



Humboldt Redwood
COMPANY, LLC

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March 16th, 2012

Ms. Catherine Kuhlman
California Regional Water Quality Control Board
North Coast Region
5550 Skylane Blvd, Suite A
Santa Rosa, CA 95403

Subject: Enrollment of THP 1-11-054 HUM in the Elk River WWDR, "Tier I and II"

Dear: Ms. Kuhlman

HRC is requesting Tier I and II enrollment under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0039 for THP 1-11-054 HUM. The attached map and table delineates what portion of the plan is being requested for tier I and II enrollment

Currently the landowner has 0 acres enrolled in the North Fork WWDR for the 2012 calendar Year. Harvest acres are summarized below. These acres make up 260.4 cumulative acres of our allowable 266 acres under Tier 1 limitations.

THP Number	Unit Number	Harvest Acres	Hazard	
			Low	High*
11-054	2	42.3	34.7	98.0
11-054	6a	13.6	12.3	16.8
11-054	8a	29.7	24.8	63.2
11-054	11a	4.8	4.3	6.4
Totals		90.4	260.4	

The Tier II portion of the unit proposed for enrollment is comprised of 318.4 acres of group selection and 0.3 acres of ROW (159.5 clear-cut equivalent acres). Total acres currently enrolled or proposed for enrollment under Order No. R1-2006-0039 Tier II is shown in the Attached Pre-Harvest Planning Report.

The Erosion Control Plan (ECP), Form 200 and an annual waste discharge enrollment fee are attached.

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. 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.

Five of the units occur in Dunlap Gulch and six are located in Brown Creek. The remaining unit is located on an abandoned terrace to North Fork Elk River. With exception of Unit 12, all of the units occupy short length, moderate to steeply inclined broadly incised slopes. The underlying geology is undifferentiated Wildcat Group. The lithology is comprised of silts, clays and sands in varying percentages and consolidation. Mass wasting was observed within the plan area but limited to areas where legacy logging activities has displaced soil (roads). This THP includes the riparian buffers prescribed for even aged management while prescribing selection silviculture. Existing unstable areas and those that may become unstable following harvest activities have been identified by a California Licensed Geologist and mitigated for in the THP. As such, it is our opinion that proposed activities in the Dunlap Brown THP meet the requirements for Tier II enrollment.

The THP proposes an uneven-age silviculture retaining 75 sq.ft. of basal area, except for those areas where the Geologist prescribed prohibiting group openings larger than ¼ acre.. Sub-merchantable trees and those with specific wildlife value characteristics (e.g., cavities, large limbs, broken tops, snags, etc.) will be retained within the harvest area to the extent feasible. Cable and tractor yarding is approved for the entire unit. Post-harvest no site preparation will occur.

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 R1-2006-0039 and R1-2008-0071.

Please do not hesitate to contact me should you have any questions or comments regarding this application for enrollment into WWDR (Order No. R1-2006-0039).

Respectfully,



Jon Woessner,
Area Forester, RPF 2571
Humboldt Redwood Company, LLC

Attachments:

Professional Certification of Design
THP Unit Review for Tier II enrollment
Pre-harvest Planning Report
Maps

Table 1 Proposed 2010 Harvest in North Fork Elk River

THP Name	THP Number	Unit Number	Silviculture				Hazard		
			CC	ROW	CT	SHR	SEL	CC Equivalent	Low
LNFE/Lake	10-070					118.4	59.2	90.7	357.1
Dunlap Brown	11-054	2				42.3	21.2	34.7	98.0
Dunlap Brown	11-054	6a				13.6	6.8	12.3	16.8
Dunlap Brown	11-054	8a				29.7	14.9	24.6	65.7
Dunlap Brown	11-054	11a				4.8	2.4	4.3	6.4
Dunlap Brown	11-054	1				32.8	16.4	25.8	90.2
Dunlap Brown	11-054	3				31.2	15.6	20.7	135.4
Dunlap Brown	11-054	4				44.7	22.4	31.8	166.3
Dunlap Brown	11-054	5	0.3			36	18.3	29	94.1
Dunlap Brown	11-054	6b				7.7	7.7	8.4	88.9
Dunlap Brown	11-054	7				51.2	25.6	32.3	243.6
Dunlap Brown	11-054	8b				7.3	3.7	0	94.1
Dunlap Brown	11-054	9				45.1	22.6	26.8	235.9
Dunlap Brown	11-054	10				37.5	18.8	27.4	130.2
Dunlap Brown	11-054	11				17.3	8.7	8.9	108.3
						Total	263.9		

*The acres represented here have been converted to High Hazard Acres by multiplying by 12.807.

Highlight indicates a THP and Specific Unit to be enrolled prior to establishing an enforceable Zero Discharge Monitoring Plan. Weighted Acreage Totals are listed below to demonstrate compliance with the Staff Landslide Model limit of 266 Harvest Acres in North Fork Elk River. 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 enforceable Zero Discharge Monitoring Plan (Tier II).

Total Clear Cut Equivalent Acres enrolled or submitted for enrollment 263.9

Table 3 Summary of THPs by Yarding System and Site Preparation for North Fork Elk River

THP Name	THP Number	Unit Number	Yarding System		Site Preparation	
			Ground Based	Yarder	Mechanical	Broadcast
LNFE/Lake	10-070		15	103.4		
Dunlap Brown	11-054	2	7.4	34.9		
Dunlap Brown	11-054	6a	0.8	12.8		
Dunlap Brown	11-054	8a	0	29.7		
Dunlap Brown	11-054	11a	0.8	4.8		
Dunlap Brown	11-054	1	0	32		
Dunlap Brown	11-054	3	0	31.2		
Dunlap Brown	11-054	4	0	44.7		
Dunlap Brown	11-054	5	16	20.3		
Dunlap Brown	11-054	6b	0	15.3		
Dunlap Brown	11-054	7	0	51.2		
Dunlap Brown	11-054	8b	0	7.3		
Dunlap Brown	11-054	9	0	45.1		
Dunlap Brown	11-054	10	0	37.5		
Dunlap Brown	11-054	11	0	17.3		
Dunlap Brown	11-054	12	3.2	5		

Table 2. Summary of THPs to be enrolled prior to establishment of Zero Discharge Monitoring Plan for North Fork Elk River.

THP Number	Unit Number	Harvest Acres	Hazard	
			Low	High*
11-054	2	42.3	34.7	98.0
11-054	6a	13.6	12.3	16.8
11-054	8a	29.7	24.8	63.2
11-054	11a	4.8	4.3	6.4
Totals		90.4		260.4



State of California
Regional Water Quality Control Board
**APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT**



A. Facility:

I. FACILITY INFORMATION

Name: THP 1-11-054 Morton Ridge			
Address:			
City:	County:	State:	Zip Code:
Contact Person: Jon Woessner		Telephone Number: 707-764-4376	

B. Facility Owner: (timber owner)

Name: Humboldt Redwood Company LLC			Owner Type (Check One):	
Address: P.O. Box 712			1. <input type="checkbox"/> Individual	2. <input checked="" type="checkbox"/> Corporation
City: Scotia	State: CA	Zip: 95565	3. <input type="checkbox"/> Governmental Agency	4. <input type="checkbox"/> Partnership
Contact Person: Jon Woessner			Telephone Number: 707-764-4376	Federal Tax ID:

C. Facility Operator (The agency or business, not the person): (plan submitter)

Name: Humboldt Redwood Company LLC			Owner Type (Check One):	
Address: P.O. Box 712			1. <input type="checkbox"/> Individual	2. <input checked="" type="checkbox"/> Corporation
City: Scotia	State: CA	Zip: 95565	3. <input type="checkbox"/> Governmental Agency	4. <input type="checkbox"/> Partnership
Contact Person: Jon Woessner			Telephone Number: 707-764-4376	Federal Tax ID:

D. Owner of the Land:

Name: Humboldt Redwood Company LLC			Owner Type (Check One):	
Address: P.O. Box 712			1. <input type="checkbox"/> Individual	2. <input checked="" type="checkbox"/> Corporation
City: Scotia	State: CA	City: Scotia	3. <input type="checkbox"/> Governmental Agency	4. <input type="checkbox"/> Partnership
Contact Person: Jon Woessner			State: CA	5. <input type="checkbox"/> Other
Contact Person: Jon Woessner			Telephone Number: 707-764-4376	Federal tax ID:

E. Address Where Legal Notice May Be Served:

Address: 125 Main Street		
City: Scotia	State: CA	Zip: 95565
Contact Person: Mike Jani		Telephone Number: 707-764-4403

F. Billing Address:

Address: P.O. Box 712		
City: Scotia	State: CA	Zip: 95565
Contact Person: Jon Woessner		Telephone Number: 707-764-4376



State of California
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II. TYPE OF DISCHARGE

Check Type of Discharge(s) Described in this Application (A or B):

- A. WASTE DISCHARGE TO LAND** **B. WASTE DISCHARGE TO SURFACE WATER**

Check all that apply:

- | | | |
|---|--|---|
| <input type="checkbox"/> Domestic/Municipal Wastewater Treatment and Disposal | <input type="checkbox"/> Animal Waste Solids | <input type="checkbox"/> Animal or Aquacultural Wastewater |
| <input type="checkbox"/> Cooling Water | <input type="checkbox"/> Land Treatment Unit | <input type="checkbox"/> Biosolids/Residual |
| <input type="checkbox"/> Mining | <input type="checkbox"/> Dredge Material Disposal | <input type="checkbox"/> Hazardous Waste (see instructions) |
| <input type="checkbox"/> Waste Pile | <input type="checkbox"/> Surface Impoundment | <input type="checkbox"/> Landfill (see instructions) |
| <input type="checkbox"/> Wastewater Reclamation | <input type="checkbox"/> Industrial Process Wastewater | <input type="checkbox"/> Storm Water |
| <input checked="" type="checkbox"/> Other, please describe: Timber harvest activities | | |

III. LOCATION OF THE FACILITY

Describe the physical location of the facility.

1. Assessor's Parcel Number(s)
Facility:
Discharge Point:

2. Latitude
Facility:
Discharge Point:

3. Longitude
Facility:
Discharge Point:

IV. REASON FOR FILING

- | | |
|---|---|
| <input checked="" type="checkbox"/> New Discharge or Facility | <input type="checkbox"/> Changes in Ownership/Operator (see instructions) |
| <input type="checkbox"/> Change in Design or Operation | <input type="checkbox"/> Waste Discharge Requirements Update or NPDES Permit Reissuance |
| <input type="checkbox"/> Change in Quantity/Type of Discharge | <input type="checkbox"/> Other: |

V. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Name of Lead Agency: California Department of Forestry and Fire Protection

Has a public agency determined that the proposed project is exempt from CEQA? Yes No

If Yes, state the basis for the exemption and the name of the agency supplying the exemption on the line below.

Basis for Exemption/Agency:

Has a "Notice of Determination" been filed under CEQA? Yes No

If Yes, enclose a copy of the CEQA document, Environmental Impact Report, or Negative Declaration. If no, identify the expected type of CEQA document and expected date of completion.

Expected CEQA Documents:

- EIR Negative Declaration

Expected CEQA Completion Date:



State of California
Regional Water Quality Control Board
APPLICATION/REPORT OF WASTE DISCHARGE
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WASTE DISCHARGE REQUIREMENTS OR NPDES PERMIT



VI. OTHER REQUIRED INFORMATION

Please provide a COMPLETE characterization of your discharge. A complete characterization includes, but is not limited to, design and actual flows, a list of constituents and the discharge concentration of each constituent, a list of other appropriate waste discharge characteristics, a description and schematic drawing of all treatment processes, a description of any Best Management Practices (BMPs) used, and a description of disposal methods.

Also include a site map showing the location of the facility and, if you are submitting this application for an NPDES permit, identify the surface water to which you propose to discharge. Please try to limit your maps to a scale of 1:24,000 (7.5' USGS Quadrangle) or a street map, if more appropriate.

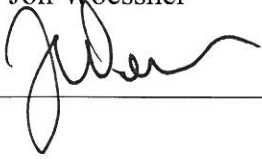
VII. OTHER

Attach additional sheets to explain any responses which need clarification. List attachments with titles and dates below:

You will be notified by a representative of the RWQCB within 30 days of receipt of your application. The notice will state if your application is complete or if there is additional information you must submit to complete your Application/Report of Waste Discharge, pursuant to Division 7, Section 13260 of the California Water Code.

VIII. CERTIFICATION

"I certify under penalty of law that this document, including all attachments and supplemental information, were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

Print Name: Jon Woessner
Signature: 
Title: Northern Area Manager
Date: 3/16/2012

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:
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Dunlap Brown
Topographic Map

24N 23E Sec. 19, 20, 29, 30 IB&M
 14N 23E Sec. 25
 IB&M

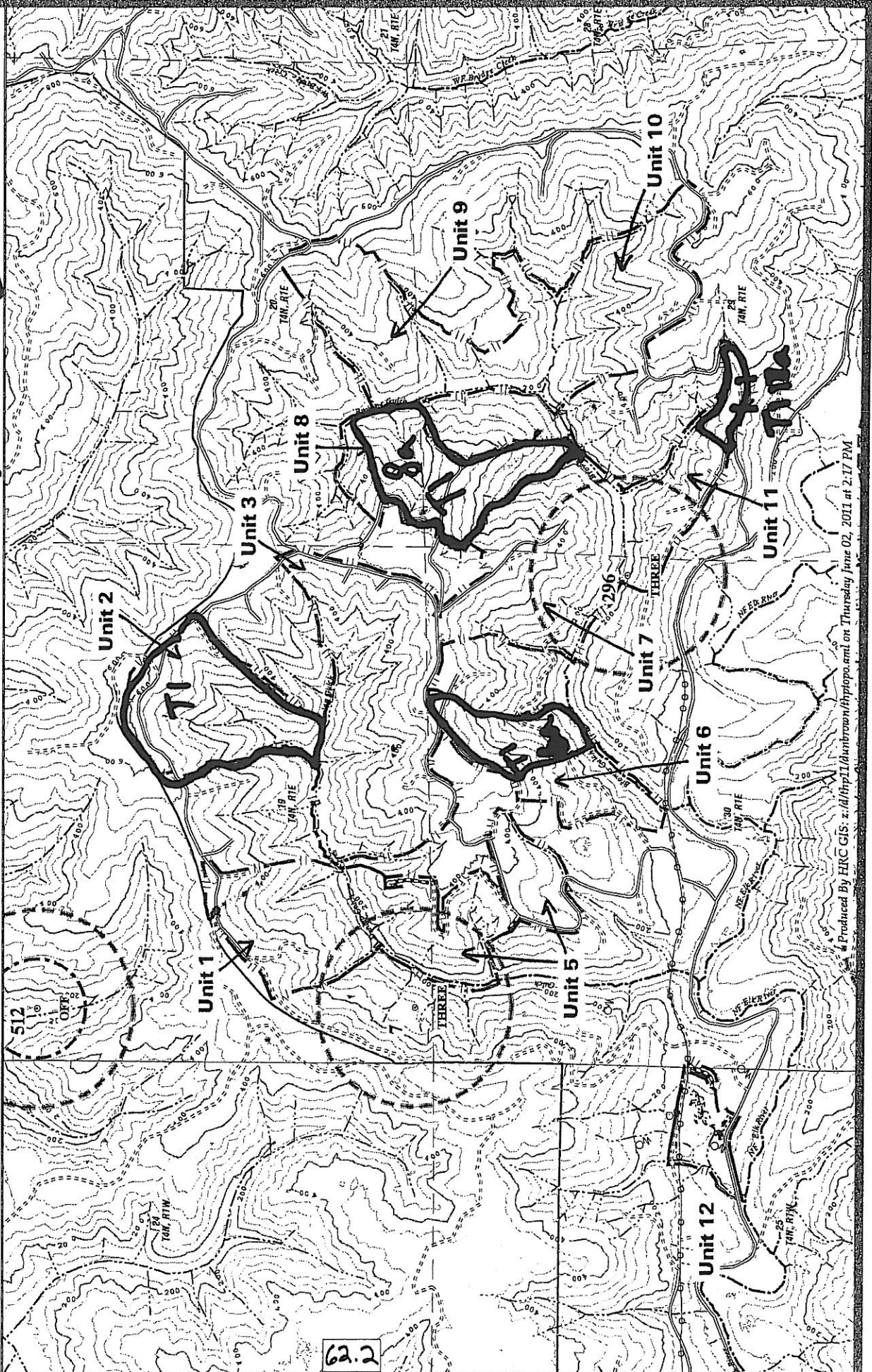
USGS Quad (s): MCHINNEY CREEK

Map Scale: 1 inch = 1320 feet

Contour Interval: 40 feet

- Property Line
- Harvest Boundary
- Permanent Road
- Seasonal Road
- Proposed
- Seasonal Road
- Class I Watercourse
- Class II Watercourse
- Class III Watercourse
- Class I Waters
- Power Line
- NSO Site
- 600' NSO Buffer
- 1000' NSO Buffer
- HRA

□ - Tier 1
All others Tier 2
except Unit 12



62.2

Professional Certification of Design

I, Tagg Nordstrom, P.G. 7950, 3/9/2012,
Name license # Date



Tagg Nordstrom
Signature

Place licensed seal here

hereby certify, in accordance with North Coast Regional Water Quality Control Board (NCRWQCB) Order Nos. R1-2006-0039 and R1-2006-0041, that the attached application and the description of THP modifications, and the materials submitted along with:

THP No. 1-11-054 HUM (Dunlap Brown) Unit # 1 through 12

- a. are in accordance with accepted practices, and recognized professional standards;
- b. comply with the requirements of the Monitoring and Reporting Program No. R1-2008-0071, approved by the Executive Officer of the North Coast Regional Water Quality Control Board; and
- c. provided that the THP is properly implemented, operated, and maintained, are adequate for the THP to meet the applicable Zero Net Delivery performance standards of NCRWQCB Orders R1-2006-0039, R1-2006-0041, and R1-2006-0103, insofar as such performance can reasonably be predicted by accepted engineering geologic practices.

The opinions presented in the subject THP have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report.

THP: Dunlap Brown THP #: 11-054 Units # 1 through 12 March 6, 2012

Tools Used in This Assessment	Figure Number
Elevation Map with 10 ft Contours (HRC LiDAR)	1
SHALSTAB (Montgomery and Dietrich, 1994 and Palco, 2006) / Slope Class / Hillshade Maps	2
CGS Geology and Geomorphic Features (CGS, 1999b)	3
Mass Wasting Potential Map (Palco, 1999)	4
Aerial Photo Map (HRC, 2007)	5
Palco Freshwater Creek WA deep-seated LS inventory (WPN, 2001)	6
Road Condition Map	7

Please see back of enrollment for references

Geological Summary (information presented from existing bodies of work):

The harvest units occupy predominantly convex to concave slope forms adjacent Dunlap Gulch and Brown Gulch, two tributaries of the North Fork Elk River. Undifferentiated Wildcat Group sediments composed of silts, sands, and infrequent gravels, underlay the majority of the plan area. Previous works have interpreted the plan area to be within and adjacent to east-west trending fold axis however, the massively bedded siltstones and silty fine sandstone do not show evidence of structural bedding. A more detailed disclosure of previous geologic work conducted in the plan area is provided in the geologic evaluation provided for this harvest plan.

Geologic review was conducted for the THP using guidelines established under Note 50 (CGS, 1997), Note 45 (CGS, 1999a), and Tier 2 enrollment. The reviewing Geologist compared the maps provided for Tier 2 enrollment with mapping conducted during field evaluations. An excellent discussion of the findings is provided in the Geologic Evaluation found in Section 5 of the THP. This is a public document and can be found on the internet at <http://thp.fire.ca.gov/THPLibrary/North Coast Region/THPs2011/1-11-054HUM/>. The reviewing Geologist identified several landslides within the units and offered recommendations to minimize harvest related impacts which were adopted by the Forester. The THP was reviewed by various agencies during PHI and found to be compliant with the Forest Practice Rules and the HCP regulations with respect to disclosure of all known unstable areas.

The harvest units were evaluated at the THP level with respect to partial harvest (selection) silviculture. Retention of timber on the slopes reduces the potential for harvest related mass wasting.

References:

- CGS, 1997. *Note 50: Factors Affecting Landslides In Forested Terrain*. Sacramento: CDMG
- CGS 1999a, *Note 45, Guidelines for Engineering Geologic Reports for Timber Harvesting Plans*. Sacramento: CDMG
- CGS, 1999b, North Coast Watersheds Mapping, DMG CD-ROM 99-002.
http://redirect.conservation.ca.gov/CGS/information/publications/database/Publications_year.asp
- HRC, 2007, Ortho-photo rectified aerial photographs flown by 3Di West, Eugene Oregon.
- Montgomery, D.R. and W.E. Dietrich, 1994. A physically based model for the topographic control on shallow landsliding. *Wat. Resour. Res.* 30: 1153-1171. For specific details regarding the model used in this evaluation, please see Palco, 2006. Additional information from the model authors is available at the following website: <http://socrates.berkeley.edu/~geomorph/shalstab>
- Palco, 2006. Freshwater Creek and Elk River WDR Permit Acreage Enrollment and Compliant Monitoring Program, NCRWQCB R1-2006—0039 and R1-2006-0041, Quality Assurance Project Plan, Version 3.0. Policy document submitted to NCRWQCB dated June 7, 2006.
- Palco (The Pacific Lumber Company), 2005, The Pacific Lumber Company (PALCO) Prescriptions Based on Watershed Analysis for Freshwater Creek, California, August 15, 2002.
- PALCO, 1999, Habitat Conservation Plan, Vol. 2 Part D, Landscape Assessment of Geomorphic Sensitivity, Public Review Draft.
- Watershed Professionals Network (WPN), 2001, Freshwater Creek Watershed Analysis, Appendix A, Map A-5

Humboldt Redwood Company LLC

Erosion Control Plan (ECP) for the “Dunlap Brown” 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: Dunlap Brown
Contact Person: Jon Woessner Phone: (707) 764-4376

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

The RPF and/or the RPF Designee have conducted an inventory of potential "controllable sediment discharge sources" within the project area. As defined in California Regional Water Quality Control Board Order No. R1-2006-0039 (Elk River).

"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

If no controllable sediment sources were discovered in your plan area (this means along your appurtenant road system and within your units), you must discuss that fact here. In addition, if all of the controllable sediment sources in your plan area were previously identified under other THP's, you must list those previously identified sites here. If you locate ECP sites that cannot be repaired list them here. 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. R1-2006-0039 (Elk River). Highest priority is assigned to the largest sediment discharge sources that discharge to waters that support domestic water supplies or fish. The landowner's prioritization method considers this guidance, and combines it with consideration for accessibility and level of imminent risk of significant sediment discharge. Sources that receive a high priority rating will be treated by a date certain as noted in the Controllable Sediment Sources table. Sources that receive a low or medium rating are determined to have a low to moderate risk of imminent discharge and will be treated prior to completion of the THP, or as otherwise indicated.

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

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

II. General Prevention and Minimization Measures for Controllable Sediment Discharge

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

THP Section II:

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

THP Section V:

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

Maps attached:

- ECP Map

III Inspection Plan and Reporting Requirements

A. Inspection Plan

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

- B. Qualified and trained professionals will conduct all specified inspections of the project site to identify areas causing or contributing to a violation of the applicable water quality requirements or other provisions of these WWDRs. The responsible party for inspection and reporting is **Jon Woessner (707) 764-4376**.
- C. No inspections are required in Project Areas where Timber Harvest Activities have not yet commenced.
- D. Project Areas where Timber Harvest Activities have commenced and no winter period Timber Harvest Activities have occurred inspections will be conducted each year and throughout the duration of the Project while Timber Harvest Activities occur.
 - a. The Project is covered under WWDRs and the following inspection requirements will begin at the startup of timber harvest activities within the Project area:
 - i. By November 15 to assure Project Areas are secure for the winter period;
 - ii. Once following ten (10) inches of cumulative rainfall commencing on November 15 and prior to March 1, as worker safety and access allows; and
 - iii. After April 1 and before June 15 to assess the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment discharges sources have developed.
 - b. Project Areas with Winter Period Timber Harvest Activities will conduct inspections of such Project Areas while Timber Harvesting Activities occur and the Project is covered under the WWDRs as follows:
 - i. Immediately following cessation of winter period Timber Harvest Activities to assure areas with winter Timber Harvest Activities are secure for the winter;
 - ii. Once following ten (10) inches of cumulative rainfall commencing on November 15 and prior to March 1, as worker safety and access allows; and
 - iii. After April 1 and before June 15 to assess the effectiveness of management measures designed to address controllable sediment discharges and to determine if any new controllable sediment discharges sources have developed.
 - c. Inspection reports will identify where management measures have been ineffective and when repairs and design changes will be implemented to correct management measure failures.
 - d. After completing the required inspections, and when it has been determined new controllable sediment discharges sources have developed, the ECP, implementation schedule, and inspection plan will be updated, if required, consistent with the WWDRs and submit the updated documents to the Regional Water Board to maintain coverage under the WWDRs. If the approved amendment is found to be out of compliance with the WWDRs, the Project will be amended to be consistent with the provisions of the WWDR within 30 days, or coverage under the WWDRs will be terminated. The Project will then be required to seek Project coverage under an individual WDR.
 - e. Equipment, materials, and workers will be available for rapid response to failures and emergencies, implement, as feasible, emergency management measures depending upon field conditions and worker safety for access.
- D. If during the inspection or during the course of conducting timber harvest activities, a violation of an applicable water quality requirement or conditions of WWDRs is discovered, the following procedures will be followed:
 - a. When it has been determined that discharges are causing or contributing to a violation or an exceedence of an applicable water quality requirement or a violation of a WWDR prohibition:
 - i. Corrective measures will be implemented immediately following the discovery that applicable water quality requirements were exceeded or a prohibition violated, followed by notification to the Regional Board by telephone as soon as possible but no later than 48 hours after the discharge has been discovered. The notification will be followed by a report within 14 days to the Regional Board, unless otherwise directed by the Executive Officer, that includes:
 - 1. the date the violation was discovered;
 - 2. the name and title of the person(s) discovering the violation;

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

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

If helicopter operations are proposed for this project, please find attached a Columbia Helicopters, Inc. (CHI) Fuel Spill Prevention and Cleanup Plan For Columbia Helicopters Field Operations.

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 indicated in Implementation Schedule column.
Implementation Schedule	Indicates the timing of implementing the prevention and minimization measures listed in the Treatment column.
Site Description	Provides sufficient information that describes the existing condition of the site and factors that inform the chosen treatment methods and implementation schedule. This information will include a description of how the existing condition of the site (ie. stable or unstable) will be affected by different storm events, and whether sediment discharge is imminent. For example, an unstable site could easily discharge significant amounts of sediment in a small storm, thus the treatment priority should be higher. Conversely, a stable site that may take one or more very large storms to trigger discharge could be lower treatment priority. If PWA method is used to calculate erosion/delivery volumes, it will noted here.
Treatment	Sediment discharge prevention and minimization measures that will be implemented at the site, including treatment specifications if necessary.

Attachments:

- **ECP Table**
- **Columbia Fuel Spill Prevention and Cleanup Plan**

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 Dunlap Brown							
RD: Off Road STATION: 1 SITE: bf6462 WOID: 1311054357 SEDID: 8942 REPAIRED: NO	Tractor Crossing	20	20 100%	Med	Prior to THP Final Completion.	Class II watercourse with a skid trail crossing. Channel currently crosses fill material with a headcut present.	Skid trail crossing on Class II watercourse will be decommissioned prior to plan completion. Excavation shall extend down to natural channel where feasible and shall be slightly wider than natural channel. If a head-cut is created it shall be armored with rock or wood to prevent future erosion. All exposed soils within the RMZ shall be treated for erosion control as per Item 18 of the THP.
RD: U STATION: 8206 SITE: NFE431 WOID: 1305564669 SEDID: 30535 REPAIRED: NO	Permanent Crossing	3	3 100%	Low	Prior to THP Final Completion.	Bank slough above inlet. Potential future inlet blockage. Sloughed material causes deflection of water during high flows. Material is well vegetated with woody debris and is not actively eroding however it causes some minimal bank erosion from the deflection onto the opposite stream bank.	Old bank slough near inlet of Class I crossing. Remove material from the channel and lay back bank to a stable angle. If needed, bank may be over steepened and armored to buttress the slope. If armor is used it shall be of a sufficient size so as to not be displaced during high flows. Exposed soil within the RMZ shall be treated to control erosion as per Item 18 in the THP.
RD: U17.10 STATION: 884 SITE: NFE634 WOID: 5902 SEDID: 30635 REPAIRED: NO	Failing Fill	889	889 100%	Med	NO TREATMENT	Failing road fill due to hillslope instability. Road prism has dropped more than 2 feet. Hillslope below road is hummocky with leaning trees and tilted old growth stumps. This site is not considered a controllable sediment site.	Upon Geologist recommendations this site will not be disturbed. See Dunlap Brown THP Section V for additional information included in the Geology Report.
RD: U17.10 STATION: 1390 SITE: NFE632 WOID: 5900 SEDID: 30633 REPAIRED: NO	Failing Fill	162	162 100%	Med	NO TREATMENT	Landslide encompasses road prism for over 100 feet. Approximately 1-2 foot cracks apparent in road. Hillslope below road is hummocky with leaning trees and tilted old growth stumps. This is not a controllable sediment site.	Upon Geologist recommendation this site will not be disturbed. See Dunlap Brown THP Section V for additional information included in the Geology Report.
RD: U17.10 STATION: 1863 SITE: NFE631 WOID: 5860 SEDID: 30632 REPAIRED: NO	Failing Fill	30	30 100%	Med	NO TREATMENT	Road prism has failed completely and is toeing into a Class II watercourse. Access is restricted by multiple landslides.	Fill failure will not be treated due to access restrictions. See Dunlap Brown Section V for additional information included in the Geology Report.
RD: U17.10 STATION: 1994 SITE: NFE630 WOID: 5859 SEDID: 30631 REPAIRED: NO	Crossing	159	159 100%	Med	NO TREATMENT	Class II watercourse gullies through road fill, no functional drainage structure in place.	This site will not be treated due to access restrictions. See Dunlap Brown Section V for additional information included in the Geology Report.

236.1 (no page 236)

Site	Site Type	Est. Potential Erosion (Cu. Yards)	Est. Potential Delivery (Cu. Yards & %)	Priority for Implementation Treatment	Site Description	Treatment
RD: U17.27 STATION: 884 SITE: NFE635 WOID: 5903 SEDD: 30643 REPAIRED: NO	Crossing	26	26 100%	Low	Prior to Oct 15; Partially decommissioned Class III crossing. No visible active erosion is occurring at this site.	Partially decommissioned Class III crossing will need a temporary crossing if water is present during operations using a minimum 6 in. culvert. Crossing shall be fully decommissioned prior to October 15th of the year of use. Excavation shall be as close as feasible to channel grade, wider than natural channel width, with sideslopes laid back to 2:1 or matching adjacent natural slopes whichever is steeper. Alternatively a permanent rocked ford may be installed; the armor used for the outboard edge of this crossing shall be of sufficient size and design to not be displaced during large storm events. Note, spoils from the original decommissioning are piled on approaches and will likely need removal to provide for a stable and compacted running surface.
RD: U25.5181 STATION: 1380 SITE: NFE642 WOID: 1305645353 SEDD: 30647 REPAIRED: NO	Pulled Crossing	197	197 100%	High	NO TREATMENT Class II crossing has been decommissioned which resulted in removal of hillslope toe and resulting landslide into channel. This slide extends upslope for more than 100 feet.	Due to geologist recommendation, this site will not be treated. See Section V for additional information included in the Geology Report.
Total Estimated Yards		1486	1486			



FUEL SPILL PREVENTION AND CLEANUP PLAN FOR COLUMBIA HELICOPTERS FIELD OPERATIONS

Scope

This plan has been prepared by Columbia Helicopters, Inc. (CHI) to meet the requirements set forth by the Federal, State and Local rules that apply to fuel storage.

The procedures and/or plans have been designed to minimize the hazards to human health and the environment from fires, explosions, and hazardous spills. All affected CHI employees and our contractors are charged with the compliance of the provisions of this plan from a maintenance standpoint and whenever there is an emergency. All CHI field mechanics have been instructed and trained in carrying out the plan, and the appropriate techniques of fuel spill prevention and cleanup.

Preparedness and Prevention

CHI maintains and operates its job sites to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste/material or hazardous waste/material constituents to air, soil or surface water which could threaten human health or the environment.

Emergency Command Structure

CHI has a field emergency command structure on all of its job sites. The Primary Emergency Coordinator is the Project Manager, with the Crew Chief or Logging Trainer as alternates. See CHI form CHI-S-31A (enclosed) which is located in the maintenance van for a list of applicable personnel and emergency phone numbers. CHI Field Mechanics are responsible to act as initial responders.

Emergency Coordinators Duties

At all times, there is at least one employee either at the job site or on call with the responsibility for coordinating all emergency response measures. The Emergency Coordinator is thoroughly familiar with all aspects of CHI's Fuel Spill Prevention and Cleanup Plan, all aspects of operations and activities, location and usage of emergency equipment at the job site, and which persons or agencies to notify immediately in the event of an emergency. This person has the authority to commit the resources needed to carry out this Spill Prevention and Cleanup Plan.

Field Mechanics Duties

CHI Field Mechanics are responsible for contacting the Emergency Coordinator immediately and acting as initial responders in the event of a fuel spill. The primary objective of the initial response is to keep the fuel out of waterways, stabilize or contain the fuel to prevent further spillage, and begin the cleanup process.

Emergency Equipment

CHI maintains an adequate supply of absorbent pads, shovels, pumps and hoses, drums, visqueen, fire extinguishers, first aid equipment, etc. in the maintenance vans in the event of an emergency. The fueling area maintains a smaller supply of absorbent pads, shovels, fire extinguishers, first aid equipment and secondary containment around fuel tanks. Nurse trucks when used for remote fueling will also carry a fire extinguisher, first aid kit, and a small supply of absorbent pads. Absorbent pads may be wrung out and reused. See Spill Containment Plan for diagram of secondary containment system for fuel tanks. CHI is capable of obtaining other emergency equipment from a variety of other sources, such as: local fire and police departments and Riedel Environmental Services, Inc. or another private emergency response contractor.

Emergency Procedures

Whenever there is an imminent or actual emergency situation, the Emergency Coordinator must immediately notify all field maintenance personnel and/or visitors, contractors, CHI management, state and local agencies, and other necessary persons, if needed, then assess the incident, then control or contain the release, if possible, and then if necessary call the National Response Center, 1-800-424-8802. See CHI form CHI-S-31A in maintenance van for phone numbers. The National Response Center, State and Local agencies must be provided with the following information:

- Name and telephone number of the person making the report.
- Name and address or location of the job site.
- Time and type of the incident.
- Name and quantity of the material(s) involved to the extent possible.
- Extent of any injuries known.
- Possible hazards to human health and the environment, outside of job site.

Personnel who cause or observe a spill or release of hazardous materials must immediately call the Emergency Coordinator. If the material(s) come in contact with your skin, wash it off immediately with copious amounts water. If the material(s) come into contact with your clothes, remove the clothes at the best available time and then wash your skin off with copious amounts of water.

Personnel who cause or observe small localized fires or explosions may try to extinguish the fire by using one of the available extinguishers. As soon as the fire is extinguished, contact your supervisor and the Emergency Coordinator.

The Emergency Coordinator will do everything in their power to keep the release from entering surface or ground water. This may include diking or berming, or using absorbents. Once contained or controlled put the material(s) solids/semi solids into open top 17H DOT drums and liquids into closed top 17E metal or poly drums or other approved storage devices that are compatible with the spilled material(s). Immediately label the drums with the words "Hazardous Waste" or words describing the contents of the waste. Also put an

accumulation date on the label. Then contact CHI's Hazardous Materials Manager to arrange for proper waste disposal.

If the spill or release reaches a stream, river, lake or is greater than the Reportable Quantity listed in 40 CFR 302.4 (for non-petroleum products), then the National Response Center must be notified of the release/spill. See CHI form CHI-O-31 in the maintenance van for the telephone number of the National Response Center. If fuel/oil is spilled in quantities greater than 42 gallons, in Oregon only, the Oregon Emergency Response Service must be called at 1-800-452-0311.

If the spill/release is determined to be greater than CHI personnel are able to handle or cleanup, an environmental cleanup contractor will be called to handle that portion of the remediation activities. Foss Environmental Services, Inc. can be reached 24 hour a day at 1-800-337-7455 or 503-283-1150.

Immediately after the spill the Emergency Coordinator will provide for the treatment, storage or disposal of the recovered waste, contaminated soil, surface water or any other material that results from a release, fire or explosion at the job site.

Follow Up

The Emergency Coordinator will ensure that affected area(s) of the job site have no waste which is incompatible with the released material that is treated, stored or disposed of until cleanup procedures are completed, e.g. flammables and oxidizers, and acids and bases. All emergency equipment will be cleaned and fit for its intended use before operations will resume.

Required Reports

CHI will notify the EPA Regional Administrator and the state environmental agency that the job site is in compliance with 40 CFR 265.56 (h) before operations are resumed in the affected area(s) of the job site.

CHI will note in a memorandum the time, date and details of any incident that requires implementation of this plan. Also, CHI will, within 15 days after the incident, submit a written report on the incident to the Regional Administrator. The report will include the following:

- Name, address and telephone number of CHI.
- Date, time and type of incident.
- Name and quantity of the material(s) involved.
- The extent of the injuries, if any.
- An assessment of actual or potential hazards to human health and the environment, where this is applicable.
- Estimated quantity and disposition of the recovered material.

General Purpose Decontamination Solutions/Procedures

<u>Type of Hazard Suspected</u>	<u>Solution</u>	<u>Directions for Preparation</u>
1. Inorganic acids, metal processing wastes.	A	To 10 gallons of water add 4 lbs of sodium carbonate (soda lime) and 4 lbs of trisodium phosphate. Stir until evenly mixed.
2. Heavy metals: chrome, lead, cadmium, etc.	A	Same as item 1
3. Pesticides, fungicides, chlorinated phenols, and dioxins.	B	To 10 gallons of water add 8 lbs of calcium hypochlorite. Stir with wooden or plastic stirrer until evenly mixed.
4. Cyanides, ammonia, and other non-acidic inorganic wastes.	B	Same as Item 3
5. Solvents and organic compound such as trichloroethane and toluene.	C or A	To 10 gallons of water add 4 lbs of trisodium phosphate. Stir until evenly mixed.
6. PCB's and oily, greasy wastes.	C or A	Same as item 5
7. Inorganic bases, alkali and caustic waste.	D	To 10 gallons of water add 1 pint of concentrated hydrochloric acid. Stir with a wooden or plastic stirrer.

CHI equipment that is contaminated will be thoroughly decontaminated with the above solutions for the appropriate contaminate. The rinse waters are to be captured to determine if they are hazardous or not. Personnel decontaminating equipment will wear the proper protective equipment such as goggles, face shield, rubber gloves and boots, a splash suit and air purifying respirator, if necessary.

Note: The decontamination chemicals listed above can be purchased at most feed and hardware stores.

Revisions

This plan will be amended or reviewed if applicable regulations change, the plan fails in an emergency, the job site changes in its design, construction, operation, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions or releases of hazardous wastes or hazardous constituents, or changes in the response necessary in an emergency, the list of emergency coordinators changes or the list of emergency equipment changes.

**COLUMBIA HELICOPTERS, INC.
OIL SPILLAGE PROCEDURES**

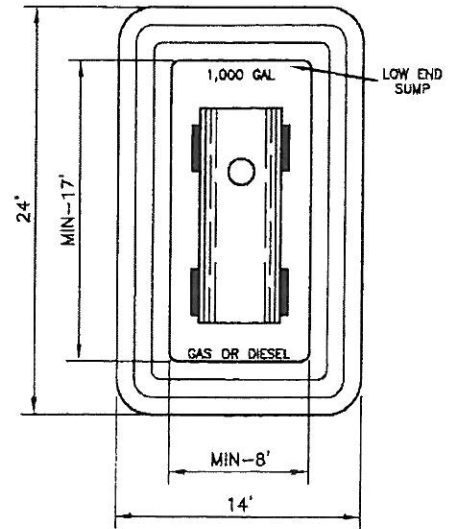
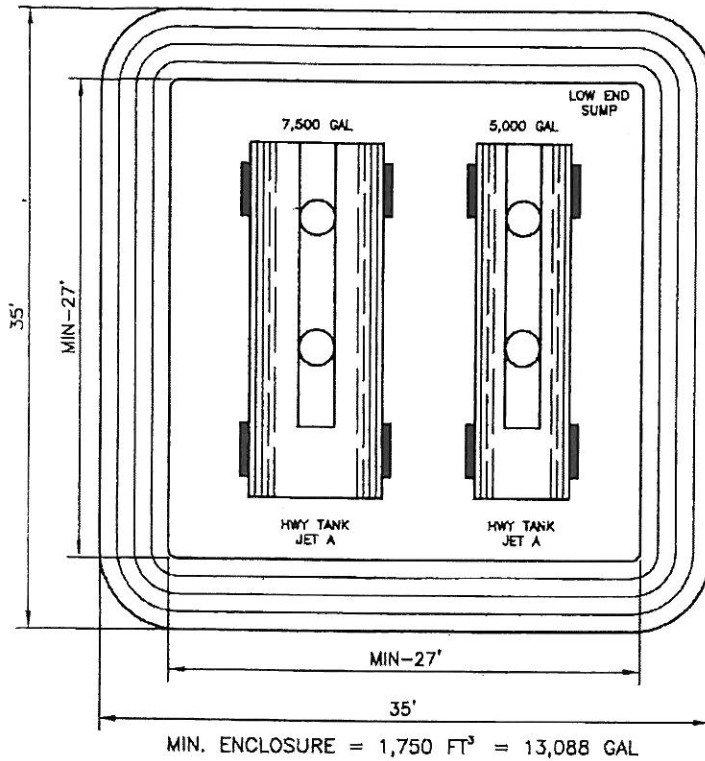
*** POST IN SERVICE VAN ***

In the event of fuel or oil spillage, immediately contact the Aurora office.

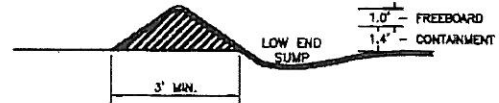
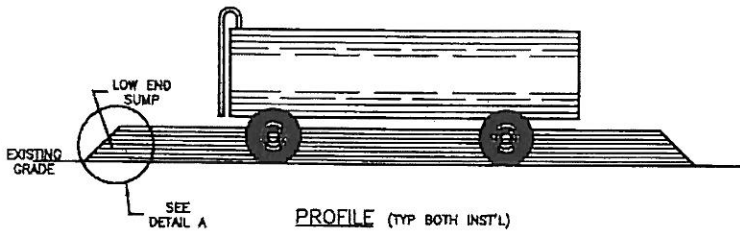
1. Project Manager _____ or
2. Crew Chief _____ or
3. Logging Trainer _____
4. Aurora Office 503-678-1222
5. U.S. Coast Guard 1-800-242-8802
(National Response Center)
6. Oregon DEQ 1-800-452-0311
Washington DEQ 1-800-258-5990
California EPA 916-262-1821 or in-state 1-800-645-7911
Idaho DEQ 208-373-0502 or in-state 1-800-632-8000
Alaska DEQ (Juneau) 907-485-5340 or after hours 1-800-478-9300
7. Local Bulk Commodities Common Carrier:

8. Clean-up Services/Environmental Emergency Services
Foss Environmental Services 1-800-337-7455
9. If appropriate, use oil absorbent pads located at service van.

(DRAWING NOT TO SCALE)



MIN. ENCLOSURE = 326 FT³ = 2,441 GAL



DETAIL A
TYPICAL CROSS SECTION

NOTES

1. Blade fuel containment area clean of all brush, debris, stones and loose soil. Rake and shovel clean soil base (or sump liner). Provide slight slope to 8" deep sump at corner.
2. Sump liner to be Keptax VCR 2801 25 MIL PVC Fiberglass mesh reinforced fuel pit liner or equivalent. Lay liner over prepared base with edges folded back to allow berm construction. Construct berm to shape shown using soil (or equivalent) free of rock and debris which could puncture or abraid the liner. Roll liner over berm and secure. Volume of finished cell to be adequate to contain volume of largest single tank plus sufficient freeboard to allow for precipitation.
3. Minor holes and tears may be repaired using patches of PVC plastic with adhesives or mastics resistant to Jet A fuel.

SECONDARY CONTAINMENT FACILITIES SHOWN IN THIS DRAWING CONFORM TO EPA 40 CFR PART 112.8(c)(2)



THE PACIFIC LUMBER COMPANY HELICOPTER LOGGING OPERATIONS	
FIGURE 1	
SECONDARY CONTAINMENT DESIGN FOR PETROLEUM STORAGE TANKS	
PROJECT: 240033	DATE: 10/22/04
REV:	BY: MH CHECKED: FC
MFG, Inc. <i>consulting scientists and engineers</i>	

Date: 10/22/2004 File: H:\PALCO_ONLY_PROJECTS\240033_minesuppr\1\HEL CONT.MKT.dwg

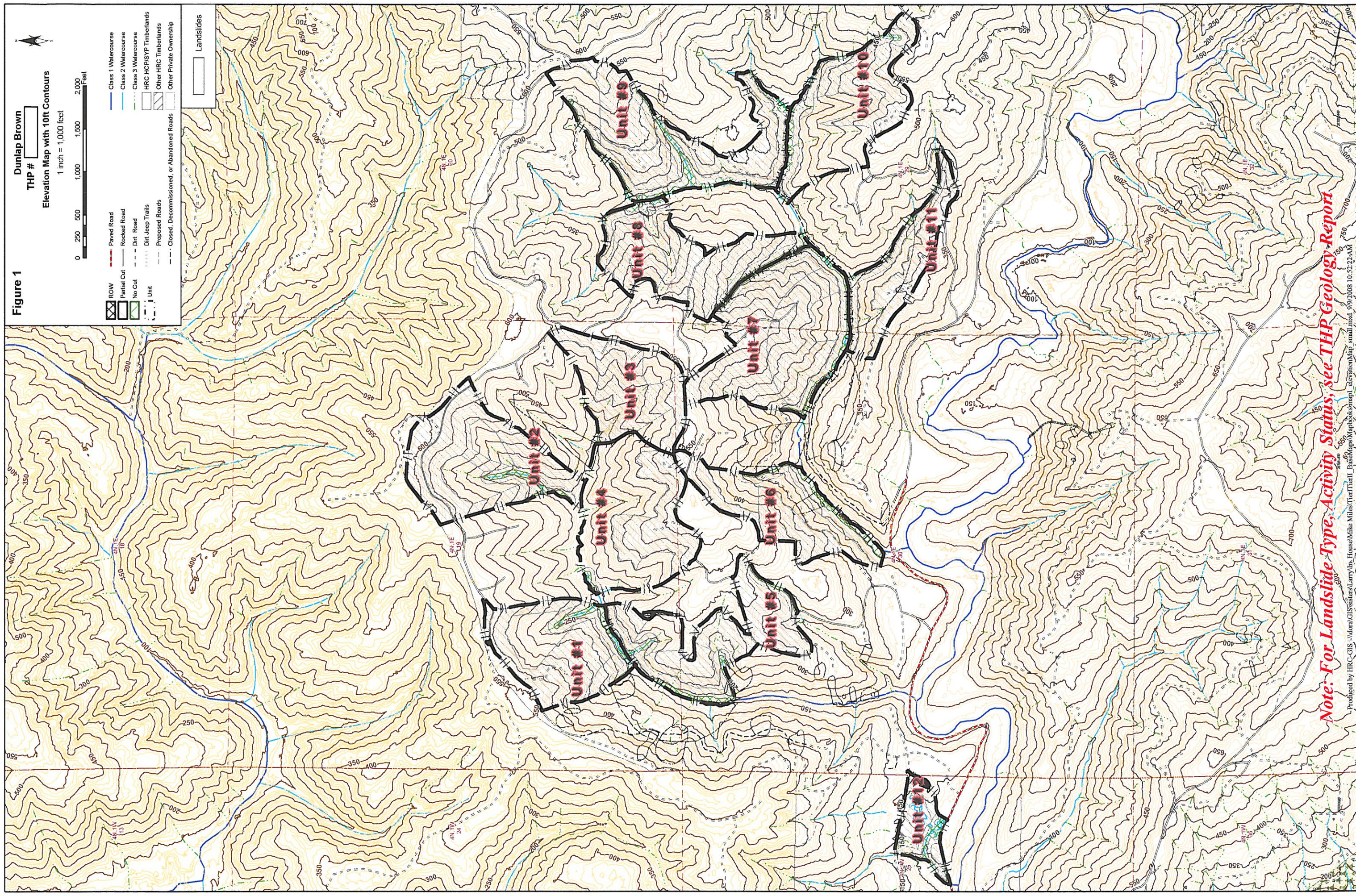
Figure 1

Dunlap Brown
THP # []

Elevation Map with 10ft Contours
1 inch = 1,000 feet



- ROW: Paved Road, Partial Cut, No Cut
- Watercourse: Class 1, Class 2, Class 3
- Trail: Dirt Jeep Trails
- Timberlands: HRC HCPSYP, Other HRC
- Roads: Proposed, Closed/Decommissioned/Abandoned
- Other: Landslides



Note: For Landslide Type, Activity Status, see THP Geology Report

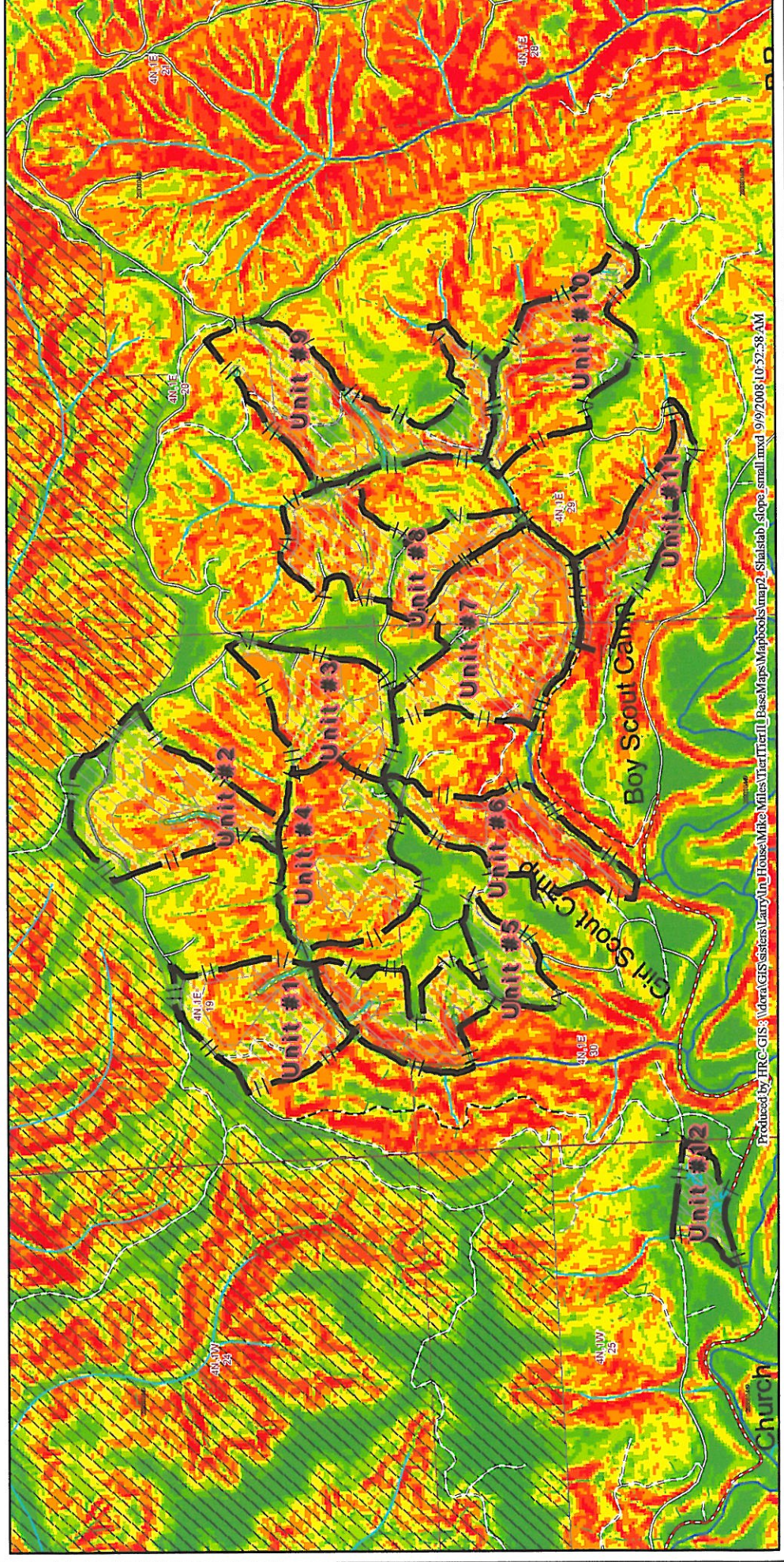
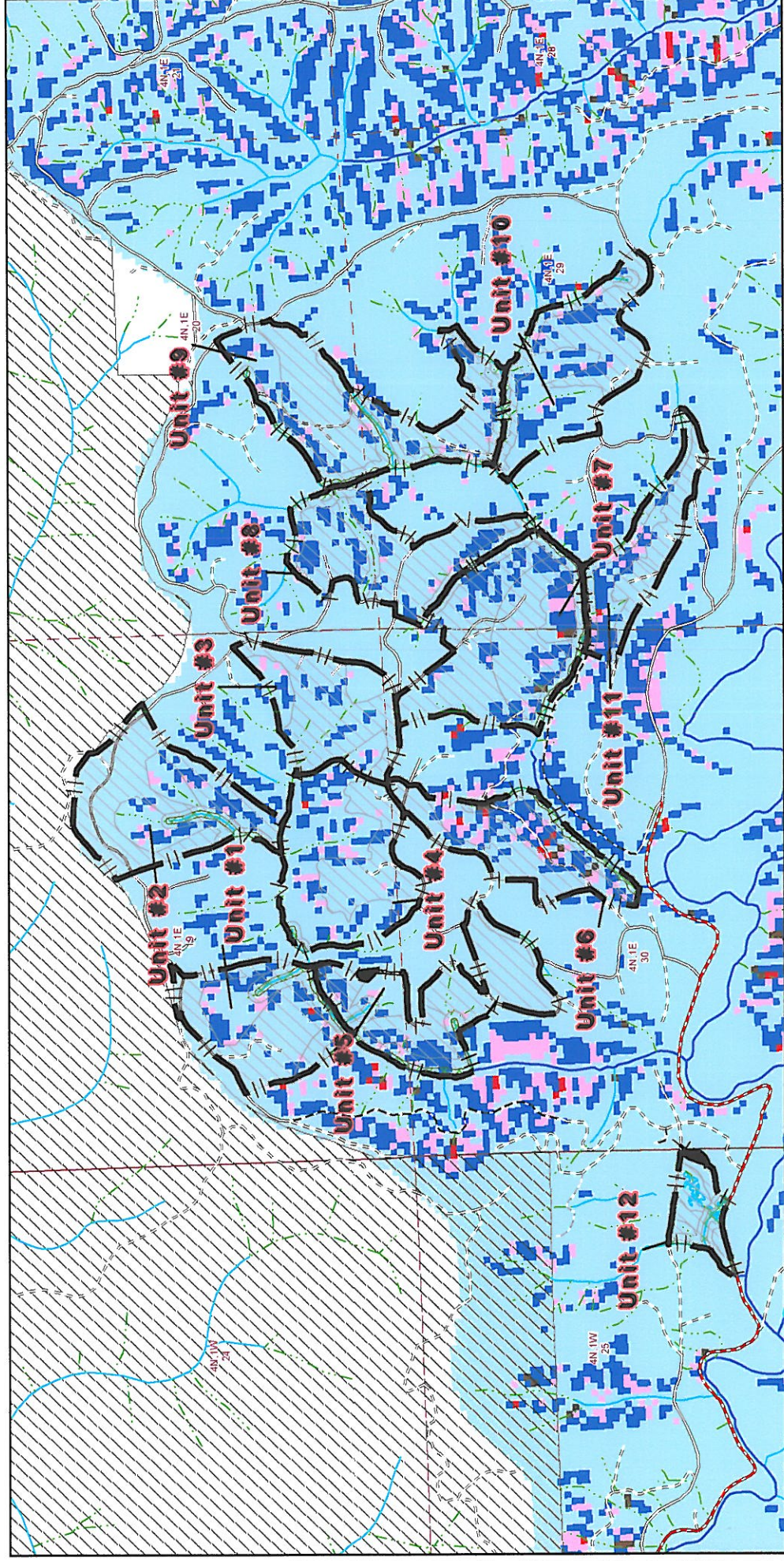
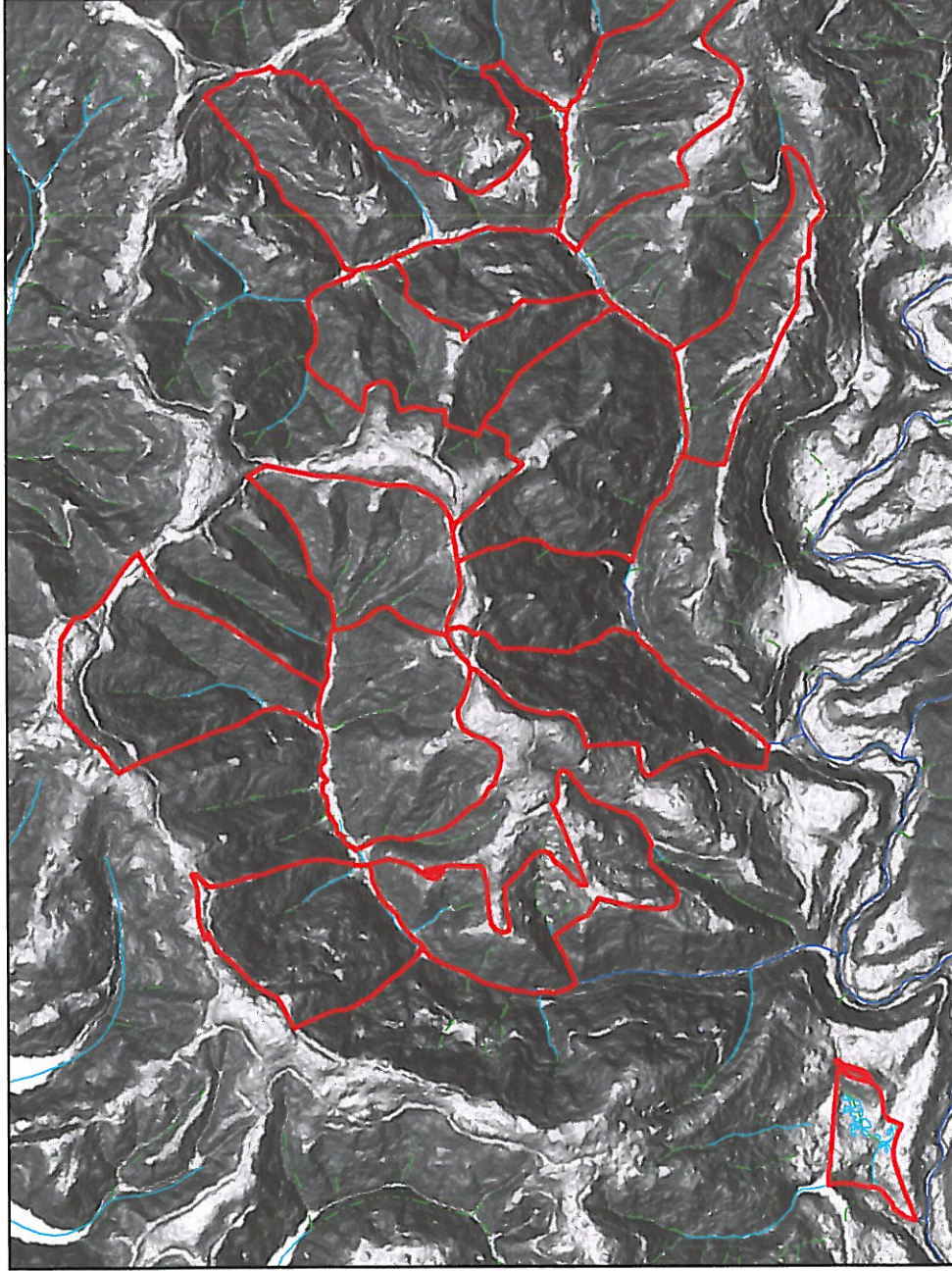
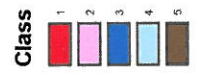
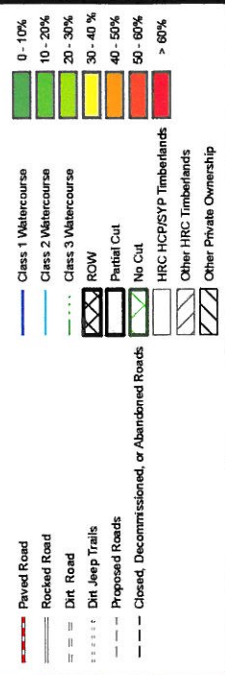
Figure 2

Dunlap Brown
THP #

Shalstab 10 mts grid / Slope Class Map

1 inch = 1,500 feet

0 380 760 1,520 2,280 3,040 Feet



Geologic Units

Q (Qal of McLaughlin and others, 2000) Alluvium consisting of sands, silt, clays, and gravel along major stream channels. Because of the location of this material mass wasting is typically not an issue, but in certain locations, in streams alluvium can be incorporated into debris torrents traveling the channel.

Qt (included in Qf of McLaughlin and others, 2000) Quaternary river terrace deposits. Unconsolidated generally poorly sorted pebble sands and sandy pebbles to boulder-conglomerates with silt interbeds. Generally flat-lying, but can be susceptible to debris sliding on steep slopes and small-scale rotational landsliding where adjacent to streams.

Qh (included in Qf of McLaughlin and others, 2000) Hookton Formation. Wrapped and folded unconsolidated marine and non marine sands, gravel and silt. Fossiliferous. Contains rare thin beds of volcanic ash. This formation is prone to erosion and debris sliding. Can be subject to shallow and deep-seated bedding plane failures resulting in translation and earthflow landslides where out of slope bedding occurs.

Qtwu (included in Qtw of McLaughlin and others, 2000) Marine and non-marine sedimentary rocks of the Wildcat Group. Typically consists of poorly to moderately consolidated siltstone and fine-grained silty sandstone with some lenses of pebble conglomerate. These deposits are moderately susceptible to deep-seated landsliding, with rotational displacements in massive units and translation along planar weaknesses such as bedding planes, joints and fractures.

Ty (Y1 of McLaughlin and others, 2000) Yager terrane of the Franciscan Complex Coastal Belt.

In the Elk River Watershed it typically consists of well-indurated and highly folded arkosic sandstone and argillite. The sandstone is typically very strong and argillite is typically very weak. The argillite is prone to slaking, and deep weathering and is often very sheared. Slopes underlain by this material are often irregular and lack well developed sidehill drainages. The slaking, shearing and deep weathering results in deep-seated flow type failures on moderate slopes.

Kjfs (m2 of McLaughlin and others, 2000) Melange of the Franciscan Complex Central Belt. Deeply sheared meta-sandstone and meta-argillite with chert and carbonates. Includes large rock block with diverse lithologies. Where the unit deeply sheared, particularly within the argillite, the rock of the regolith may fail as earthflows. Because this unit may contain large deep-seated earthflow failures with large inclusions of well indurated sandstone, areas underlain by this unit may appear hummocky and may lack well-defined drainages. Because of the pervasive shearing that limits internal cohesion of the sliding mass, relatively deep-seated translational sliding occurring on steeper slopes underlain by this material can develop into debris flows and occasionally torrents. Soils developed from this sheared rock are typically plastic sandy clays and clayey sands. Large blocks of massive sandstone present in the central belt are typically well indurated and support steep slopes. The soils and colluvium developed from the sandstone are sandy silts to silty lo sand that have relatively low cohesion and are susceptible to debris flows.

Figure 3

Dunlap Brown
THP #
CGS Map

1 inch = 1,074.259194 feet



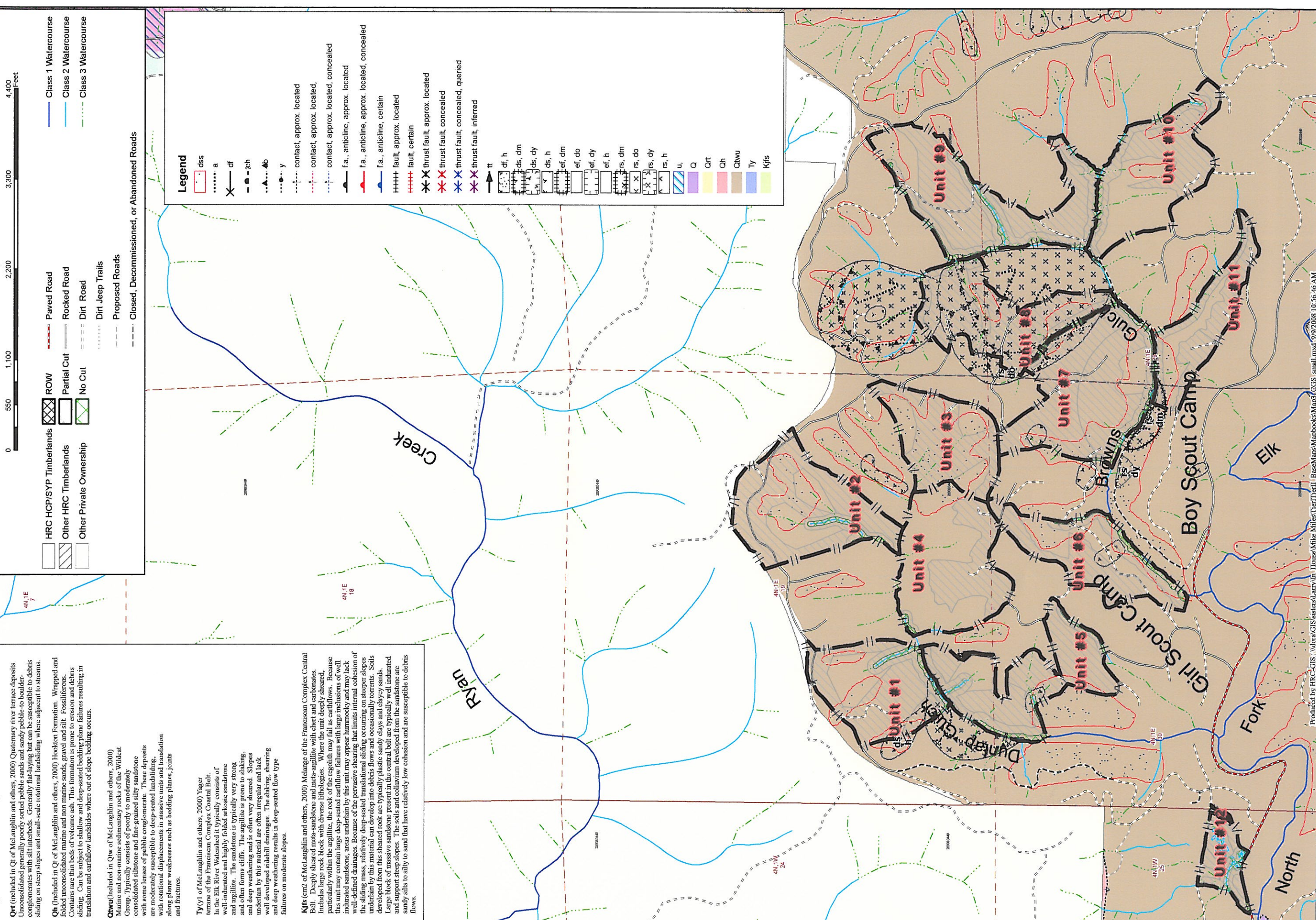
- HRC HCP/SYP Timberlands
- Other HRC Timberlands
- Other Private Ownership
- ROW
- Partial Cut
- No Cut
- Paved Road
- Rocked Road
- Dirt Road
- Dirt Jeep Trails
- Proposed Roads
- Closed, Decommissioned, or Abandoned Roads
- Class 1 Watercourse
- Class 2 Watercourse
- Class 3 Watercourse

Legend

- dss
- a
- df
- zeh
- ab
- y
- contact, approx. located
- contact, approx. located
- contact, approx. located, concealed
- f.a., anticline, approx. located
- f.a., anticline, approx. located, concealed
- f.a., anticline, certain
- fault, approx. located
- fault, certain
- thrust fault, approx. located
- thrust fault, concealed
- thrust fault, concealed, queried
- thrust fault, inferred

U

- df, h
- ds, drn
- ds, dy
- ds, h
- ef, drn
- ef, do
- ef, dy
- ef, h
- rs, drn
- rs, do
- rs, dy
- rs, h
- u
- Q
- Crt
- Ch
- Qtwu
- Ty
- Kjfs



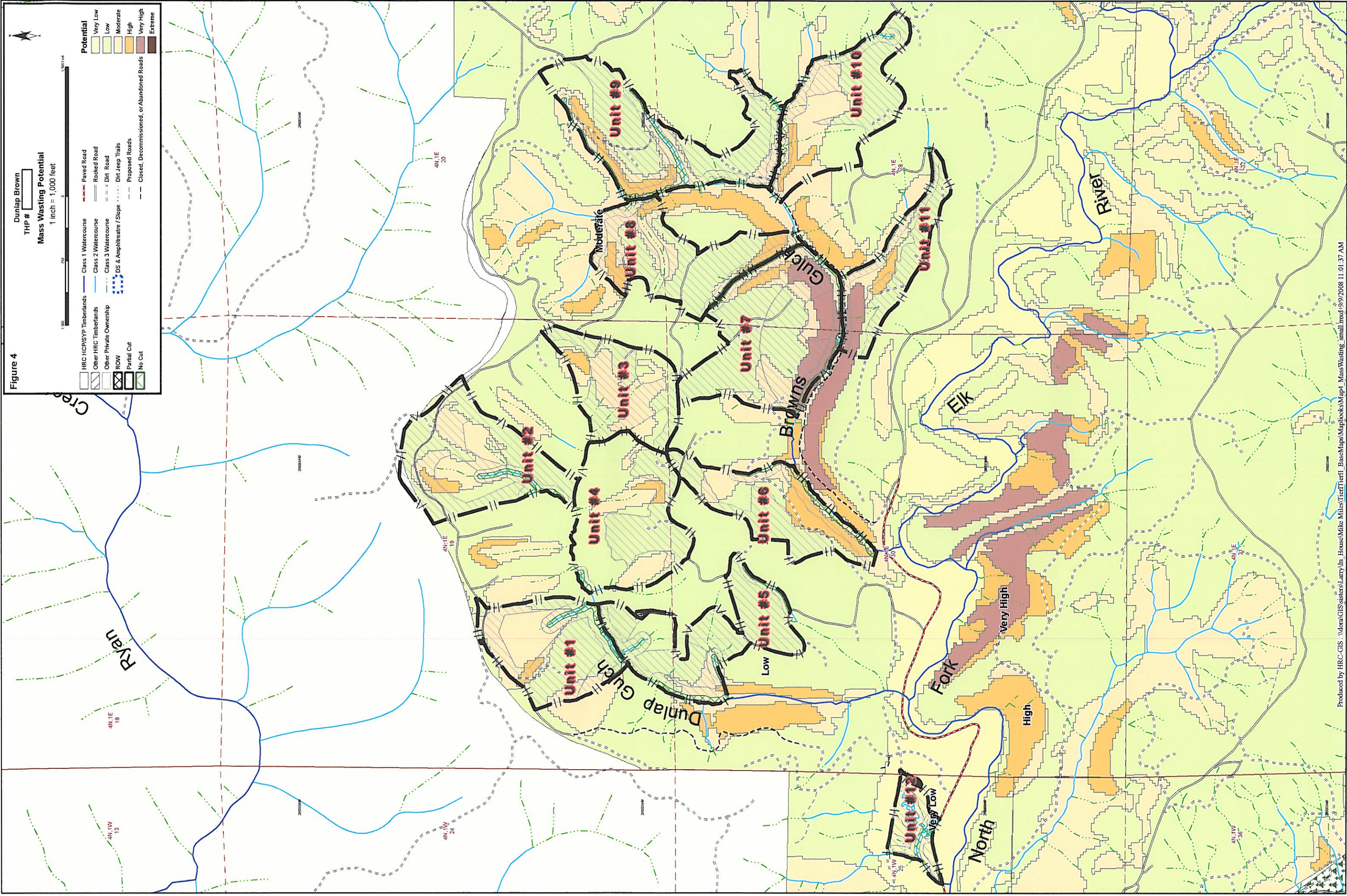


Figure 5

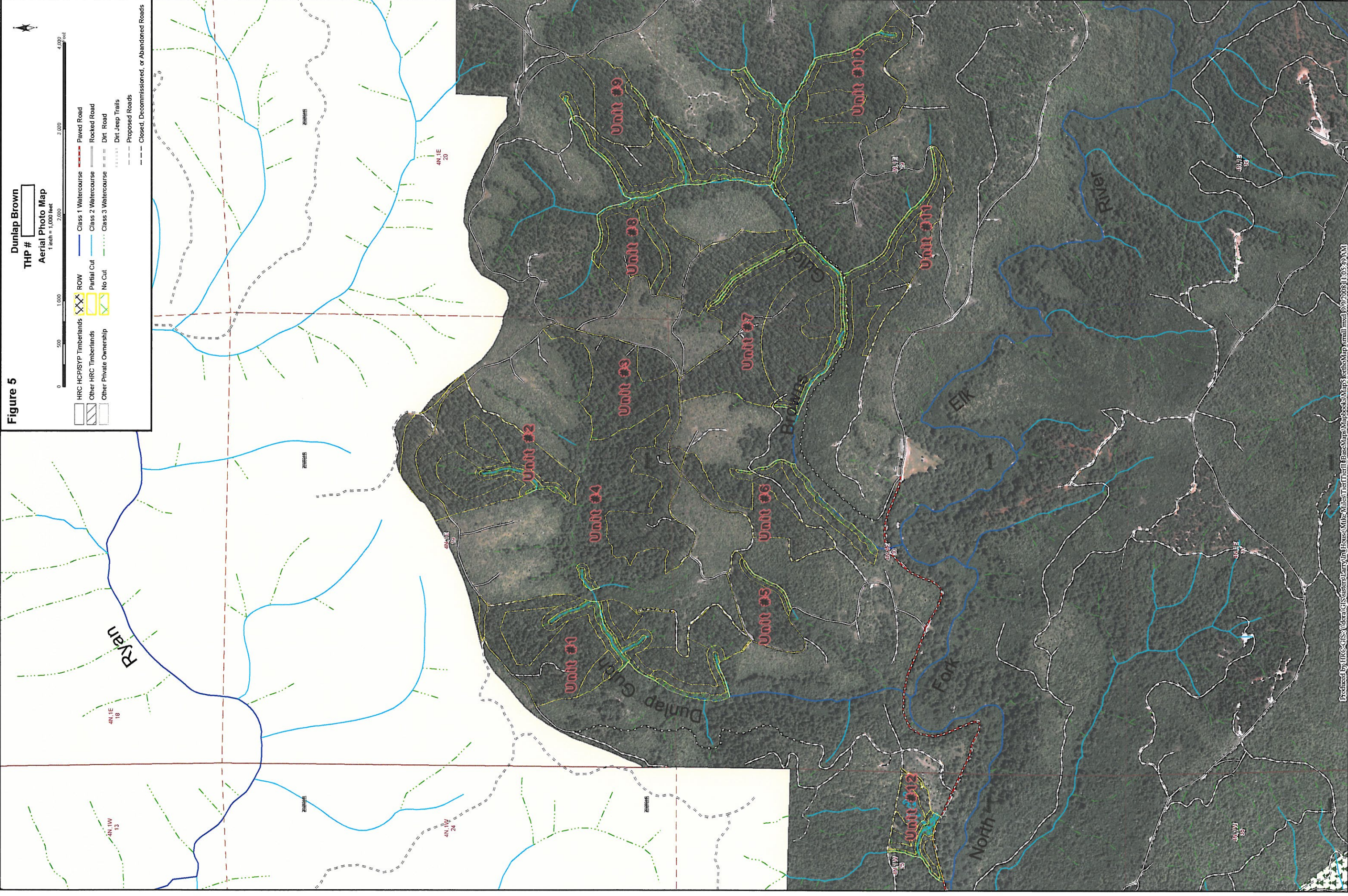


Figure 7

Dunlap Brown

THP # []

Road Map



- | | | | |
|-------------------------|--|----------------|--------------|
| HRC HCP/SYP Timberlands | Class 1 Watercourse | Paved Road | Stormproofed |
| Other HRC Timberlands | Class 2 Watercourse | Rocked Road | Upgraded |
| Other Private Ownership | Class 3 Watercourse | Dirt Road | |
| ROW | Dirt Jeep Trails | Proposed Roads | |
| Partial Cut | Closed, Decommissioned, or Abandoned Roads | | |
| No Cut | | | |

