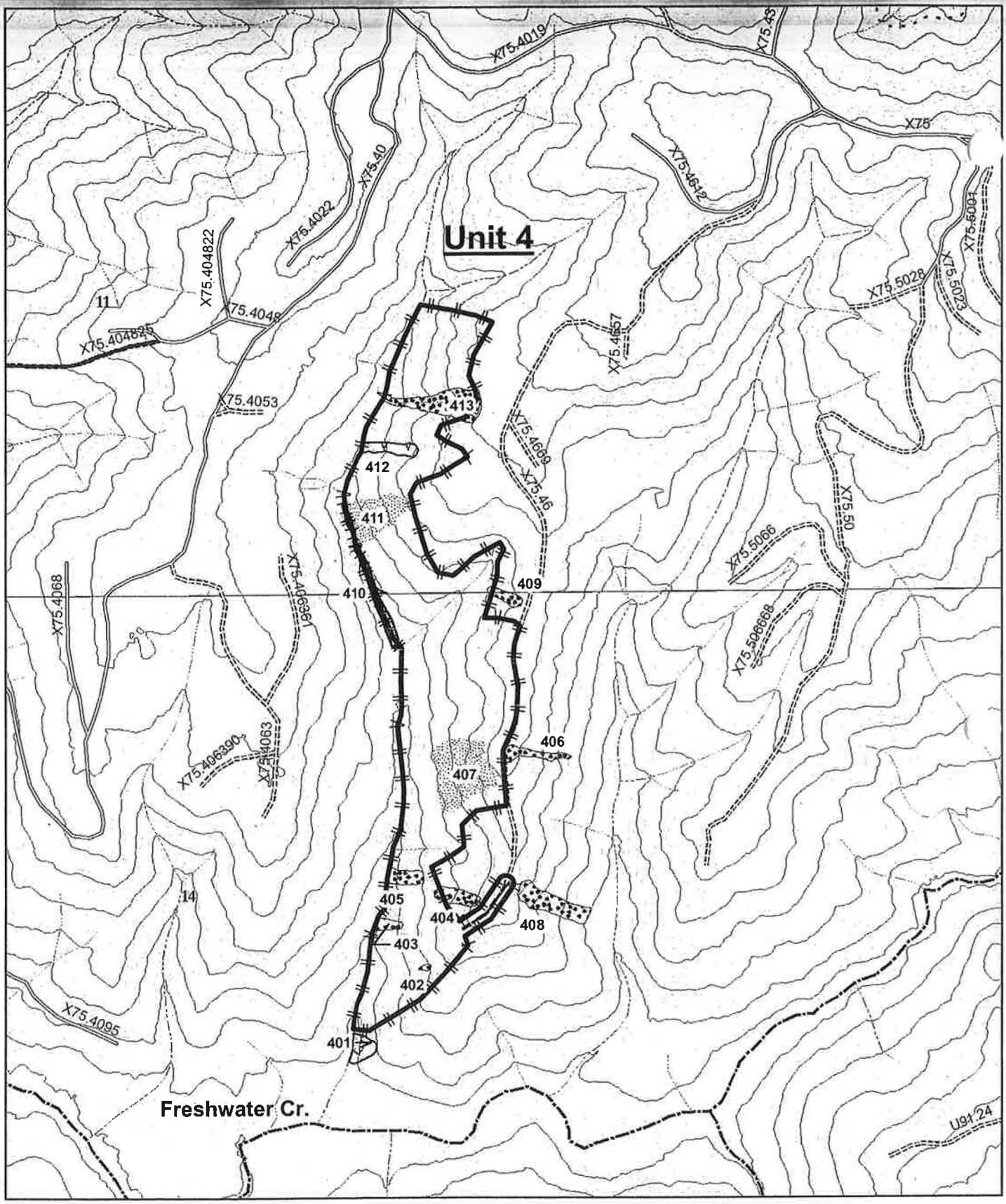


Refer to Explanation Sheet for definition of map symbols

Refer to Appendix A for individual landslide characteristics

HRC LiDAR 10 Foot Contours

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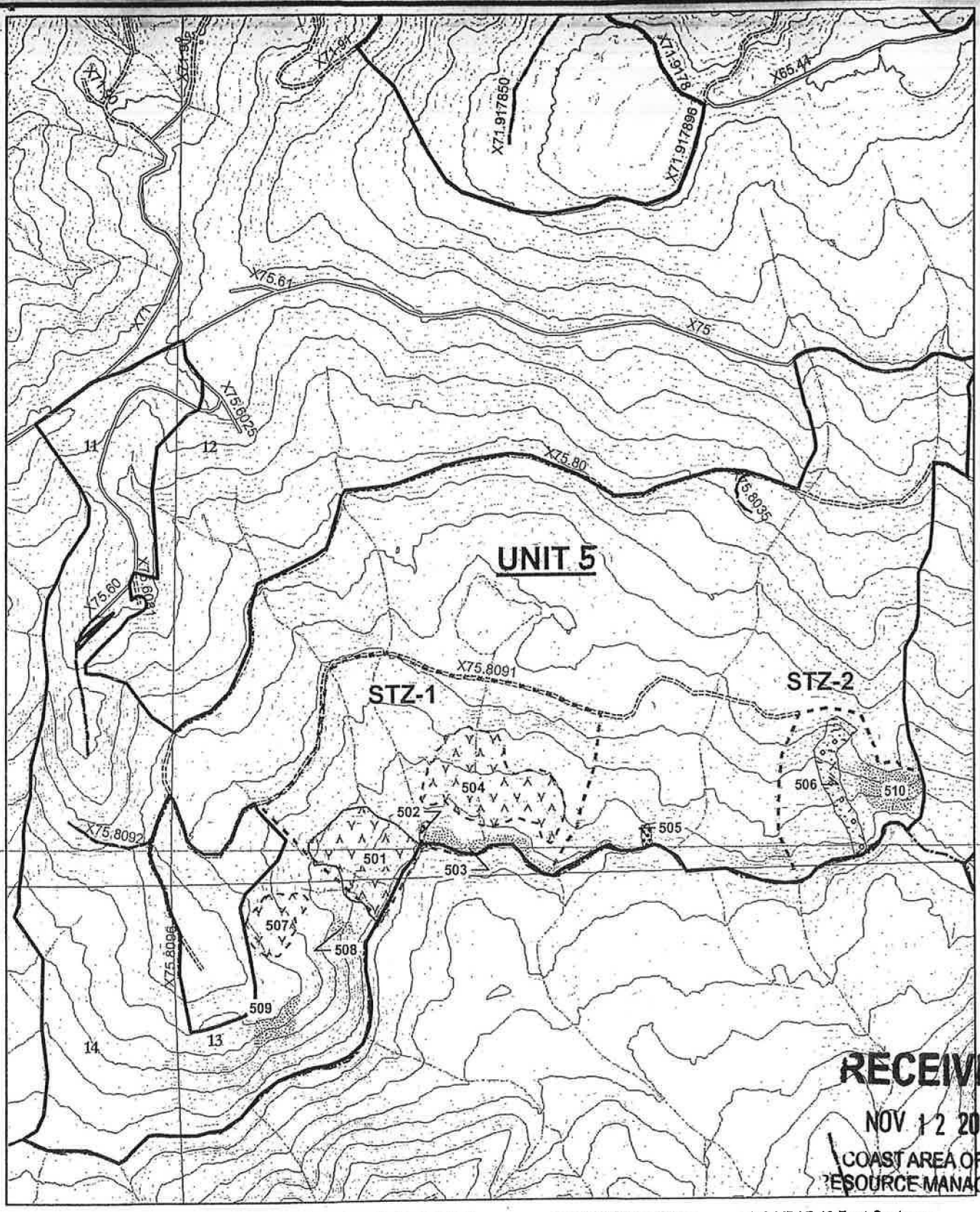


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Refer to Explanation Sheet for definition of map symbols

Refer to Appendix A for individual landslide characteristics

REVISED 9-24-2013

HRC LiDAR 10 Foot Contours

0 250 500 Feet

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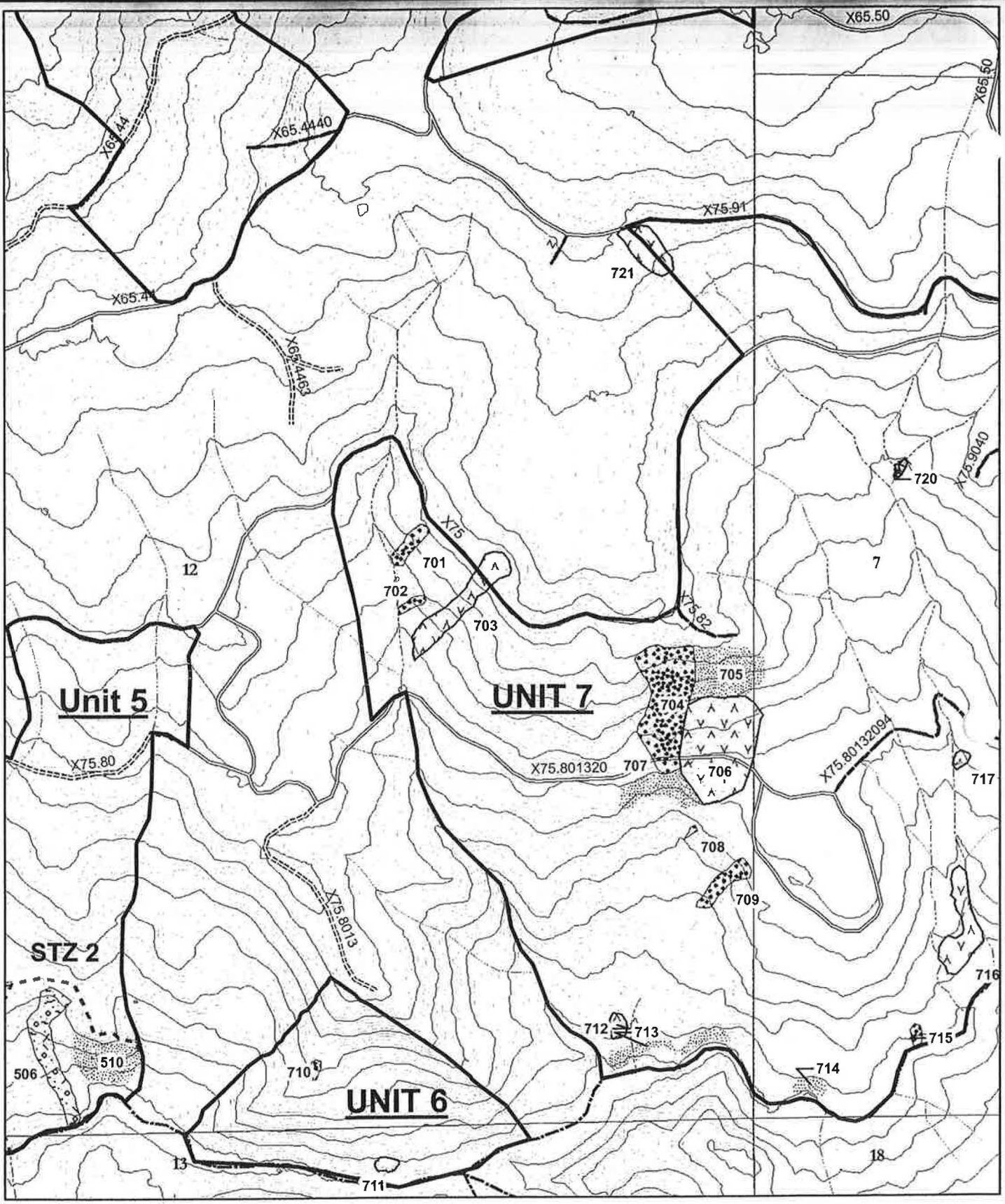
| HRC GeoScience Depart<br>Drawn By: SMB<br>Date: 7/26/13 | N | Double Deuce THP<br>Areas of Concern Map 280 | FIGURE 4 |

PART OF PLAN




Refer to Explanation Sheet for definition of map symbols

Refer to Appendix A for individual landslide characteristics

HRC LiDAR 10 Foot Contours

0 250 500 Feet

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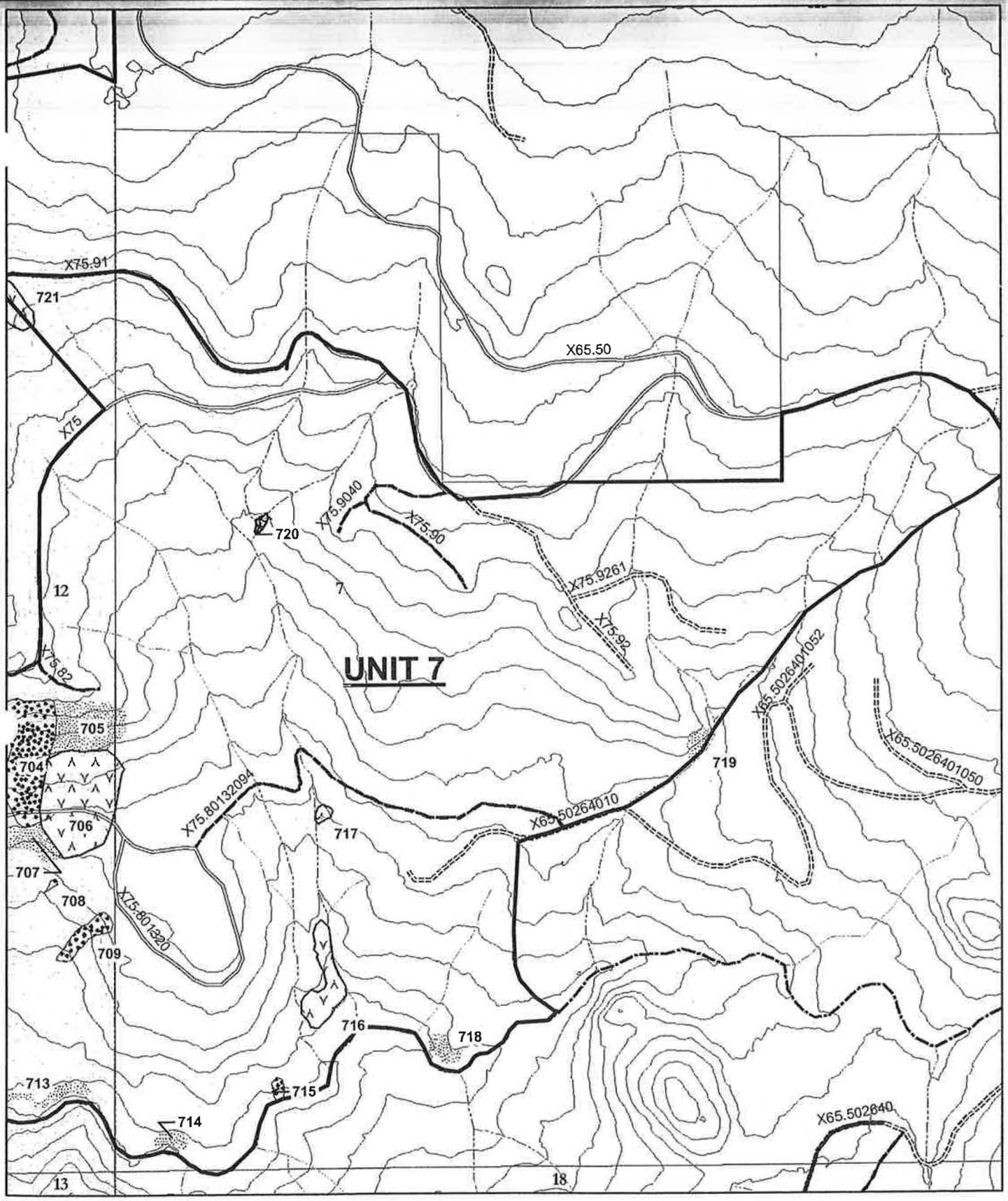
|---|---|---|---|
| HRC GeoScience Depart<br>Drawn By: SMB<br>Date: 7/26/13 | N | **Double Deuce THP**<br>**Areas of Concern Map** 281 | **FIGURE 5** |




Refer to Explanation Sheet for definition of map symbols

Refer to Appendix A for individual landslide characteristics

**HRC LiDAR 10 Foot Contours**

0 250 500 Feet

| | | | |
|---|---|---|---|
| HRC GeoScience Depart<br>Drawn By: SMB<br>Date: 7/26/13 | N | **Double Deuce THP**<br>**Areas of Concern Map** | **FIGURE 6** |

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THP Unit Boundary

## Landslide Types

- Debris Flow
- Debris Flow with Torrent Track
- Disrupted Ground
- Debris Slide
- Debris Slide Slope
- Earthflow
- Headwall Swale
- Inner Gorge Slopes
- Specail Treatment Zone
- Translationial/ Rotationial Landslide

## Watercourses

- Class I
- Class II
- Class III

## Ownership

- HRC
- OUT

## Roads

### SURFACE, CONDITION

- Paved Roads
- Rocked Roads
- Dirt Roads
- Closed
- Decommissioned Roads
- Jeep Trail
- Proposed

**Slide boundaries are solid where active to dormant-historic in age, dashed where dormant-historic to dormant-young or greaterin age, quired where age or location is uncertain.**

**Refer to Appendix A for individual landslide ages and attributes.**

Attached maps are for illustrative purposes only, location and dimensions of landslides and landslide-realted landforms are approximate. Any differences that maybe noted in dimensions, location, etc., will not have an impact upon conclusions/ recommendations contained within the attached report.

| | | |
|---|---|---|
| HRC GeoScience Depart | **Double Deuce THP** | **FIGURE 7** |
| Drawn By: SMB | **Symbol Explanation Key** | |
| Date: 8/2/13 | 283 | |

# APPENDIX A

# Double Deuce THP
# APPENDIX A
## Landslide Inventory Table

| ID # | Landslide type | Age | Dimensions (W x L x D) (ft.) | Depletion/ Accumulation Zone Characteristics | Del. | Proposed Silviculture | Comments | Rec. |
|---|---|---|---|---|---|---|---|---|
| 401 | translational/ rotationial | dormant-historic | 100 x 100 x 8 | brush with lot of wind throw downed trees | yes | none | outside unit boundaries | none* |
| 402 | debris slide | dormant-historic | 30 x 50 x 3 | brush with lot of wind throw downed trees | no | group selection | shallow slide that intiated slopes that define the head margin of a dormant-old llandlside-related landform | none* |
| 403 | debris slide | dormant-historic | 20 x 150 x 3 | open stand of second growht conifers | yes | inner and outer band of Class II RMZ | timber appears to range from 70 to 80 years inage | none* |
| 404 | debris slide | dormant-historic | 60 x 180 x 5 | second growth conifer, hummocky slope, and weathered scarps | no | none; outside unit | slide deposit perched on a mid-slope surface | none* |
| 405 | debris slide | dormant-historic | 80 x 150 x 6 | limited number of second growth conifer and brush | yes | inner and outer band of Class II RMZ | (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 406 | debris slide | dormant-historic | 60 x 150 x 6 | limited number of second growth conifer and brush | no | none; ouside unit | slide deposit perched on a mid-slope surface | none* |
| 407 | debris slide slope | dormant-historic | 250 x 350 x 2-6 | steep raveling slopes with limited vegetation | no | group selection | bluff like landform (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 408 | earthflow | dormant-historic | 75 x 250 x 6 | brush | no | none; outside plan area | difficult to observe in field (Scopac Geology Depart. [THP 1-02-049]) | none* |
| 409 | debris slide (fill embankment failure) | dormant-historic | 50 x 75 x 6 | brush and small regeneration conifer | probablly | none; outside unit | outside unit boundaries | none* |
| 410 | inner gorge slope | active to dormant-historic | 700 foot segment | brush, bare mineral soils, small to moderate sized regeneration conifer | yes | inner band of Class II RMZ | occures within 30 feet of the stream channel | none* |
| 411 | debris slide slope | dormant-historic | 250 x 250 x 2-6 | brush, bare mineral soils, small to moderate sized regeneration conifer | probablly | inner and outer band of enhanced Class II RMZ | enhnaced RMZ (BGC, 2001 [THP 1-01-453 HUM]) | none* |

* proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic recourses

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# Dou e Deuce THP
# APPENDIX A
## Landslide Inventory Table

| ID # | Landslide type | Age | Dimensions (W x L x D) (ft.) | Depletion/ Accumulation Zone Characteristics | Del. | Proposed Silviculture | Comments | Rec. |
|---|---|---|---|---|---|---|---|---|
| 412 | earthflow | dormant-historic | 100 x 300 x 8 | small regeneration conifer and brush | yes | inner/outer bands of Class II RMZ | sublte slide morphology with distinct change in vegetation between slide area and adjacent slopes | retain 100 spaure feet and no group openings |
| 413 | debris slide | dormant-historic | 120 x 300 x 6 | small regeneration conifer and brush | yes | inner/outer bands of Class II RMZ | no mechantable timber on slide evacuation area with limited numbers on slide mass | retain 100 spaure feet and no group openings |

* proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic recourses

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# Double Deuce THP
# APPENDIX A
## Landslide Inventory Table

| ID # | Landslide type | Age | Dimensions (W x L x D) (ft.) | Depletion/ Accumulation Zone Characteristics | Del. | Proposed Silviculture | Comments | Rec. |
|---|---|---|---|---|---|---|---|---|
| 501 | earthflow | active to dormant-historic | 250 x 350 x 8-10 | warp conifers, brush, raw scarps, and rotated stumps | yes | inner and outer band of Class I RMZ and single tree selection | large slide complex (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 502 | debris slides | active to dormant-historic | 30 x 200 x 1-3 | warp conifers, brush, weathered scarps, and rotated stumps | yes | inner and outer band of Class II RMZ | streamside failures along the right flank of the failure at 503 (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 503 | inner gorge | dormant-historic | 800 x 75 x 2-4 | brush, blue blossom and 2 to 6 inch diameter conifer | yes | inner band of Class I RMZ | distinct vegetation change with board bench above (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 504 | compound failure (earthflow dominate) | dormant-historic to dormant young | est. 600 x 400 x 4-10 | densely forester with healthy upright conifers and rare highly weathered scarps (1 to 4 feet tall) | no | outer band of Class I RMZ and single tree selection | slides appear to toe out on to broad flat above inner gorge slope (BGC, 2001 [THP 1-01-453 HUM]) | establish STZ; refer to recommendation section for details |
| 505 | debris slide | dormant-historic | 40 x 150 x 3 | bare mineral soil, bedrock, and grass | yes | inner band of Class I RMZ | associated with steep inner valley terrain (Falls, 1999) | none* |
| 506 | debris flow | dormant-historic | 100 x 700 x 12 | brush, blue blossom, jackstraw conifer, bare mineral soils and bedrock (headscarp) | yes | inner/ outer band of Class II RMZ and single tree selection | associated with landing | none* |
| 507 | earthflow | dormant-historic | 100 x 200 4 | down and warped timber | no | single tree selection | upland earthflow (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 508 | micro debris slide slope | dormant-historic | 100 x 150 x 1-3 | brush and talus | no | inner and outer band of Class I RMZ | shallow slide scars | none* |
| 509 | bedrock block with talus slopes | dormant-historic | 200 x 175 x 1-3 | hardwood, bedrock, brush, talus piles | no | single tree selection | no trees due to rock nature of the slope (BGC, 2001 [THP 1-01-453 HUM]) | none* |
| 510 | bedrock block with talus slopes | dormant-historic | 250 x 300 x 1-3 | hardwood, bedrock, brush, talus piles | yes | inner and outer band of Class I RMZ | no trees due to rock nature of the slope | establish STZ; refer to recommendation section for details |

* proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic recourses

# Dou .e Deuce THP
# APPENDIX A
## Landslide Inventory Table

| ID # | Landslide type | Age | Dimensions (W x L x D) (ft.) | Depletion/ Accumulation Zone Characteristics | Del. | Proposed Silviculture | Comments | Rec. |
|---|---|---|---|---|---|---|---|---|
| 701 | debris flow | dormant-historic | 25-40 x 100 x 4 | brush and buried stump | yes | inner and outer band of Class II RMZ | no trees to mark | none* |
| 702 | debris slide | dormant-historic | 30-45 x 150 x 3 | pampass grass, ferns and bedrock at headscarp | yes | inner and outer band of Class II RMZ | very steep planar slope | none* |
| 703 | earhflow (?) /disrupted ground | dormant-historic | 60 x 150 x 5 (?) | dead/ down trees and thick brush | no | inner/ outer band of Class II RMZ and single tree selection | distinct contrast in vegetation; difficult to differentiate based on slide morphology; appears to deform the X75 road | none* |
| 704 | disrupted ground (?) | dormant-historic | 50 x 75 x 4 | cluster of deformed | no | group selection | road is readily passable at toe of landform | none* |
| 705 | debir slide slope | dormant-historic | 400 x 250 x 2-6 | blue blossum and small conifer | no | group selection | very dense brush cover; hard to see laterial limits | none* |
| 706 | earhtflow (debris slide slope deposit) | dormant-historic | 250 x 400 x 4 | warped and leaning conifer upto 42 inches dbh, down woody debris, and dense blue blossum patches | no | group selection | irregular ground surface, often obscured by vegeation | none* |
| 707 | debris slide slope (micro ampitheater) | dormant-historic to dormant young | 300 x 120 x 4 | waethered slide scars | no | group selection | forested with small diameter conifer | none* |
| 708 | debris slide | recently active to dormant-historic | 45 x 55 x2-4 | pampass grass, ferns and bedrock at headscarp | no | group selection | at toe of steep slope subjected ground based operatins | none* |
| 709 | debris slide | dormant-historic | 330 x 110 x 5 (est.) | dense brush | no | group selection | large brush field, dificult to access | none* |
| 710 | debris slide | dormant-historic | 50 x 120 x 3 | brush patch with warp conifer in middle | no | group selection | steep midslope swale | none* |
| 711 | earthflow | dormant-historic | 75 x 80 x 12 | slightly warp conifer with distinct headscar[ | yes | inner band of Class I RMZ | crest at slope break above inner valley slope | none* |

* proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic recourses

# Double Deuce THP
# APPENDIX A
## Landslide Inventory Table

| ID # | Landslide type | Age | Dimensions (W x L x D) (ft.) | Depletion/ Accumulation Zone Characteristics | Del. | Proposed Silviculture | Comments | Rec. |
|---|---|---|---|---|---|---|---|---|
| 712 | earthflow (?) | dormant-historic | 50 x 60 x 5 | group of warped conifers | no | group selection | irregular ground near rdigeline | none* |
| 713 | debris slide slope | recently active to dormant-young | 430 x 60 x 2-3 | bare mineral soil and mature 36 inch diameter conifer | yes | inner band of Class I RMZ | no tree marked for harvest outside zone | none* |
| 714 | debris slide slope | dormant-historic | 120 x70 x 3-6 | down tree, talus, and brush | yes | inner band of Class II RMZ | tight cluster of small diameter fir | none* |
| 715 | debris slide | dormant-historic | 30-50 x 75 4-8 | brush and solitrary conifers with hardwoods along laterial margins | yes | inner band of Class II RMZ | no tree marked for harvest | none* |
| 716 | earthflow | dormant-historic | 150 x 450 x 6 | warped and straight timber, rock blocks, and multi scarps | yes | inner and outer band of Class II RMZ | no trees are marked in the area | none* |
| 717 | translationial/ rotationial | dormant-historic | 75 x 75 x 8-10 | 20-inch plus conifer stand | yes | inner/outer band of Class II RMZ | highly weathered, has a swale like appearance | none* |
| 718 | debir slide slope | dormant-historic | 300 x 200 x 4-6 | not observed | yes | inner band of Class II RMZ | mapped by Falls (1999); encompassed by enhanced Class II RMZ no-cut inner band | none* |
| 719 | rock fall and topple debris slide slope | recently active to dormant-historic | 200 x 200 x 1-5 | rock outcrops, brush, and scattered 2 to 4 inch conifer | yes | inner band of Class II RMZ | rock slope; encompassed by enhanced Class II RMZ no-cut inner band | none* |
| 720 | unstable streamside banks | dormant-historic | 50 foot reach | ferns and brush | yes | inner band of Class II RMZ | dense concentration of stream bank failures at confluance | |
| 721 | earthflow (?) embankment failure (?) | dormant-historic | 100 x 100 x 4-8 | swept conifers and tilted stump | no | group selection | possible old rail embankment | none* |

* proposed land use activities appear appropriate for site conditions and will not pose a risk to aquatic recourses

# Humboldt Redwood Company LLC

## Erosion Control Plan (ECP) for the "Double Deuce" 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: **Double Deuce**
Contact Person: **Jay Fazio** Phone: **(707) 764-4227**

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

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 **Jay Fazio**

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 discharg 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 a 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 summarv report, at a minimum will include the date of inspections, the inspector's name, the location of each inspection, a the title and name of the person submitting the summary report.

| 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. |

## Maps attached:

- **Appurtenant Road and Wet Weather Road Use map**
- **Road Construction Locations/ECP Site Locator Map**

# 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** Double Deuce | | | | | | | |
| D: X75.80<br>TATION: 1030<br>ITE: UF1101<br>VOID: -698713991<br>EDID: 20850<br>EPAIRED: NO<br>LASS: 3 | Critical Dip | 5 | 5 100% | Low | Prior to THP Final Completion. | Road surface lacks treatment. | Watercourse lacks critical dip<br><br>Post operations install critical dip, disconnect road surface with rolling dips or water bars and rock hydrologically connected segments. |
| D: X75.80<br>TATION: 3460<br>ITE: UF1103<br>VOID: 2120640531<br>EDID: 20852<br>EPAIRED: NO<br>LASS: 3 | Surface Drainage | 2 | 2 100% | Low | Prior to THP Final Completion. | Class II with Left side road surface connected. Left side is a through cut. | Class II with Left side road surface connected.<br><br>Disconnect left side road surface with waterbar or rolling dip. Rock hydrological connected areas. |
| D: X75.9261<br>TATION: 285<br>ITE: UF85.1<br>VOID: -1502256197<br>EDID: 20864<br>EPAIRED: NO<br>LASS: 2 | Temporary Crossing | 137 | 137 100% | Med | Prior to THP Final Completion. | Class II stream crossing. Crossing is not completely pulled and has headcut Bottom of crossing has large wood and slash over channel. | Class II stream crossing. Crossing is not completely pulled and has headcut Bottom of crossing has large wood and slash over channel.<br><br>Install temp. crossing with pipe large enough to handle the flow of water at the time of operations. Minimum pipe size is 6". Post operation pull all fills and lay back side slopes. Use rock, LWD to stabilize channel and Slash and/or straw to stabilize all exposed soils per item 18. |
| **Total Estimated Yards** | | 144 | 144 | | | | |

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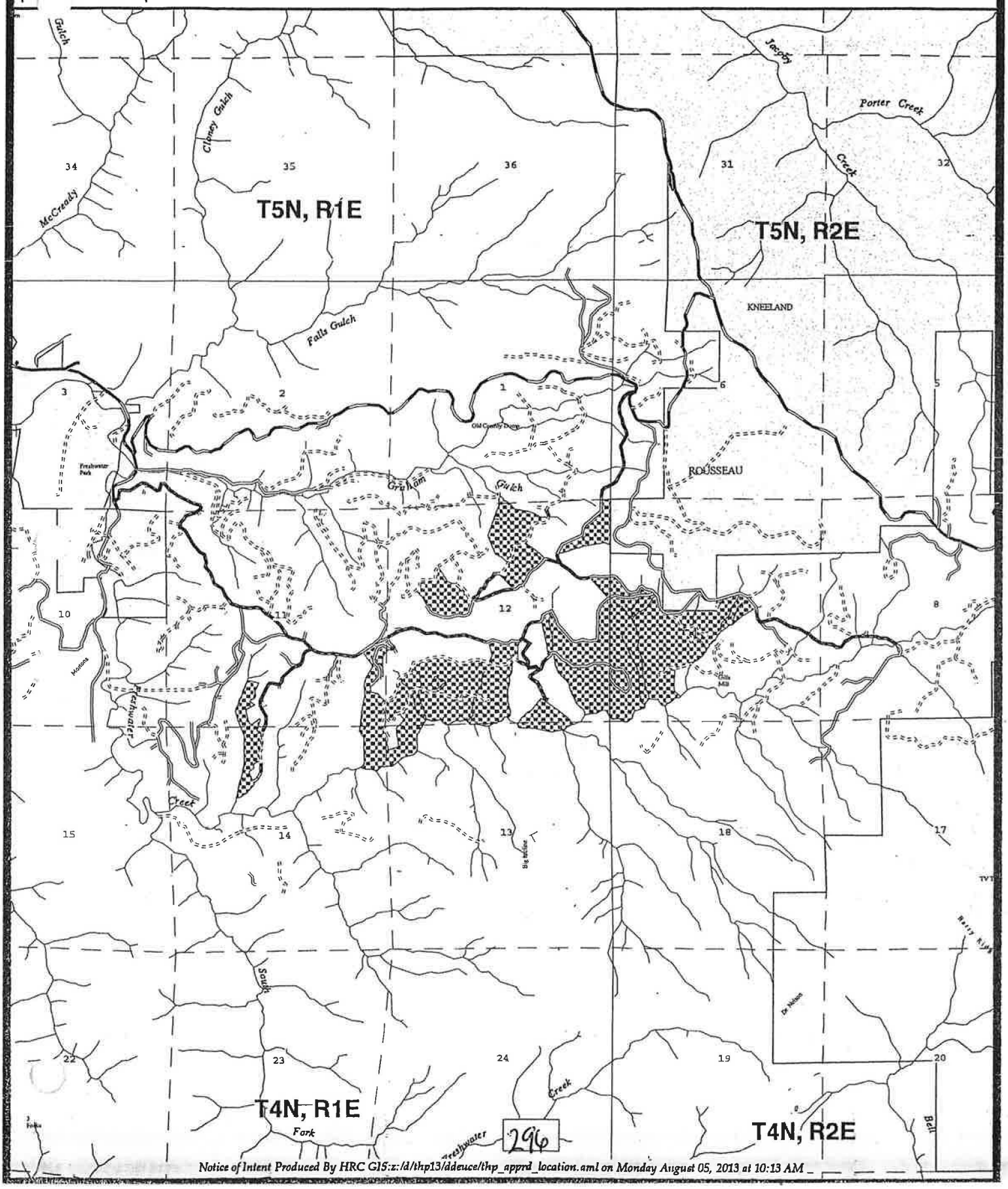
# Double Deuce
## Appurtenant Road Locator Map

T4N R1E Sec. 1, 11, 12, 13, 14 HB&M
T4N R2E Sec. 7, 18 HB&M

USGS Quad (s) : ARCATA SOUTH, IAQUA BUTTES
USGS Quad (s) : MCKINNEY CREEK

THP Harvest Unit(s)
Other Ownership(s)
HRC
Property Line
Paved Road (Public Road)
Appurtenant (Private Road)
Class I/II Watercourse

Map Scale: 1 inch = 3000 feet






Notice of Intent Produced By HRC GIS:z:/d/thp13/ddeuce/thp_apprd_location.aml on Monday August 05, 2013 at 10:13 AM

# Double Deuce

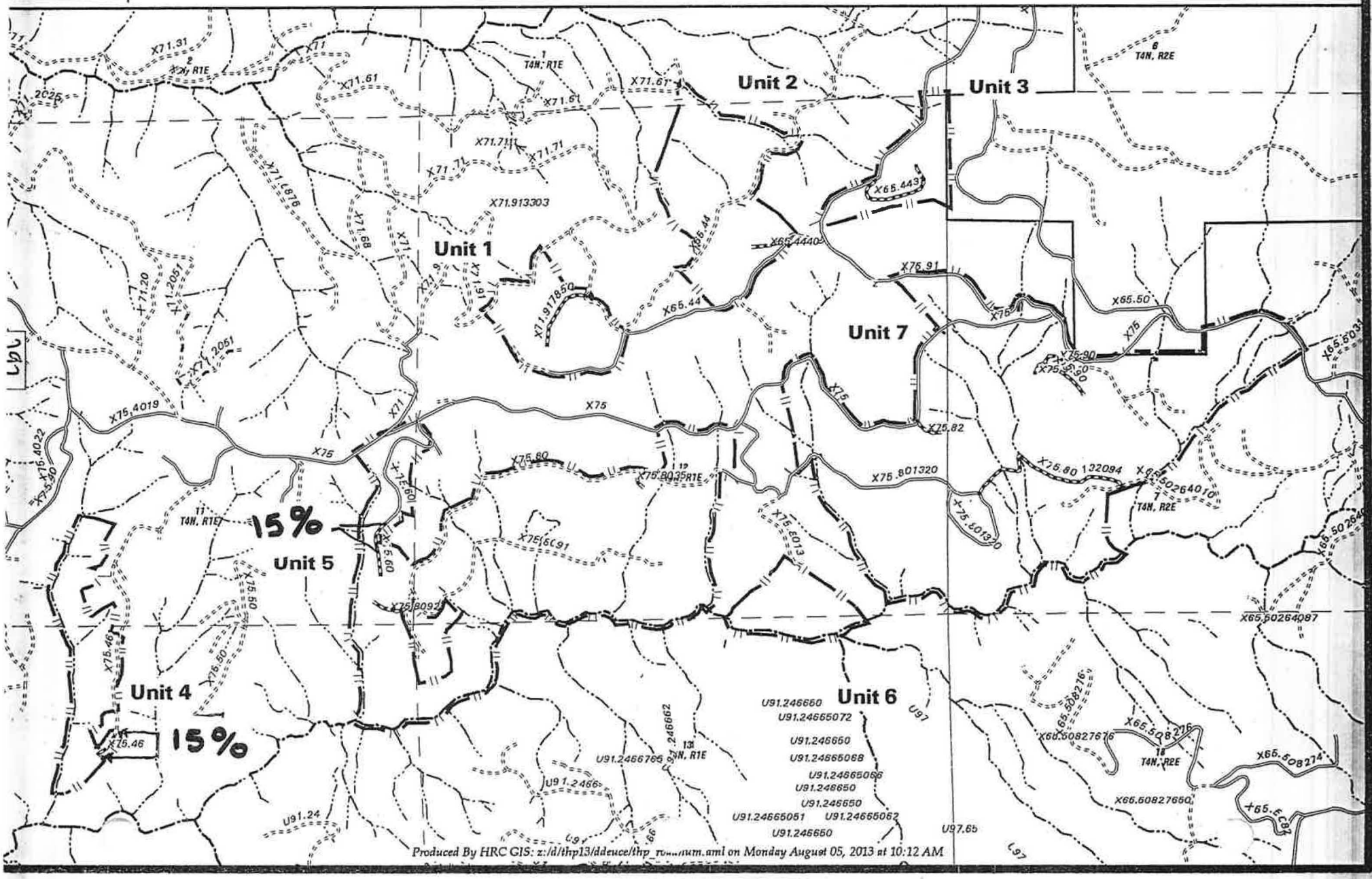
*Road Construction Location Map*

T4N R1E Sec. 1, 11, 12, 13, 14 HB&M
T4N R2E Sec. 7, 18 HB&M

USGS Quad (s) : ARCATA SOUTH, IAQUA BUTTES
USGS Quad (s) : MCWHINNEY CREEK

Property Line
Harvest Boundary
Permanent Road
Seasonal Road
Temporary Road
Proposed Seasonal Road
Class I Watercourse
Class II Watercourse
Class III Watercourse

Map Scale: 1 inch = 1320 feet

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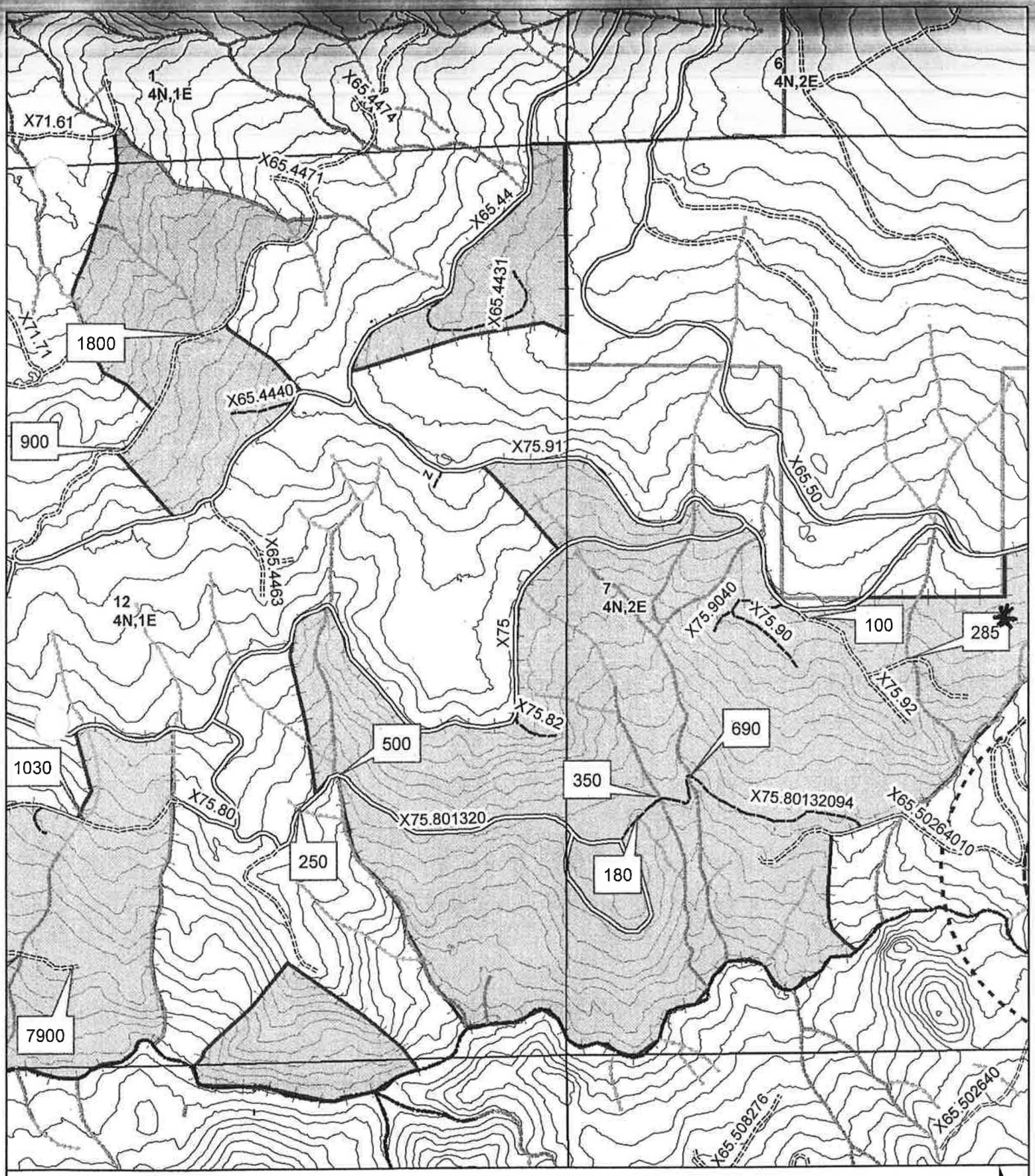



# Double Deuce THP Road Point Map

THP Area

NSO Buffer

Rocked Road
Seasonal Road
Proposed Road
Paved Road

Class 1
Class 2
Class 3

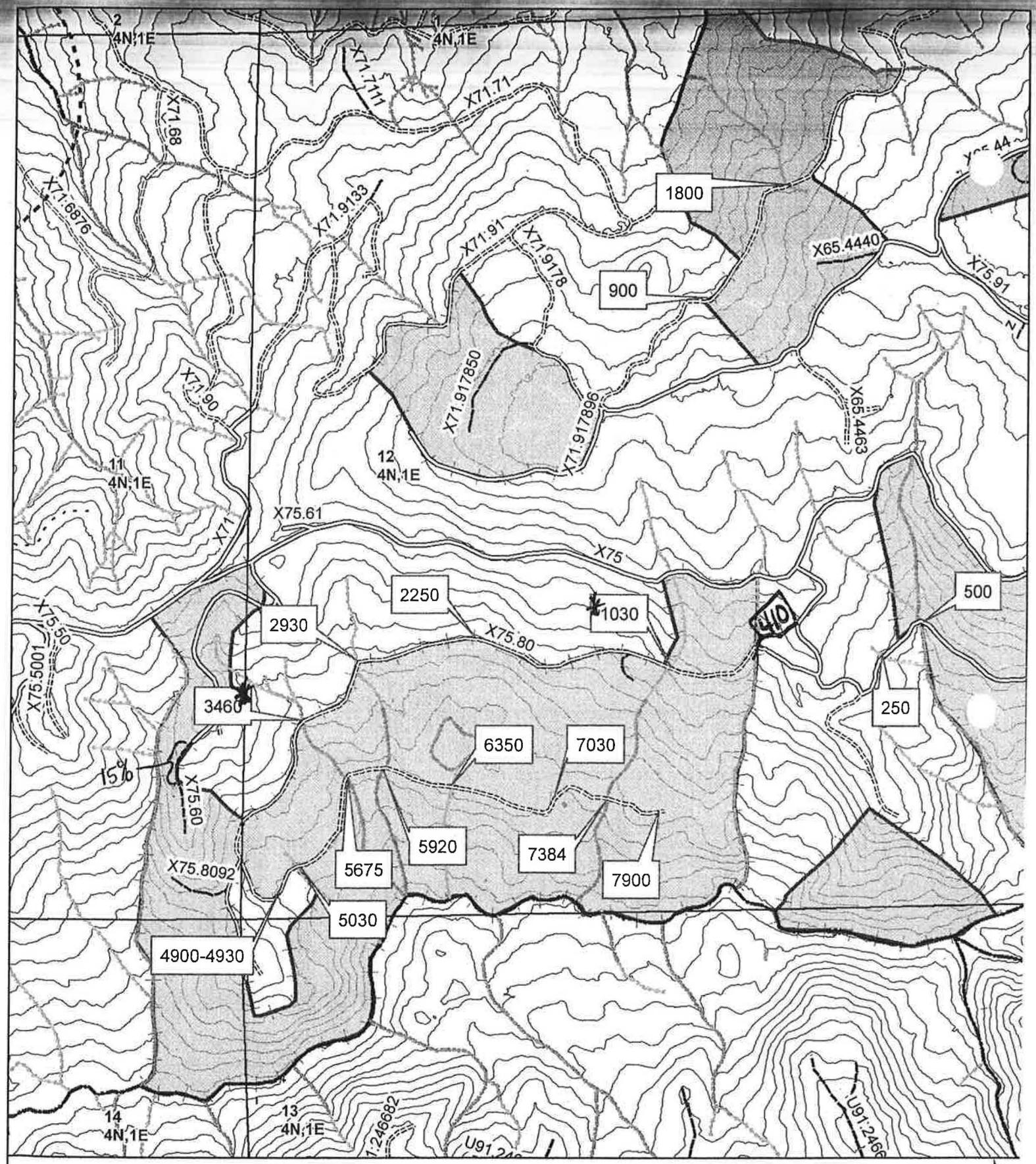
1420' Road Point

Property Line

Contour Interval 40'
1 inch = 750 feet

N

298




# Double Deuce THP Road Point Map

THP Area

NSO Buffer

Rocked Road
Seasonal Road
Proposed Road
Paved Road

Class 1
Class 2
Class 3

1420' Road Point

Property Line

Contour Interval 40'
1 inch = 750 feet

N

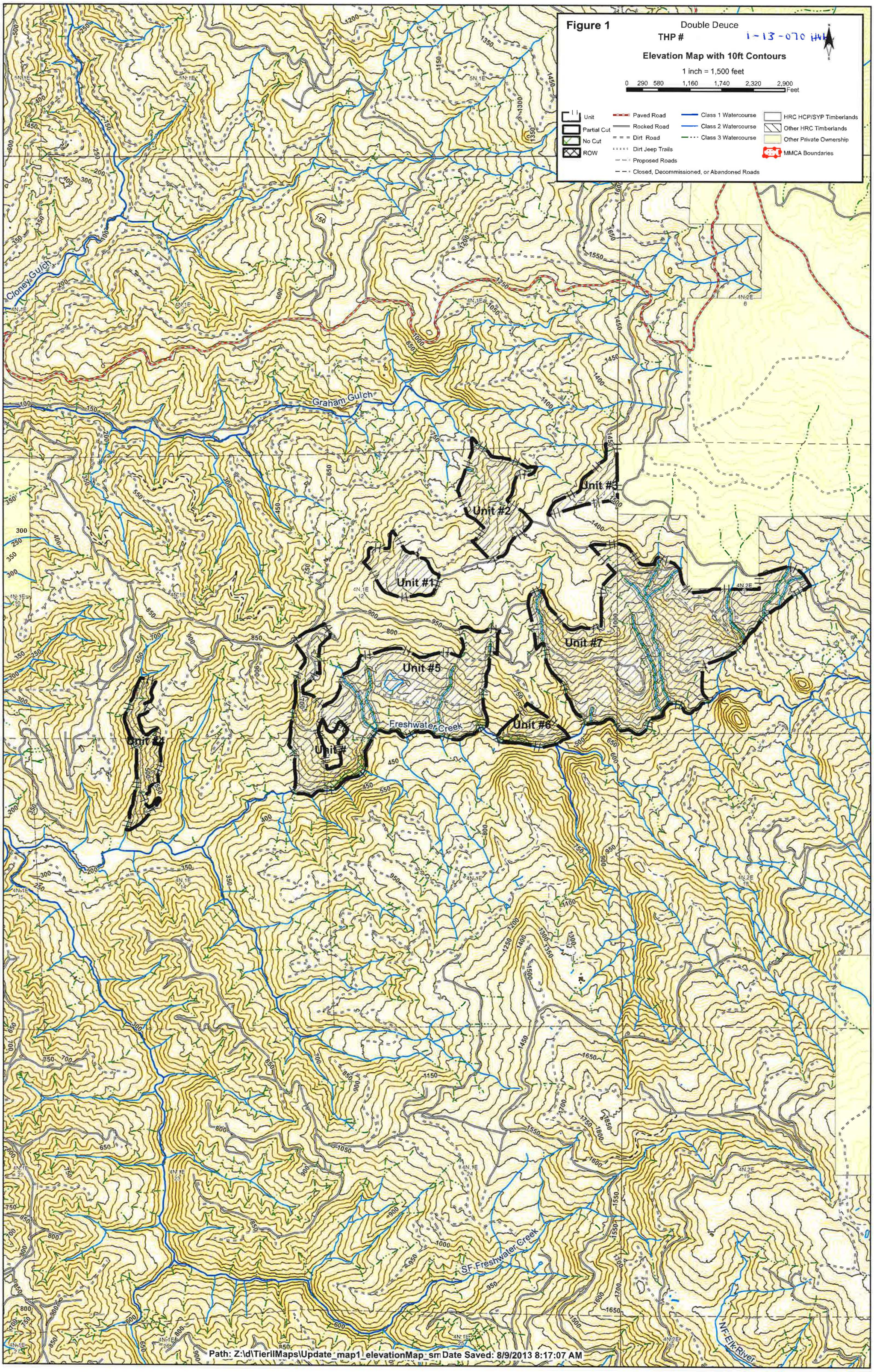


Figure 1
Double Deuce
THP # 1-13-070 HNL
Elevation Map with 10ft Contours
1 inch = 1,500 feet
0 290 580 1,160 1,740 2,320 2,900 Feet
Unit
Partial Cut
No Cut
ROW
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
MMCA Boundaries
Cloney Gulch
Graham Gulch
Freshwater Creek
SF Freshwater Creek
NF Elk River
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7
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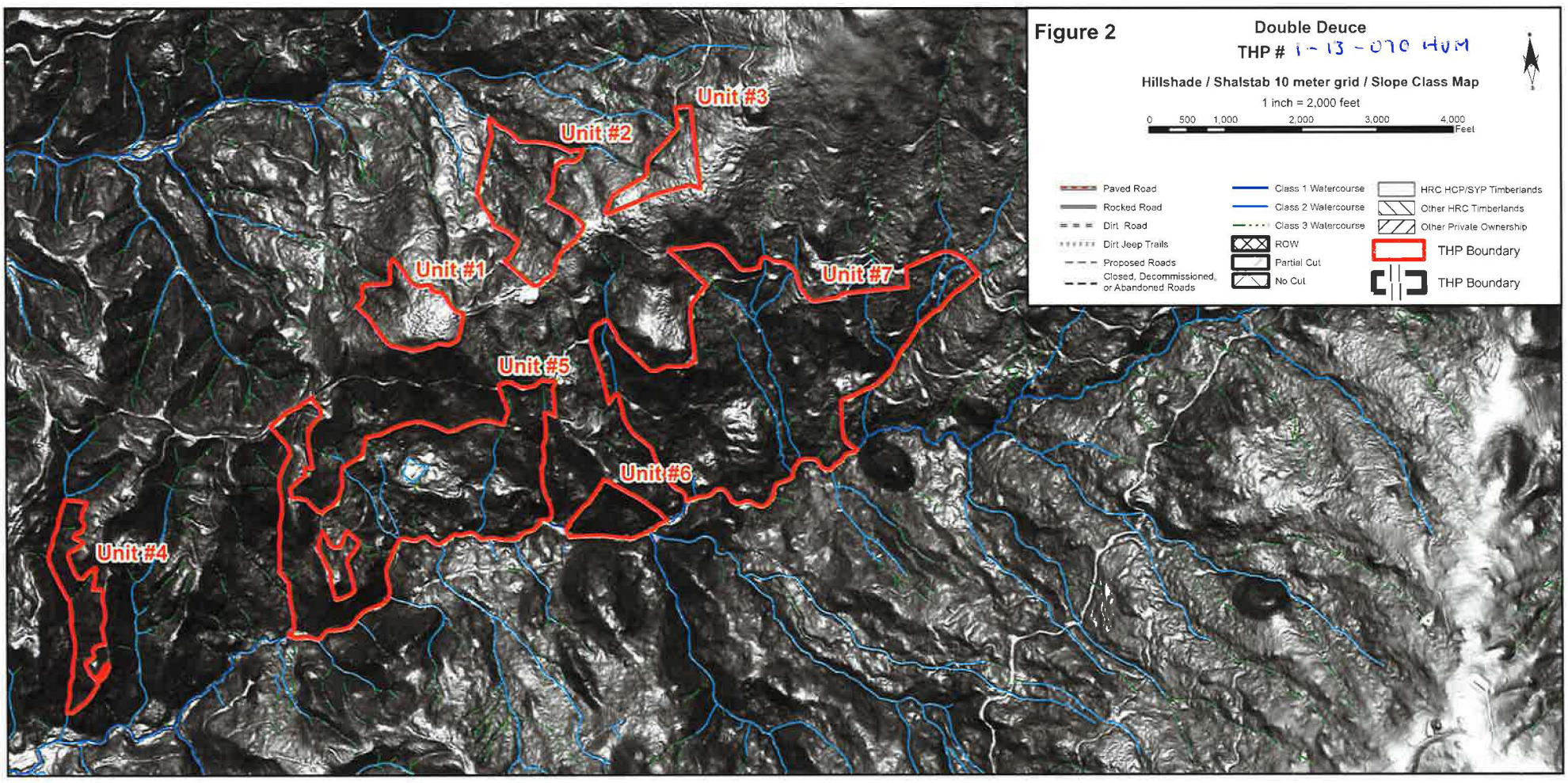
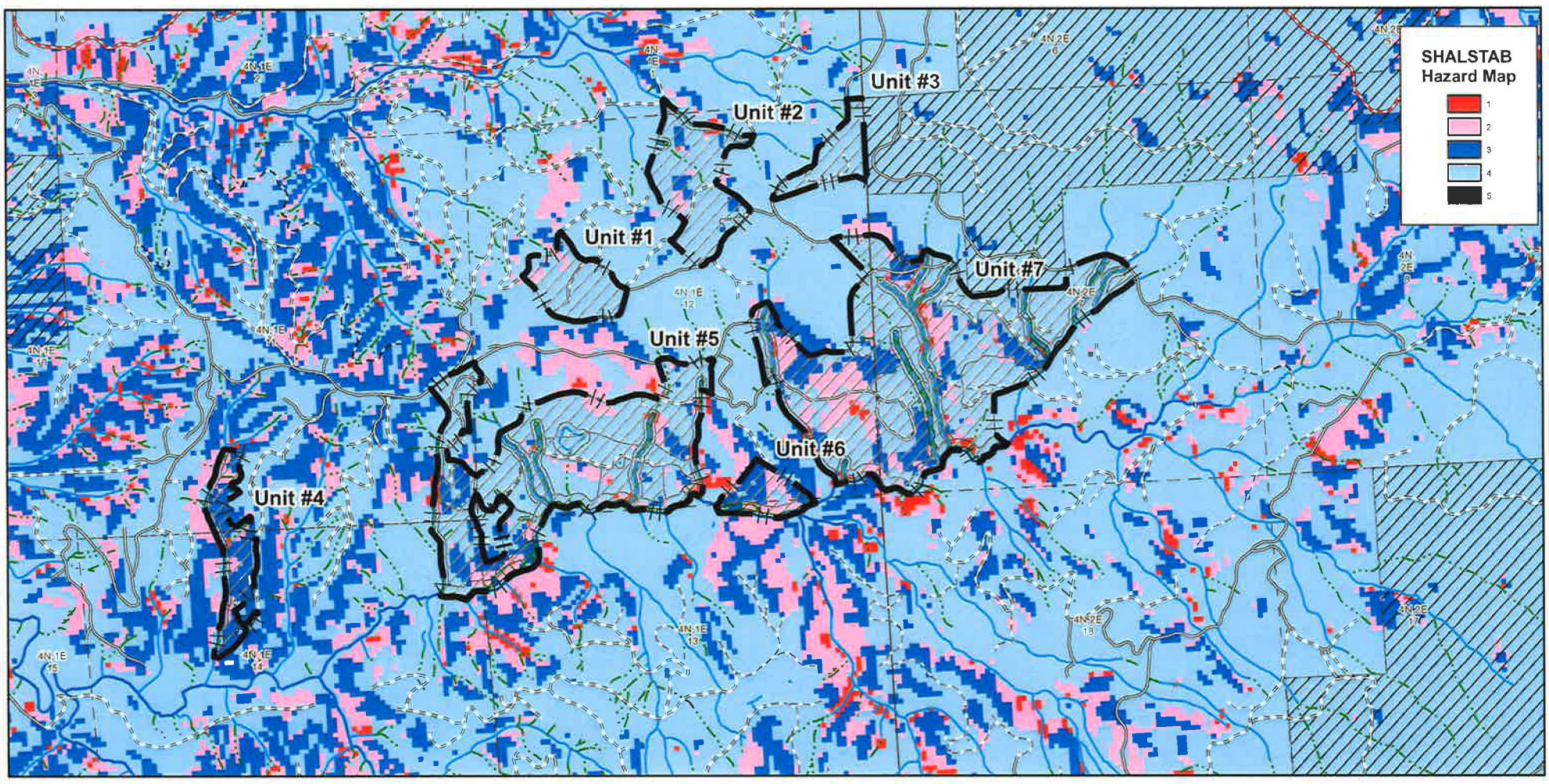
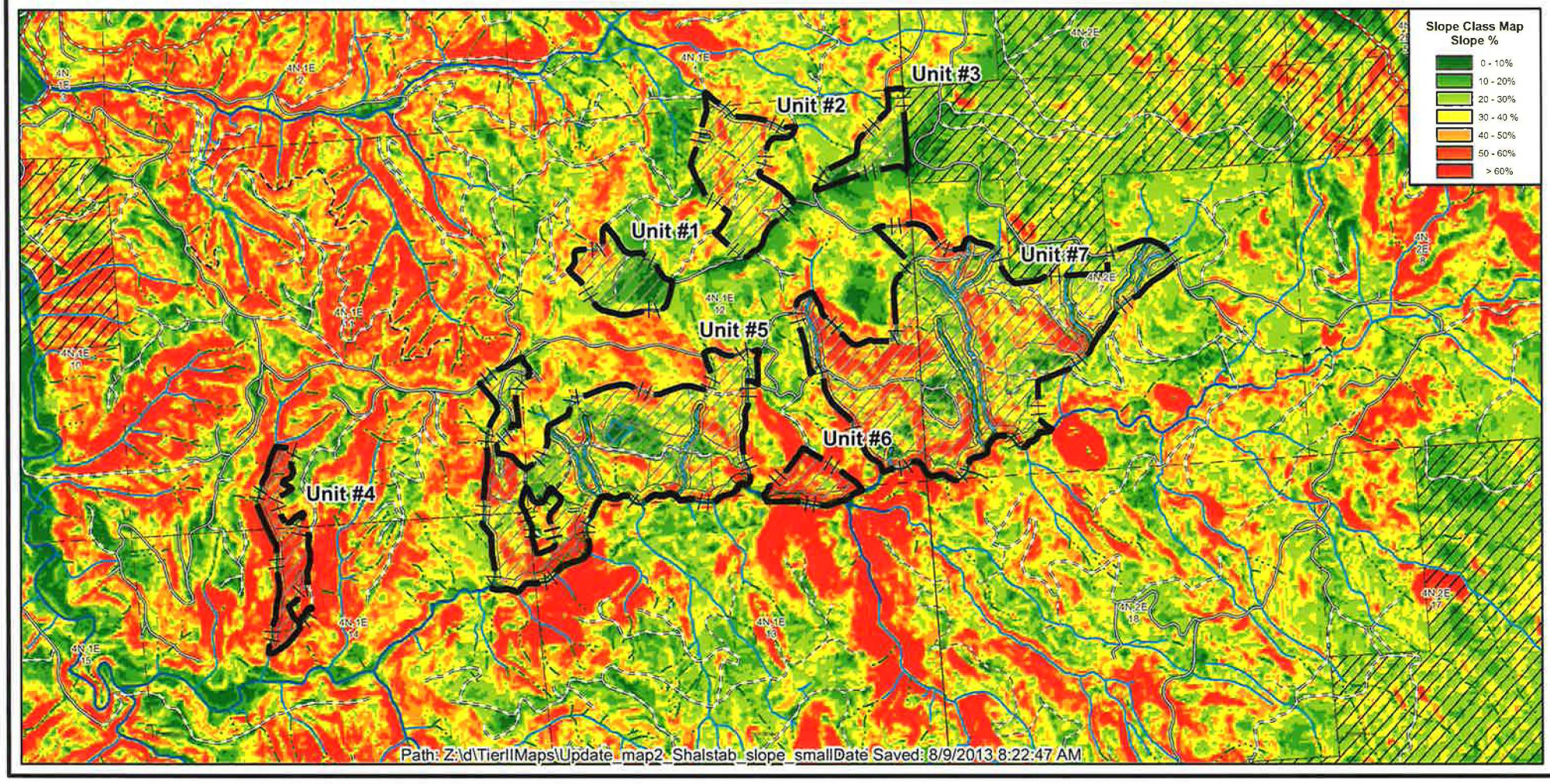


Figure 2
Double Deuce
THP # 1-13-070 HUM
Hillshade / Shalstab 10 meter grid / Slope Class Map
1 inch = 2,000 feet
0 500 1,000 2,000 3,000 4,000 Feet
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
ROW
Partial Cut
No Cut
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
THP Boundary
THP Boundary
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7


SHALSTAB
Hazard Map
1
2
3
4
5
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7


Slope Class Map
Slope %
0 - 10%
10 - 20%
20 - 30%
30 - 40 %
40 - 50%
50 - 60%
> 60%
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7
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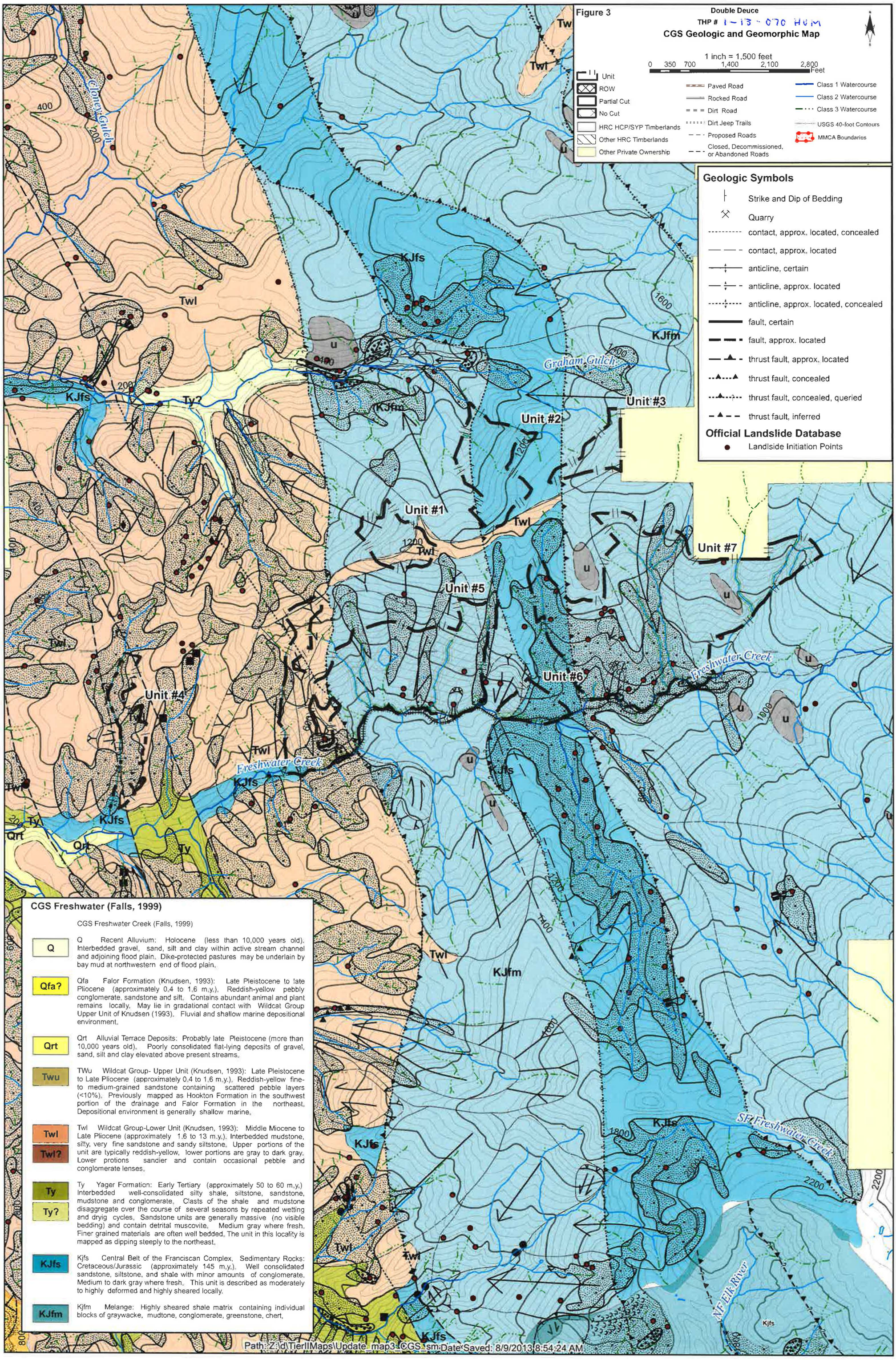
Figure 3
Double Deuce
THP # 1-13-070 HUM
CGS Geologic and Geomorphic Map
1 inch = 1,500 feet
0 350 700 1,400 2,100 2,800 Feet
Unit
ROW
Partial Cut
No Cut
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
USGS 40-foot Contours
MMCA Boundaries
Geologic Symbols
Strike and Dip of Bedding
Quarry
contact, approx. located, concealed
contact, approx. located
anticline, certain
anticline, approx. located
anticline, approx. located, concealed
fault, certain
fault, approx. located
thrust fault, approx. located
thrust fault, concealed
thrust fault, concealed, queried
thrust fault, inferred
Official Landslide Database
Landslide Initiation Points
Cloney Gulch
Graham Gulch
Freshwater Creek
SF Freshwater Creek
NF Elk River
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7
Twl
Tw
Ty?
KJfs
KJfm
u
Qrt
Ty
CGS Freshwater (Falls, 1999)
CGS Freshwater Creek (Falls, 1999)
Q
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?
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
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
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
Twl?
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
Ty?
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
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
Kjfm Melange: Highly sheared shale matrix containing individual blocks of graywacke, mudtone, conglomerate, greenstone, chert,
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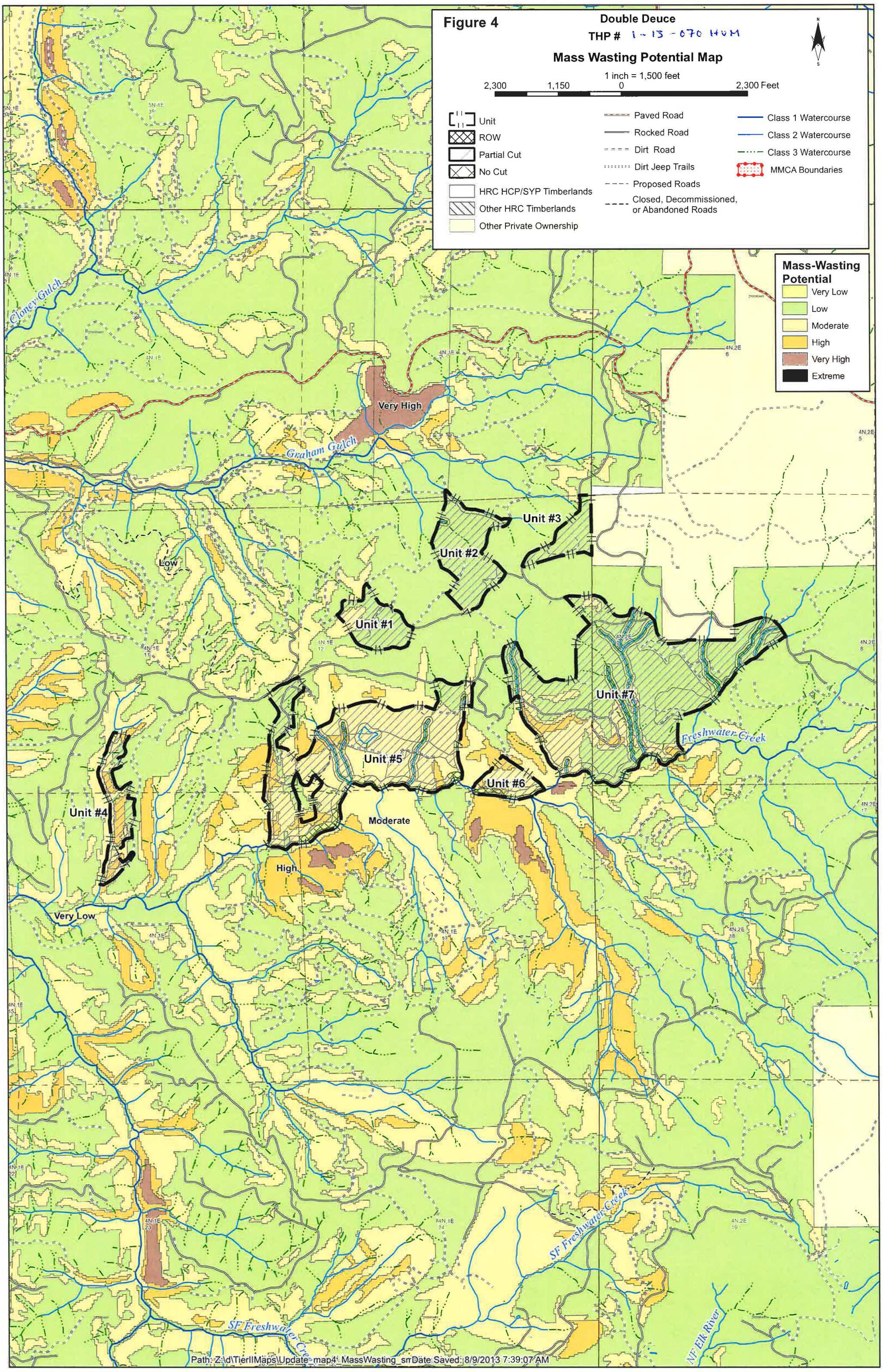
Figure 4
Double Deuce
THP # 1-13-070 HUM
Mass Wasting Potential Map
1 inch = 1,500 feet
2,300
1,150
0
2,300 Feet
N
S
Unit
ROW
Partial Cut
No Cut
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
MMCA Boundaries
Mass-Wasting Potential
Very Low
Low
Moderate
High
Very High
Extreme
Cloney Gulch
Graham Gulch
Freshwater Creek
SF Freshwater Creek
NF Elk River
Very High
Low
Moderate
High
Very Low
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7
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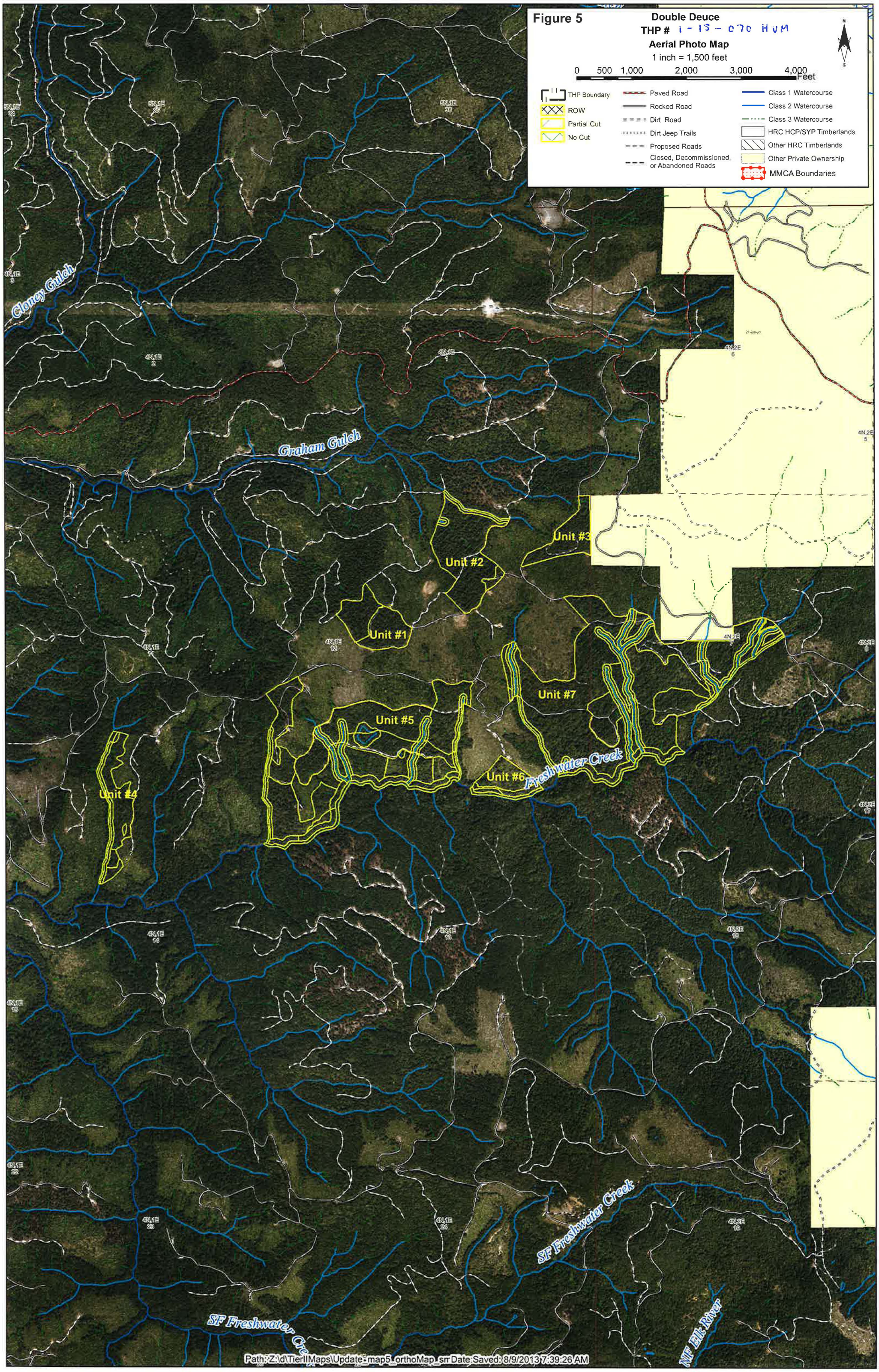
Figure 5
Double Deuce
THP # 1-13-070 HUM
Aerial Photo Map
1 inch = 1,500 feet
0 500 1,000 2,000 3,000 4,000 Feet
THP Boundary
ROW
Partial Cut
No Cut
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
MMCA Boundaries
Cloney Gulch
Graham Gulch
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7
Freshwater Creek
SF Freshwater Creek
NF Elk River
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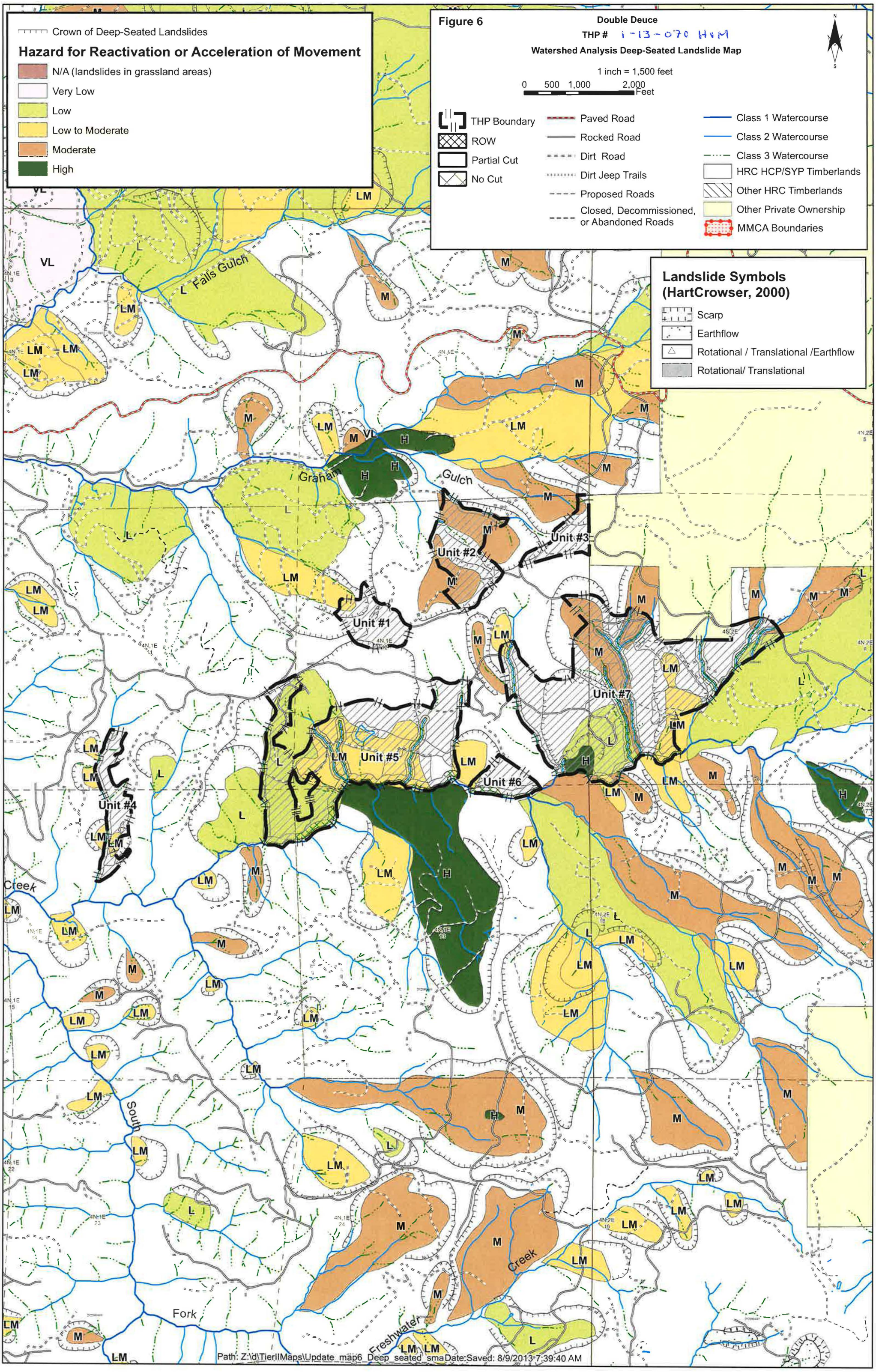
Figure 6
Double Deuce
THP # 1-13-070 HNM
Watershed Analysis Deep-Seated Landslide Map
1 inch = 1,500 feet
0 500 1,000 2,000 Feet
N
S
Crown of Deep-Seated Landslides
Hazard for Reactivation or Acceleration of Movement
N/A (landslides in grassland areas)
Very Low
Low
Low to Moderate
Moderate
High
THP Boundary
ROW
Partial Cut
No Cut
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
MMCA Boundaries
Landslide Symbols (HartCrowser, 2000)
Scarp
Earthflow
Rotational / Translational /Earthflow
Rotational/ Translational
Falls Gulch
Graham Gulch
Unit #1
Unit #2
Unit #3
Unit #4
Unit #5
Unit #6
Unit #7
South Fork
Freshwater Creek
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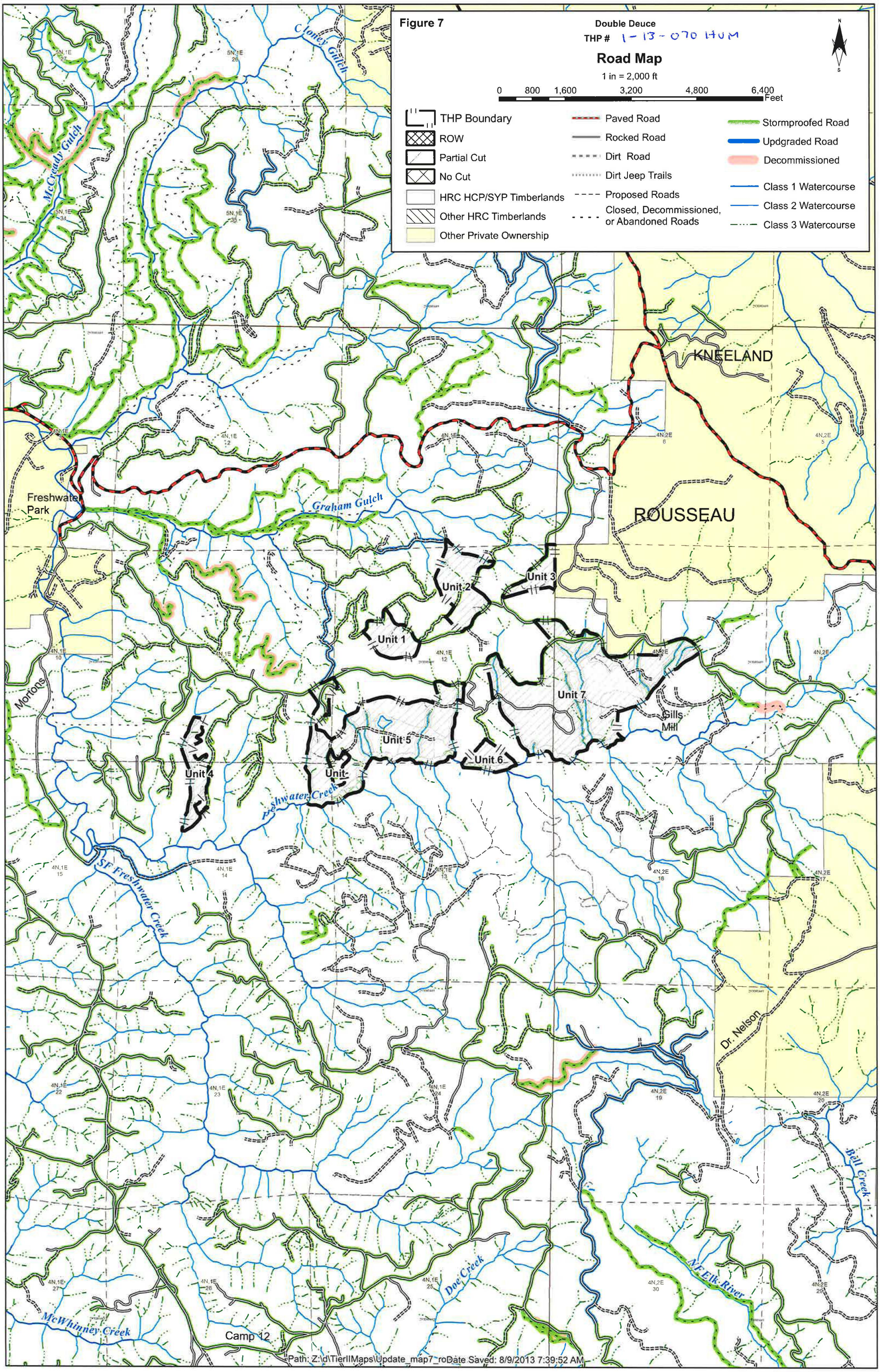
Figure 7
Double Deuce
THP # 1-13-070 HUM
Road Map
1 in = 2,000 ft
0 800 1,600 3,200 4,800 6,400 Feet
N
S
THP Boundary
ROW
Partial Cut
No Cut
HRC HCP/SYP Timberlands
Other HRC Timberlands
Other Private Ownership
Paved Road
Rocked Road
Dirt Road
Dirt Jeep Trails
Proposed Roads
Closed, Decommissioned, or Abandoned Roads
Stormproofed Road
Updgraded Road
Decommissioned
Class 1 Watercourse
Class 2 Watercourse
Class 3 Watercourse
Clooney Gulch
McCready Gulch
KNEELAND
ROUSSEAU
Freshwater Park
Graham Gulch
Unit 1
Unit 2
Unit 3
Unit 4
Unit 5
Unit 6
Unit 7
Gills Mill
Mortons
Freshwater Creek
SF Freshwater Creek
Dr. Nelson
Bell Creek
NF Elk River
Doe Creek
McWhinney Creek
Camp 12
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# 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 | 13-070 | 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 |
| | | | | | | | |
| | | | | | | | |