



Humboldt Redwood
COMPANY, LLC

Main Office
P.O. Box 37
Scotia, CA 95565
(707) 764-4472

Timber Operations
P.O. Box 712
Scotia, CA 95565
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April 1, 2010

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 1-09-100 HUM (Unit 1 and 2) in the Freshwater Creek WWDR, "Tier II"

Dear Ms. Kuhlman:

HRC is requesting Tier II enrollment under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0041 for THP 1-09-100 HUM. This THP is comprised of 58.8 acres of group selection/selection and 2.7 acres of right of way (32.1 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), Form 200 and an annual waste discharge enrollment fee have 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. 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.

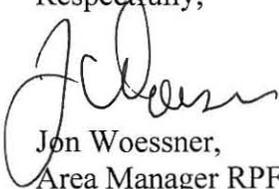
The Little Little THP included a Note 45 geologic review. The Unit 1 is primarily un-entered 2nd growth redwood with the occasional fir and hardwood, Unit 2 is previously entered 2nd growth redwood. The slopes are moderate to steeply inclined and underlain by Wildcat Group fine grained silty clayey, moderately to well consolidated sandstone. Mass wasting observed in the unit is limited to three areas in Unit 1 and one area in Unit 2. These areas received higher retention standards than adjacent unfailed slopes. The group selection units will predominantly incorporate cable yarding with very gently inclined areas ground based. The Forester has appropriately buffered all watercourses. Based on the findings during THP development and the additional review provided in this enrollment, we do not anticipate a significant increase in the potential for mass wasting as a result of the approved plan. Therefore, we have not amended the THP for Tier 2 enrollment. We consider the approved THP to meet the requirements for Tier 2 enrollment.

The THP proposes an uneven-age silviculture retaining 75 sqft of basal area. 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 ground based yarding is approved for the plan. 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 R1-2006-0041 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. R1-2006-0041).

Respectfully,



Jon Woessner,
Area Manager RPF #2571
Humboldt Redwood Company, LLC

Attachments:

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

Humboldt Redwood Company, LLC
 6500 Durable Mill Rd. P.O. Box 390
 Calpella, CA 95418

3/31/10

4521 North Coast Regional Water

INVOICE NO.	INVOICE DATE	DESCRIPTION	GROSS AMOUNT	DISCOUNT	NET AMOUNT
032109 109	3/21/10	1-09-100HUM WWD	\$ 1,226.00	\$ 0.00	\$ 1,226.00
CHECK NO.	29218	TOTALS	\$ 1,226.00	\$ 0.00	\$ 1,226.00



THIS CHECK HAS A COLORED BACKGROUND AND CONTAINS MULTIPLE SECURITY FEATURES - SEE BACK FOR DETAILS

Humboldt Redwood Company, LLC
 6500 Durable Mill Rd. P.O. Box 390
 Calpella, CA 95418

Bank of America
 Northbrook, IL

029218

70-2328
 0719

CHECK DATE 3/31/10
 CHECK NO. 029218

ONE THOUSAND TWO HUNDRED TWENTY-SIX AND 00/100*****
 ****\$ 1,226.00
 CHECK AMOUNT

PAY TO THE ORDER OF
 North Coast Regional Water
 Quality Control Board
 5550 Skylane, Suite A
 Santa Rosa CA 95403



TWO SIGNATURES REQUIRED FOR OVER 5,000 DOLLARS

⑈029218⑈ ⑆071923284⑆ 87653⑈ 16430⑈



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 1-09-100 "Little Little"			
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			5. <input type="checkbox"/> Other	Federal Tax ID:
			Telephone Number: 707-764-4376	

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			5. <input type="checkbox"/> Other	Federal Tax ID:
			Telephone Number: 707-764-4376	

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	Federal tax ID:
			Telephone Number: 707-764-4376	

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



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:
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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: <u>California Department of Forestry and Fire Protection</u>	
Has a public agency determined that the proposed project is exempt from CEQA? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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:	
<input type="checkbox"/> EIR <input type="checkbox"/> Negative Declaration	Expected CEQA Completion Date:



State of California
Regional Water Quality Control Board
**APPLICATION/REPORT OF WASTE DISCHARGE
GENERAL INFORMATION FORM FOR
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: 6/22/09

FOR OFFICE USE ONLY

Date Form 200 Received:	Letter to Discharger:	Fee Amount Received:	Check #:
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THP Name	THP Number	Unit Number	CC	Silviculture			CC Equivalent	Hazard	
				ROW	shr	SEL		Low	High*
Becks 2010	10-012	1				270	135.0	TBD	TBD
Ridge Meander	09-010	1 TII				89.1	44.6	82.7	24.6
Ridge Meander	09-010	2 TI				37.7	18.9	37.7	0.0
Ridge Meander	09-010	3 TII				90.3	45.2	88.3	7.7
Ridge Meander	09-010	1A TI				37.1	18.6	37.1	0.0
Ridge Meander	09-010	1B TI				36.1	18.1	35.4	2.7
Ridge Meander	09-010	3A T1				24.1	12.1	24.1	0.0
little little	09-100	All		2.7		58.8	31.4	57	6.9
City Dump	05-006	1				14.8	7.4	14.8	0.0
City Dump	05-006	2				7.7	3.9	7.7	0.0
City Dump	05-006	3			38.9	5.8	32.1	44.7	9.6
City Dump	05-006	4				9.8	4.9	7	10.8
City Dump	05-006	5			1	0	0.8	0.1	3.5
City Dump	05-006	6				8	4.0	5.6	9.2
City Dump	05-006	7			4.4	0	3.3	4.2	0.8
						Total	379.9		

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

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

THP Name	THP Number	Unit Number	Yarding System			Site Preparation	
			Ground Based	Yarder	Helicopter	Mechanical	Broadcast
Becks	10-012	1	TBD	TBD		0	0
Ridge Meander	09-010	1 TII	27.1	62			
Ridge Meander	09-010	2 TI	3.2	34.5			
Ridge Meander	09-010	3 TII	14.9	75.4			
Ridge Meander	09-010	1A TI		37.1			
Ridge Meander	09-010	1B TI		36.1			
Ridge Meander	09-010	3A T1	3	21.1			
little little	09-100		17.9	49.2			
City Dump	05-006	1	14.8	0			
City Dump	05-006	2	0	7.7			
City Dump	05-006	3	44.7	0			
City Dump	05-006	4	7.1	2.7			
City Dump	05-006	5	0	1			
City Dump	05-006	6	5	3			
City Dump	05-006	7	0	4.4			

Professional Certification of Design

I, Tagg Nordstrom, P.G. 7950, 4/1/10,
Name license # Date



Place licensed seal here

Signature

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. 1-09-100 HUM (Little Little) Unit # 1 and 2

- a. are in accordance with accepted practices, and recognized professional standards;
- b. comply with the requirements of the Monitoring and Reporting Program No. R1-2006-0103, 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: Little Little THP 09-100 Units # 1 and 2 March 30, 2010

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, 2005)	3
Mass Wasting Potential Map (HRC, 1999)	4
Aerial Photo Map (HRC, 2007)	5
HRC Elk River and Salmon Creek WA deep-seated LS inventory (HRC, 2004)	6
Road Condition Map	7

Please see back of enrollment for references

Summary of Changes to THP Prescriptions Based on Tier II Analysis in this Unit:

Geologic Review	Forestry Silviculture/Site Prep Plan	Operational Design Plan
U-1 (Unit 1)	<p>THP approved silviculture within polygon U-1 is group selection.</p> <p>No site preparation will occur due to partial harvesting.</p>	<p>The approved THP proposes ground based yarding within polygon U-1.</p> <p>No change to approved yarding methods.</p>
U-2 (Unit 2)	<p>THP approved silviculture within polygon U-2 is group selection.</p> <p>No site preparation will occur due to partial harvesting.</p>	<p>The approved THP proposes ground based yarding within polygon U-2.</p> <p>No change to approved yarding methods.</p>

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

The harvest units occupy predominantly convex and concave slope forms adjacent Class II and Class III tributaries of Little Freshwater Creek. The underlying geology is the lower facies of undifferentiated Wildcat Group sediments composed of interbedded mudstone, silts, fine sands, and infrequent pebbles and conglomerates over lying Yager terrane sandstone which is mapped adjacent deeply incised Class I and Class II watercourses in the area. The bedrock is compact and predominantly held together by consolidation. Yager terrane bedrock is located in the lower elevations of Unit 1 adjacent the southern Class II watercourse. CGS (1999) maps debris slide slopes that correlate regionally and locally with watercourses (Figure 3). In Unit 1 CGS (1999) also maps a deep-seated ridge to creek dormant translational/rotational landslide and a smaller dormant translational/rotational landslide that coincides with our mapping of landslide 1-2. No deep-seated landslides are mapped in Unit 2.

Mapping from Watershed Analysis (Figure 6) identifies low to moderate hazard for reactivation that correlates with CGS (1999) mapping of the deep-seated ridge to creek dormant translational/rotational landslide in Unit 1. Watershed Analysis (Figure 6) does not model any hazards within Unit 2.

Review of Figure 2 (Hillslope Shade) shows moderate correlation between surface morphology and the head scarp of the mapped deep seated landslide in Unit 1. In both units the Hillslope Shade maps show moderate to steep convergent slopes (swales) that are most prominent where Class II and Class III watercourses have been mapped. The Class II watercourses appear well entrenched with a consistent low gradient channel.

A focused geologic evaluation was conducted for the THP in accordance with Note 45 guidelines. Four unstable areas were identified within Unit 1. Two of these landslides are adjacent Class III watercourses and two are adjacent a Class II watercourse. A landslide identified in the western portion of Unit 2 has been excluded from harvest. The THP was reviewed by various agencies during PHI and was found to be compliant with the Forest Practice Rules with respect to disclosure of all known unstable areas. Detailed characterizations and justification for the proposed harvest is provided in the geology report in Section V of the THP.

For this evaluation, the harvest units have each been reviewed as one polygon. We validate this decision based on the slope morphology, consistent slope inclination with respect elevation, and slope performance in response to the previous harvest entry.

THP Unit: # 1

Polygon: U-1

A) General Observations

The unit is bound by a storm proofed ridge road on a gently inclined ridge top, two well entrenched Class II watercourses, and a well defined Class III watercourse.

The polygon occupies convergent and divergent slopes with inclinations that vary from gently inclined to over 60%. The slopes exceeding 50% typically define the flanking slopes of watercourses.

Two Class II watercourses define the down slope southern and eastern harvest boundaries for a combined 3000 feet along the channel. The unit drains to the Class II watercourses via nine Class III watercourses and one Class II watercourse that extend upslope into the unit. The Class II watercourses are flanked by predominantly 40-60% inclined hill slopes. The slopes appear smooth with moderate to deep incision of the Class III tributaries. The Class II watercourses are well developed. Slopes inclined greater than 60% are scattered in distribution, limited in acreage, and appear to correlate with the fluvial swales.

Areas of elevated SHALSTAB (Value 2) are concentrated within and adjacent the Class III watercourse. Two pixels of elevated SHALSTAB (value 2) correlate with landslide 1-3 identified in the geologic evaluation (figure 2) of the THP. Landslide 1-3 is described as a dormant mature debris slide. No pixels of elevated SHALSTAB value 1 are located within the proposed harvest unit. Our review of the SHALSTAB areas revealed steeply inclined swales, evenly distributed, in situ old growth stumps and abundant straight growing 2nd growth timber.

Debris slide slopes mapped (Figure 3) within the unit generally correlates well with watercourses. It appears that these areas were mapped as potential source areas since few actual debris slides were identified during THP layout and approval.

Mass Wasting Potential (MWP) modeled for the unit (Figure 4) is regionally low. Within the unit moderate and high MWP has been modeled adjacent the Class II watercourses. The area matching high MWP is in response to the inclusion within the model the values for the Figure 3 mapped Yager Terrane bedrock underlying mapped debris slide slopes. Moderate MWP mapped within the unit correlates well with the dormant deep-seated landslide in the northern portion of the unit.

The stand is predominantly mature redwood with occasional fir and hardwoods. The original harvest was a ground based clearcut yarded either to the downslope watercourse or the ridge top.

B) Harvest Related Impacts and Hillslope Sensitivity

Debris slide slopes mapped (Figure 3) within the unit generally correlate with the watercourses. It appears that these areas were mapped as potential source areas since few actual debris slides were identified during THP layout and approval.

Mass Wasting Potential (MWP) modeled for the unit (Figure 4) is regionally low. Within the unit moderate and high MWP has been modeled adjacent the Class II watercourses. The areas matching high MWP are in response to the inclusion within the model the values for the Figure 3 mapped debris slide slopes underlain by Yager Terrane bedrock.

The stand is predominantly redwood and fir. The original harvest was a ground based clearcut yarded either to the downslope watercourse or the ridge top. No second entry has occurred on slopes proposed for this harvest plan.

C) Forestry / Silviculture Plan

We have not changed the silviculture in response to this evaluation.

D) Operational Design Plan

THP approved yarding method is both cable and ground based. As delineated, the proposed yarding methods appear appropriate.

THP Unit: # 2

Polygon: U-2

A) General Observations

The polygon is essentially west facing and occupies a Class II sub-basin that drains to Little Freshwater Creek. The polygon includes one Class II and four Class III watercourses. The Class II watercourse is well developed and moderately armored with cobbles and gravels. The Class III watercourses are noticeable less incised and poorly armored.

Typical Riparian Management Zones for the Class II watercourses includes a 30-foot no harvest inner band and a selection buffer that extends the RMZ out to between 75 and 100 feet. The outerband may be harvested but must retain a minimum of 60% canopy closure.

A) General Observations

The implemented THP mitigation for the Class III watercourses includes the retention of all trees growing within the active channel and all trees 8 inches and less within 15 feet of the channel. Where channel sideslopes are greater than 50%, a 75' RMZ flag line has been established to indicate no group selection. Where side slopes are less than 50% employ a 50' RMZ that maintains evenly distributed single tree selection and no group opening greater than ¼ acre within the Class III RMZ flag line. Additionally 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. The Class III watercourses in this unit are short extensions of the Class II watercourse and often fall with the Class II RMZ.

SHALSTAB modeling (Figure 2) shows moderately convergent and steeply inclined slopes throughout the polygon. Three pixels of SHALSTAB value 1 are modeled in southern and western portion of the plan. Numerous value 2 pixels correlate with the swales containing Class II and Class III watercourses. One unstable area was identified in the western most portion of the unit. A cluster of SHALSTAB value two pixels correlates with our mapping the unstable area identified as a shallow debris slide.

Mass Wasting Potential (MWP) modeling for the unit is low to moderate. The majority of the moderate MWP is within the Class II RMZ. A small area of high MWP is modeled in the eastern portion of the unit adjacent Little Freshwater Creek. The high MWP correlates with steep slopes adjacent the Class II watercourse and Little Freshwater Creek (Class I watercourse). High MWP within the unit is mostly inside the Class II harvest exclusion zone and completely within the outer band of the Class II RMZ.

Watershed Analysis Deep-Seated Landslide Inventory (Figure 6) did not identify deep-seated landslides within the proposed unit.

One shallow debris slide was identified within the western portion unit. This area has been excluded from harvest with do not cut flagging.

B) Harvest Related Impacts and Hillslope Sensitivity

Surface disturbance has occurred within the unit in response to past logging activities. The disturbance is the culmination of large diameter timber dragged down slope via steam donkey. Following that impact, the area appears to have responded well and adjusted through minor slumping, settling and the infrequent failures.

The level of mass wasting delivered sediment within the watercourses appears insignificant when compared to the construction of roads and crossings within channels as observed in other near by sub-basins.

B) Harvest Related Impacts and Hillslope Sensitivity

Current planned operations will result in less ground disturbance than previous operations, especially where adjacent to watercourses, and are specifically designed to minimize potential for mass wasting-related discharge.

The extensive RMZs were designed to provide sediment filtration bands adjacent the watercourses should extensive sediment be generated from the clearcut harvesting. The current level of harvest will retain both canopy closure and slash from the harvested trees potentially increasing the effectiveness of the sediment filtration band.

Overall hillslope sensitivity to harvest activities appears minimal with respect to mass wasting.

Please see the THP geology report for a more comprehensive assessment of the role that timber harvesting has on slope stability.

C) Forestry / Silviculture Plan

We have not changed the silviculture in response to this evaluation.

D) Operational Design Plan

THP approved yarding method is high lead cable yarding. As proposed, the THP approved yarding method appears appropriate.

References:

- CGS, 2005, Geologic and Geomorphic Features Related to Landsliding, Elk River Watershed, Humboldt County, California. Department of Conservation, now California Geological Survey (CGS) Watershed Mapping Series, Mapset 4, Plate 1. Available via the web at ftp://ftp.consrv.ca.gov/pub/dmg/thp/maps/elk/elk_color.pdf
- 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>
- HRC, 2007, Ortho-photo rectified aerial photographs flown by 3Di West, Eugene Oregon,
- HRC, 2008. 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.
- HRC, 2004, Elk River / Salmon Creek Watershed Analysis, Scotia, California, prepared for Pacific Lumber Company (PALCO) dated 2004?, and acquired by Humboldt Redwood Company, LLC in 2008.
- HRC, 2005, (Policy Acquired from The Pacific Lumber Company (PALCO)) Prescriptions Based on Watershed Analysis for Freshwater Creek, California, August 15, 2002.
- HRC, 1999, The Pacific Lumber Company's Habitat Conservation Plan, Vol. 2 Part D, Landscape Assessment of Geomorphic Sensitivity, Public Review Draft.
- SGD, 2008, Geologic Evaluation of the Moss Elk THP, Humboldt County, California, unpublished report to Wayne Rice RPF, Scotia Pacific Company LLC, dated April 30, 2008. Included within section V of the THP 1-08-072.

Brief descriptions of the models used in this evaluation:

SHALSTAB was first described in Dietrich and Montgomery (1994). SHALSTAB is a simple, physically-based model based on the Mohr-Coulomb failure law that can be used to map shallow landslide potential. The model calculates the potential for failure using gridded digital elevation data. The simplicity of the model lies in the formulation of slope stability parameters that allow the model to be run parameter-free using default values suggested by the authors or determined by local measurement. Because the model uses no field measurements of critical characteristics that determine slope stability, the evaluation of potential instability is only an approximation. In applying SHALSTAB for Tier 2 enrollment, HRC has run the model on a 10-m spatial grid using LiDAR elevation data and applied the parameters as suggested by the model authors. HRC's application of the method and parameters is described in HRC (2008).

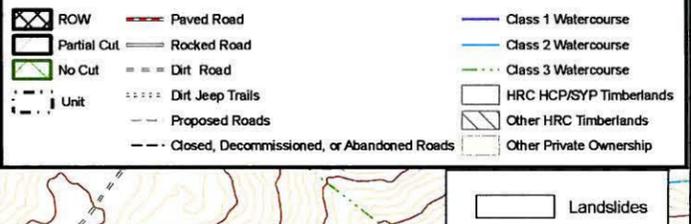
Mass Wasting Potential (MWP) modeling is a cursory regional assessment that numerically values soil, slope inclination, geology type, and geomorphology with respect to past mass wasting (HRC, 1999). The sums of the values specific to an area are measured against a set ranking system that extends from very low to extreme. The model's intent is to highlight areas of high potential for instability at the planning level. The model's use at the site specific level is limited in that pedogenic soil types are used, not textures, the geologic formations utilized provide one value for all of the incorporated facies, and the model is heavily biased if past mass wasting has occurred or has been mapped as occurring in the area.

Figure 1

Little Little
THP 09-100
Elevation Map with 10 ft contours
Unit 1

1 inch = 350 feet

0 87.5 175 350 525 700 Feet



Unit # 1
Partial Cut

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

Figure 2

Little Little
TRIP 09-100
Shalstab 10 mrs grid / Slope Class Map
Unit 1

1 inch = 500 feet
0 125 250 500 750 1,000
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/ISIP Timberlands
- Other HRC Timberlands
- Other Private Ownership

- Class
- 1
 - 2
 - 3
 - 4
 - 5

- 0-10%
- 10-20%
- 20-30%
- 30-40%
- 40-50%
- 50-60%
- > 60%

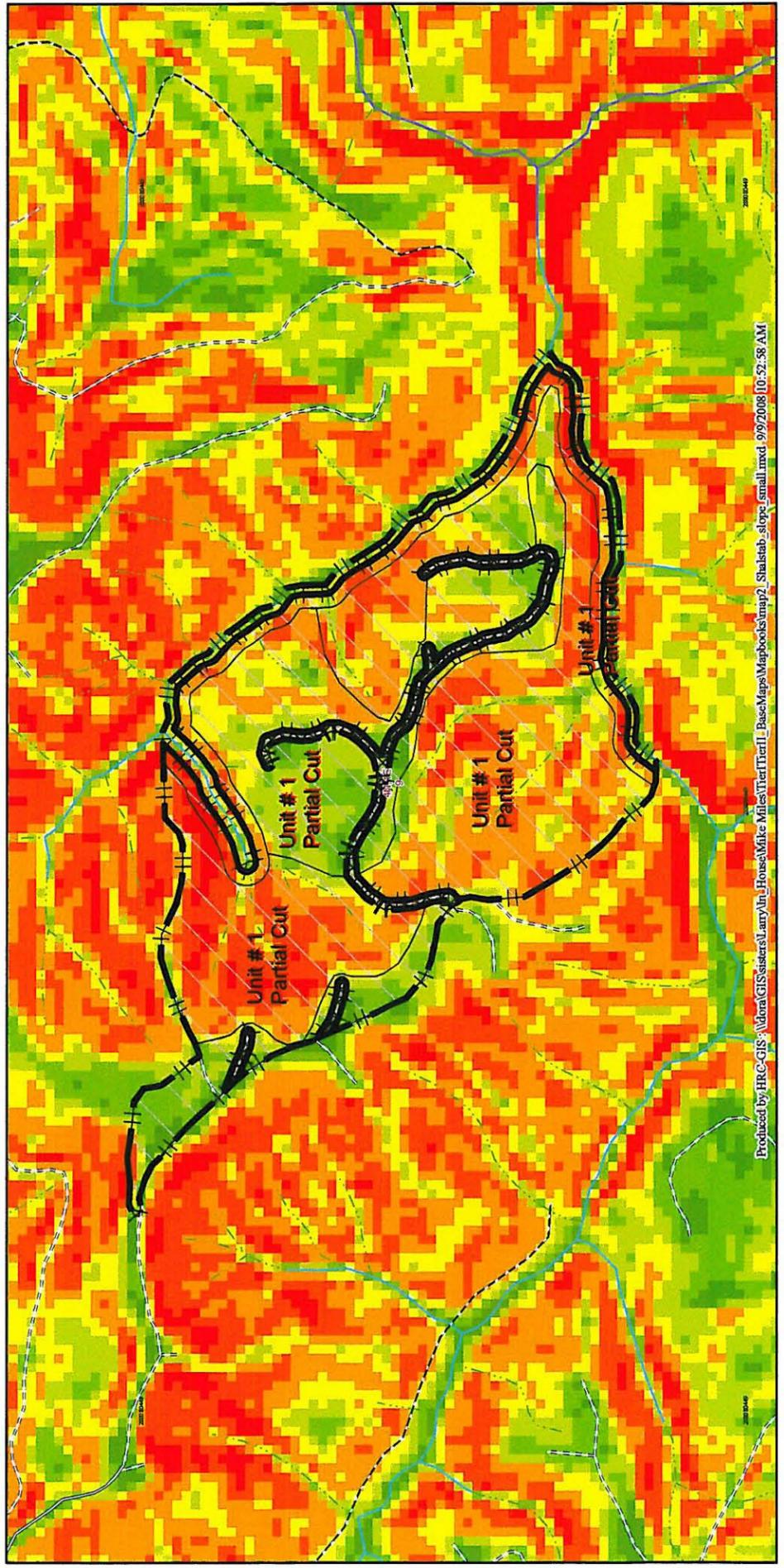
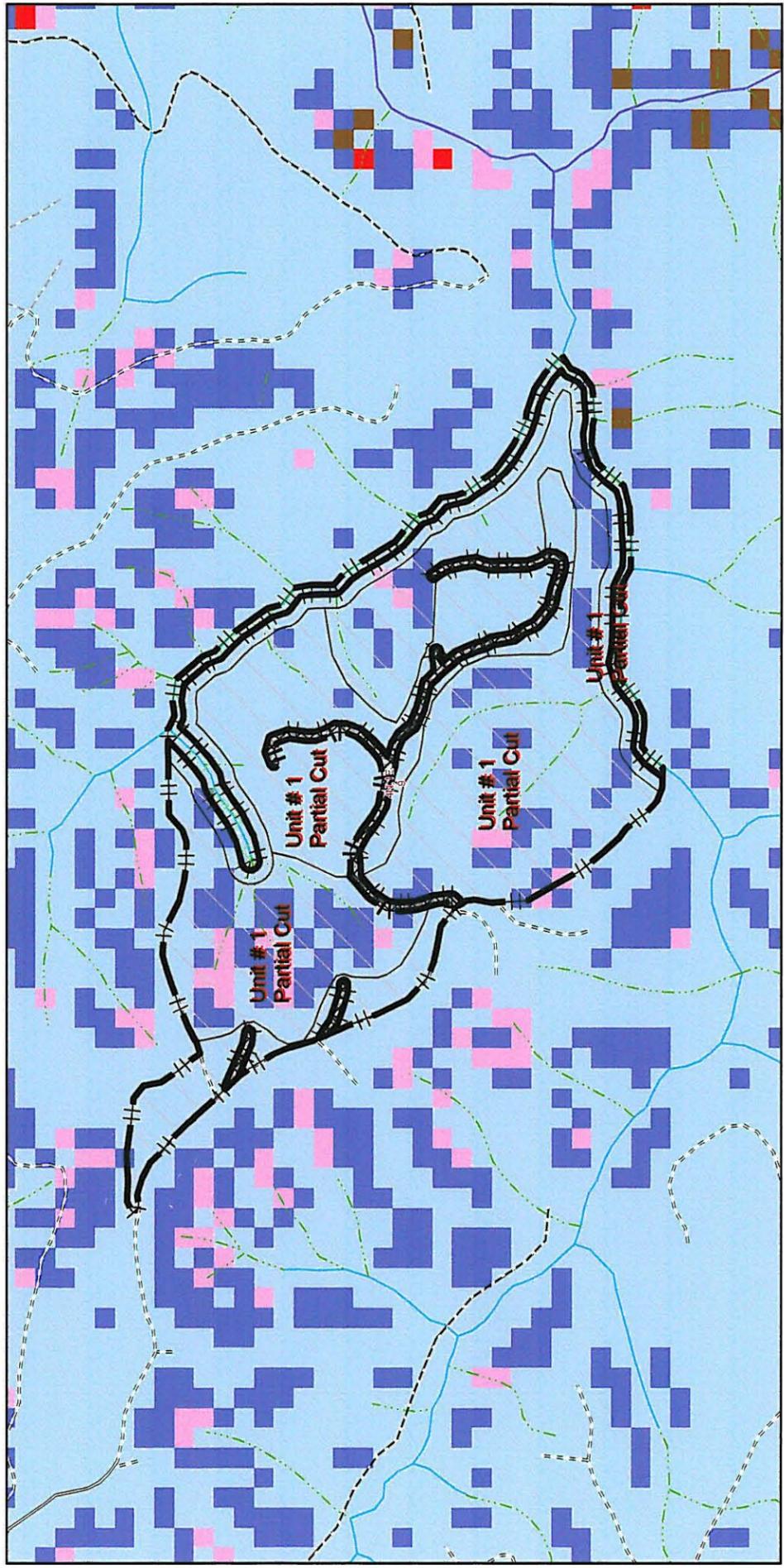
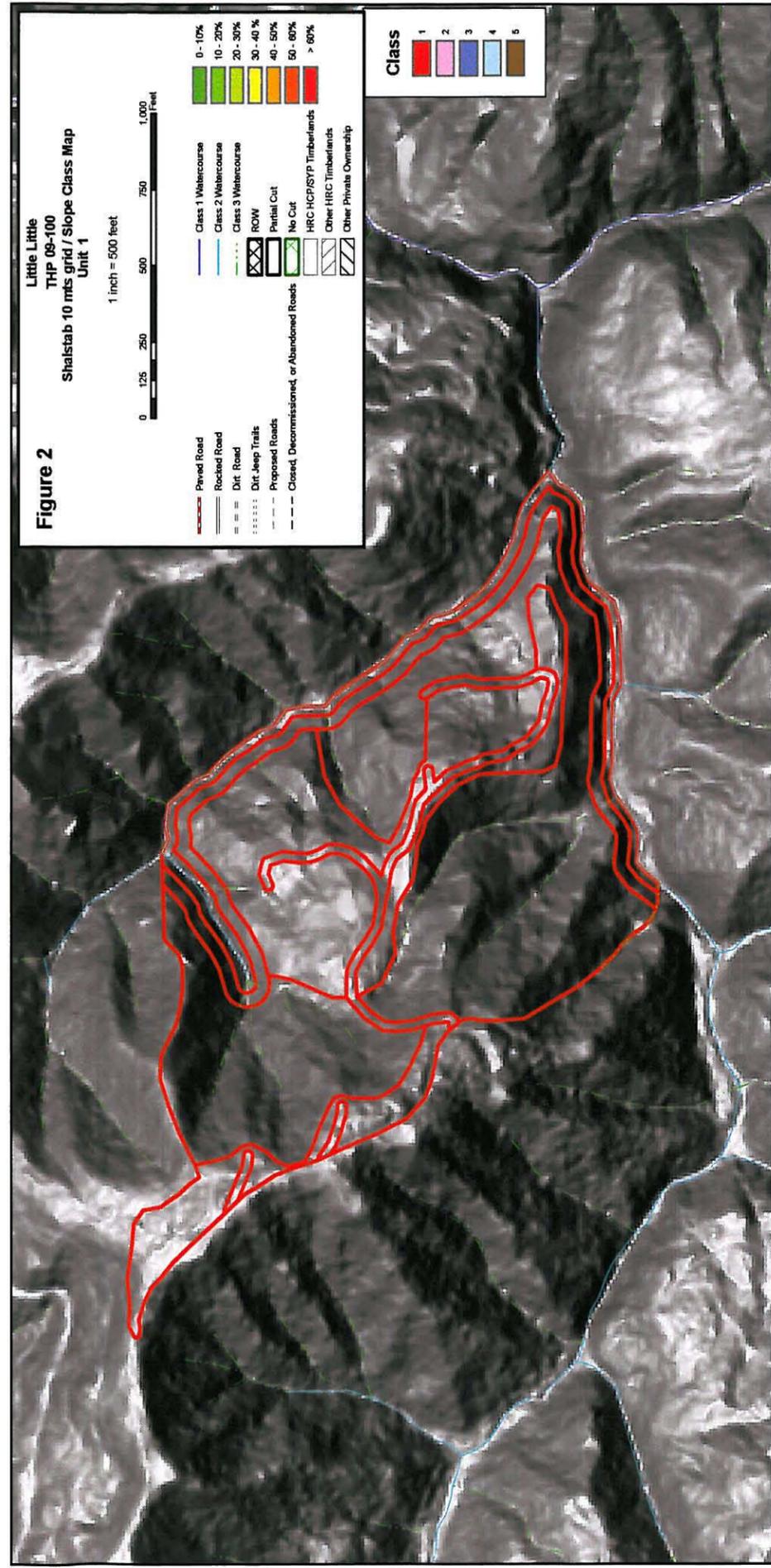
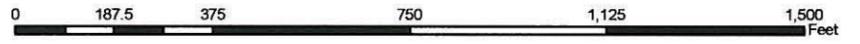


Figure 3

Little Little
THP 09-100
CGS Map Unit 1

1 inch = 350 feet



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

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

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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.

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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 drying cycles. Sandstone units are generally massive (no visible bedding) and contain detrital muscovite. Medium gray where fresh. Finer grained materials are often well bedded. The unit in this locality is mapped as dipping steeply to the northeast.

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

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

- HRC HCP/SYP Timberlands
- Other HRC Timberlands
- Other Private Ownership
- ROW
- Partial Cut
- No Cut
- Unit
- 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**
- CGS Freshwater structure**
- FEATURE**
- anticline, approx. loc.
 - fault, approx. loc.
 - fault, concealed
 - thrust fault, approx. loc.
 - thrust fault, concealed
 - thrust fault, queried
 - lineament
- CGS Freshwater lines**
- TYPE**
- HHHH lg
 - t
- CGS Freshwater LS**
- INIT_TYPE, ACTIVITY**
- df, h
 - ds, d
 - ds, h
 - ef, d
 - ef, h
 - rs, d
 - rs, h
 - dss,
- CGS Freshwater symbols**
- <all other values>**
- ACTIVITY**
- ah
 - d
- CGS Freshwater geology**
- UNIT**
- Q
 - Qfa?
 - Qrt
 - TWu
 - Twl
 - Ty
 - Kjfs
 - Kjfm
- CGS Freshwater contacts**
- CONTACT**
- approximately located
 - certain location
 - queried location

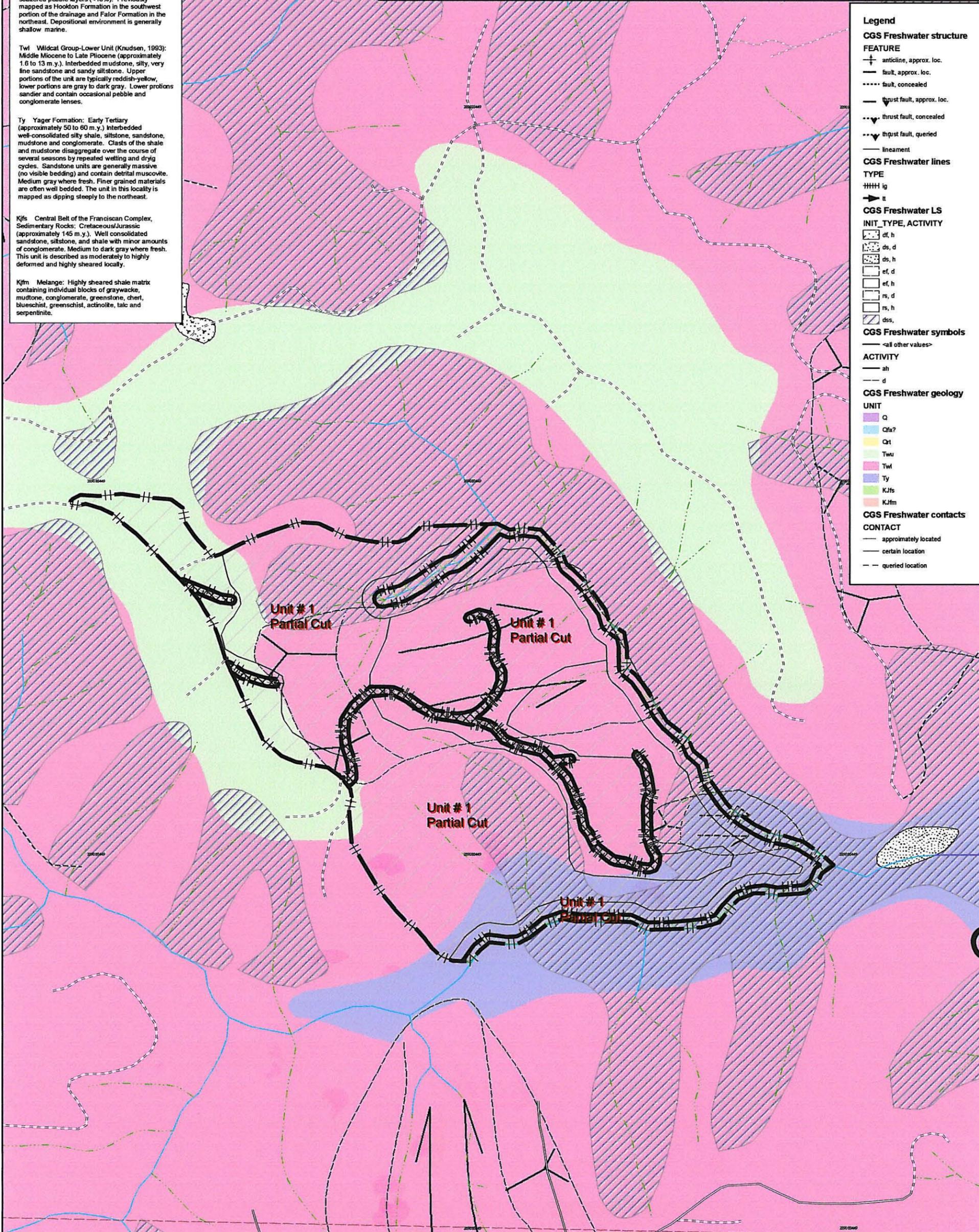


Figure 4

Little Little
THP 09-100
Mass Wasting Potential
Unit 1

1 inch = 350 feet



- | | | | |
|-------------------------|---------------------------|--|---|
| HRC HCP/SYP Timberlands | Class 1 Watercourse | Paved Road | Potential
Very Low
Low
Moderate
High
Very High
Extreme |
| Other HRC Timberlands | Class 2 Watercourse | Rocked Road | |
| Other Private Ownership | Class 3 Watercourse | Dirt Road | |
| ROW | DS & Amphitreatre / Slope | Dirt Jeep Trails | |
| Partial Cut | | Proposed Roads | |
| No Cut | | Closed, Decommissioned, or Abandoned Roads | |
| Unit | | | |

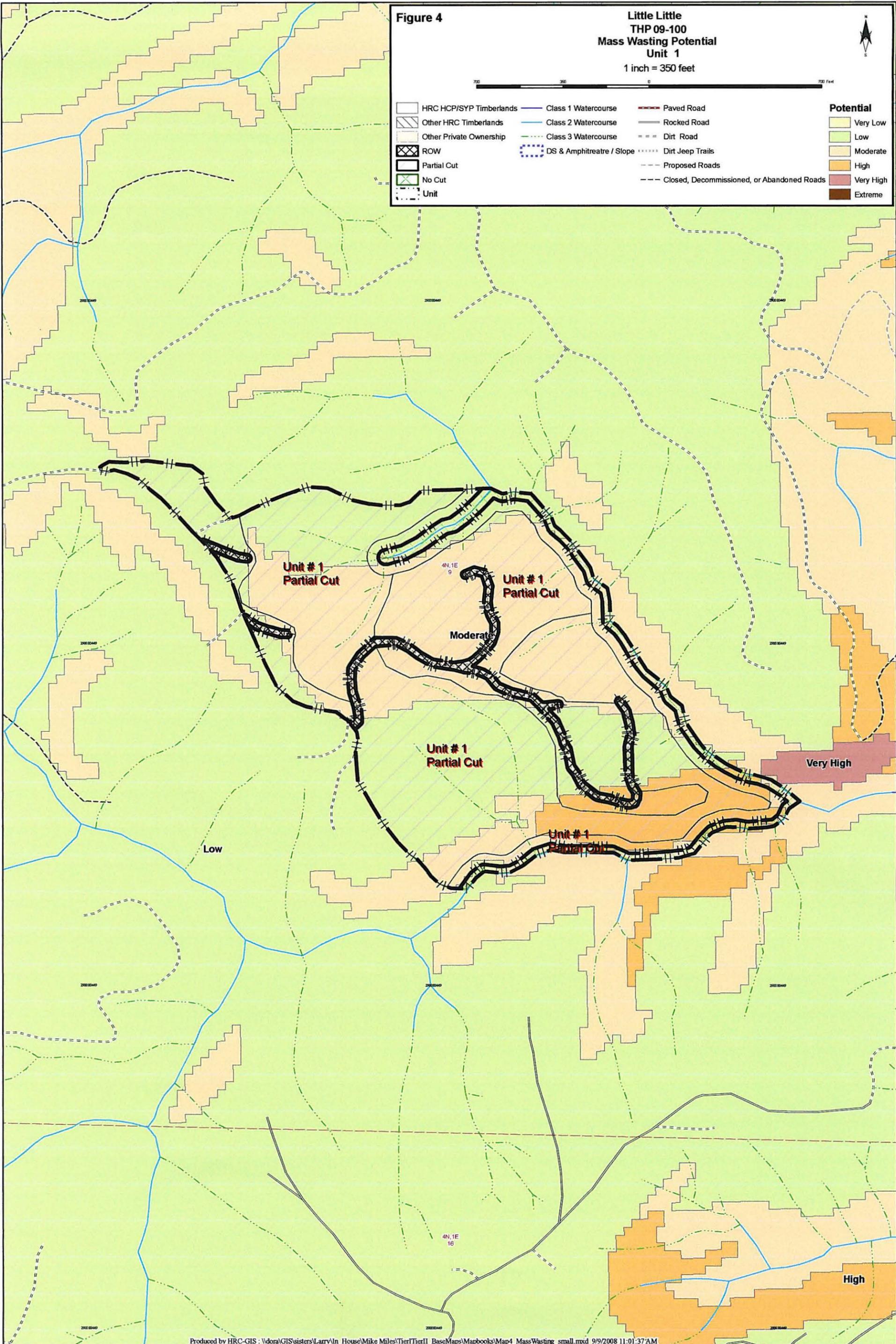


Figure 5

Little Little
THP 09-100
Aerial Photo Map - Unit 1



0 150 300 600 900 1200
Foot

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

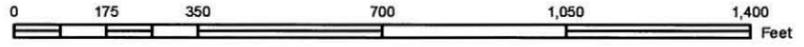


Figure 6

Little Little THP 09-100 Watershed Analysis Deep-Seated Landslide Inventory Unit 1



1 inch = 350 feet



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

- Crown of Deep-Seated Landslides
- ### Hazard for Reactivation or Acceleration of Movement REACT_HAZARD
- | | |
|--|-------------------------------------|
| | N/A (landslides in grassland areas) |
| | Very Low |
| | Low |
| | Low to Moderate |
| | Moderate |
| | High |

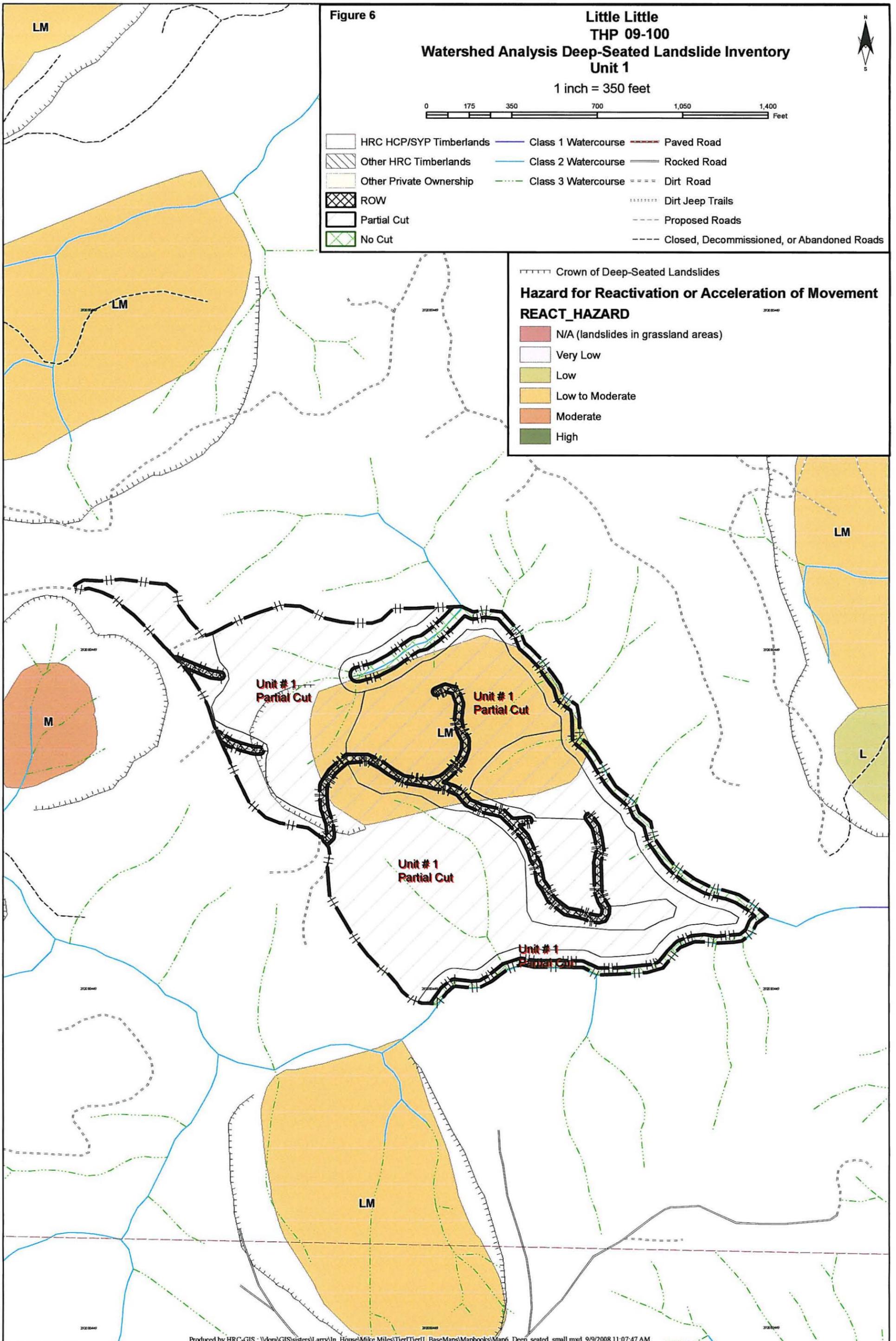


Figure 7

Little Little THP 09-100 Road Map

1 inch = 1,000 feet



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

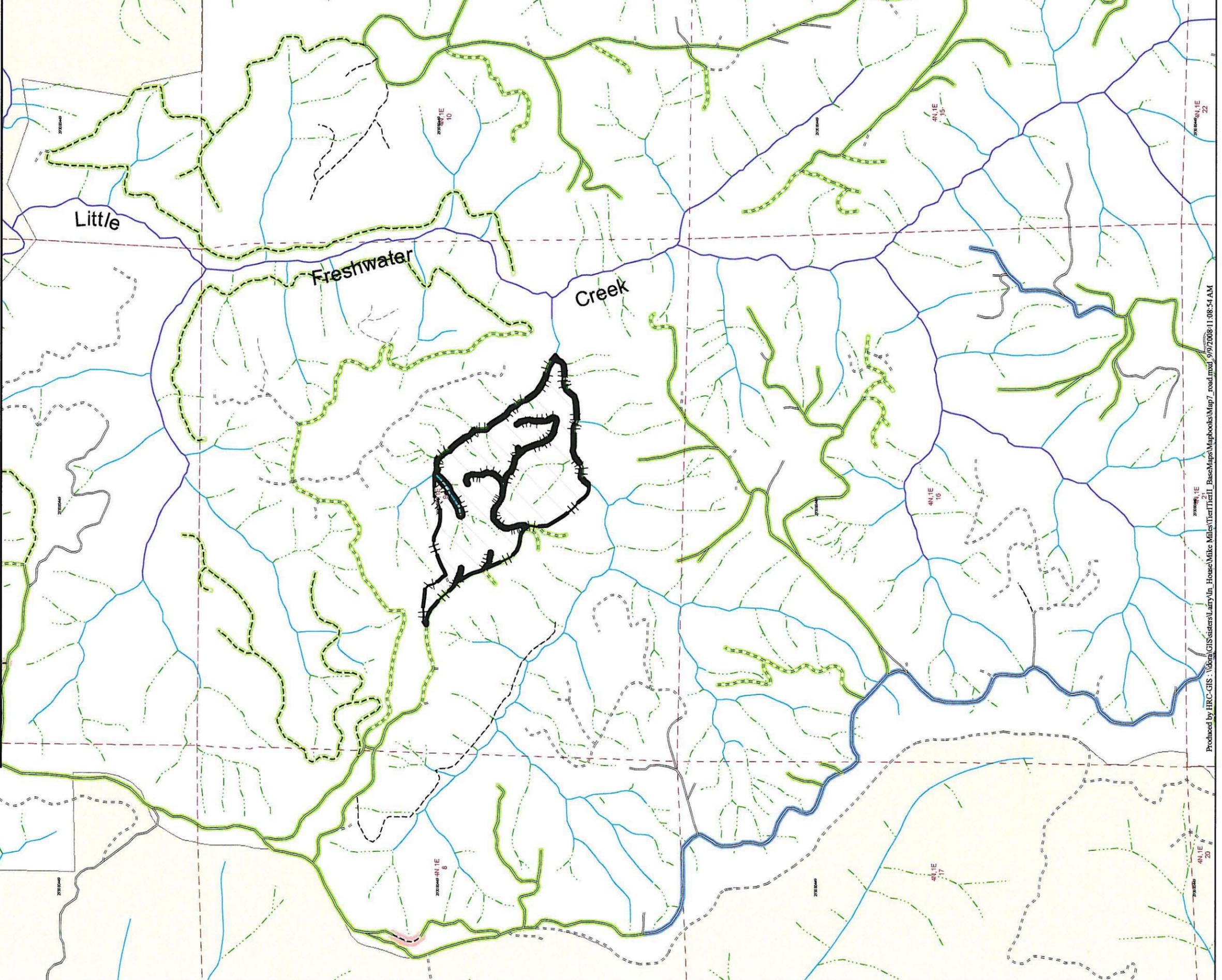


Figure 1

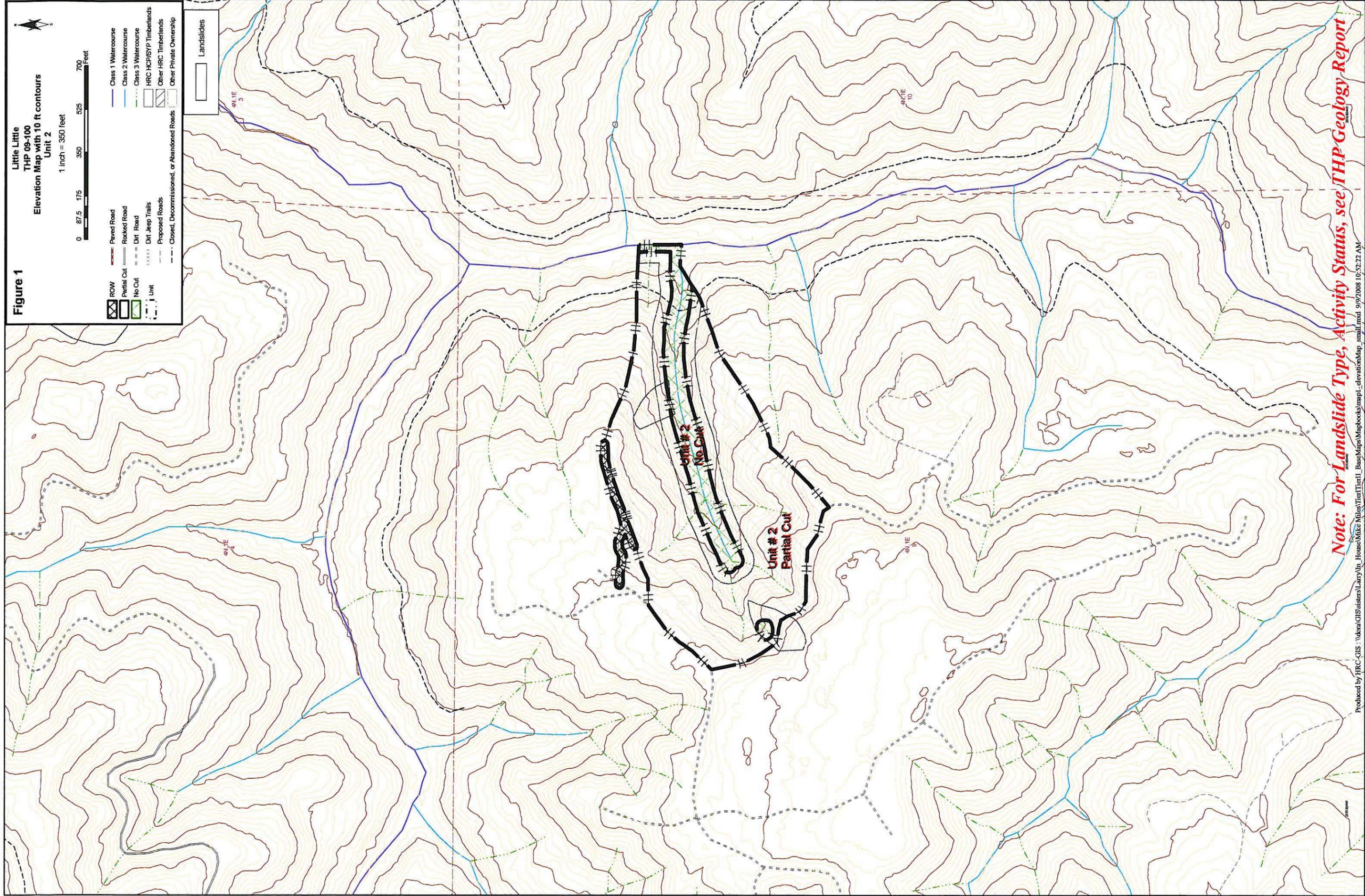
Little Little
THP 09-100
Elevation Map with 10 ft contours
Unit 2

1 inch = 350 feet



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

Landslides



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

Figure 2

Little Little
THP 09-100
Shalstab 10 mts grid / Slope Class Map
Unit 2

1 inch = 500 feet

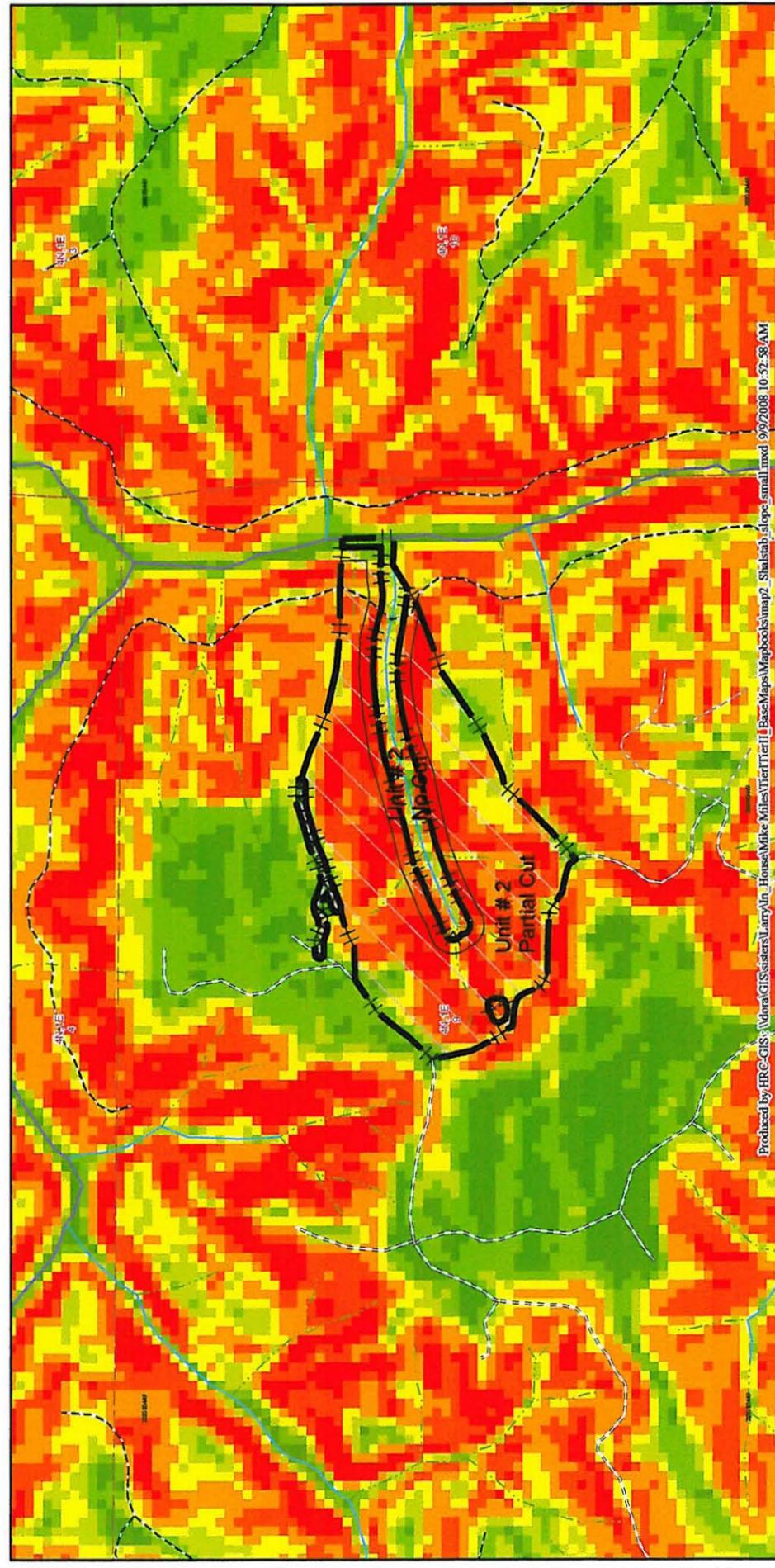
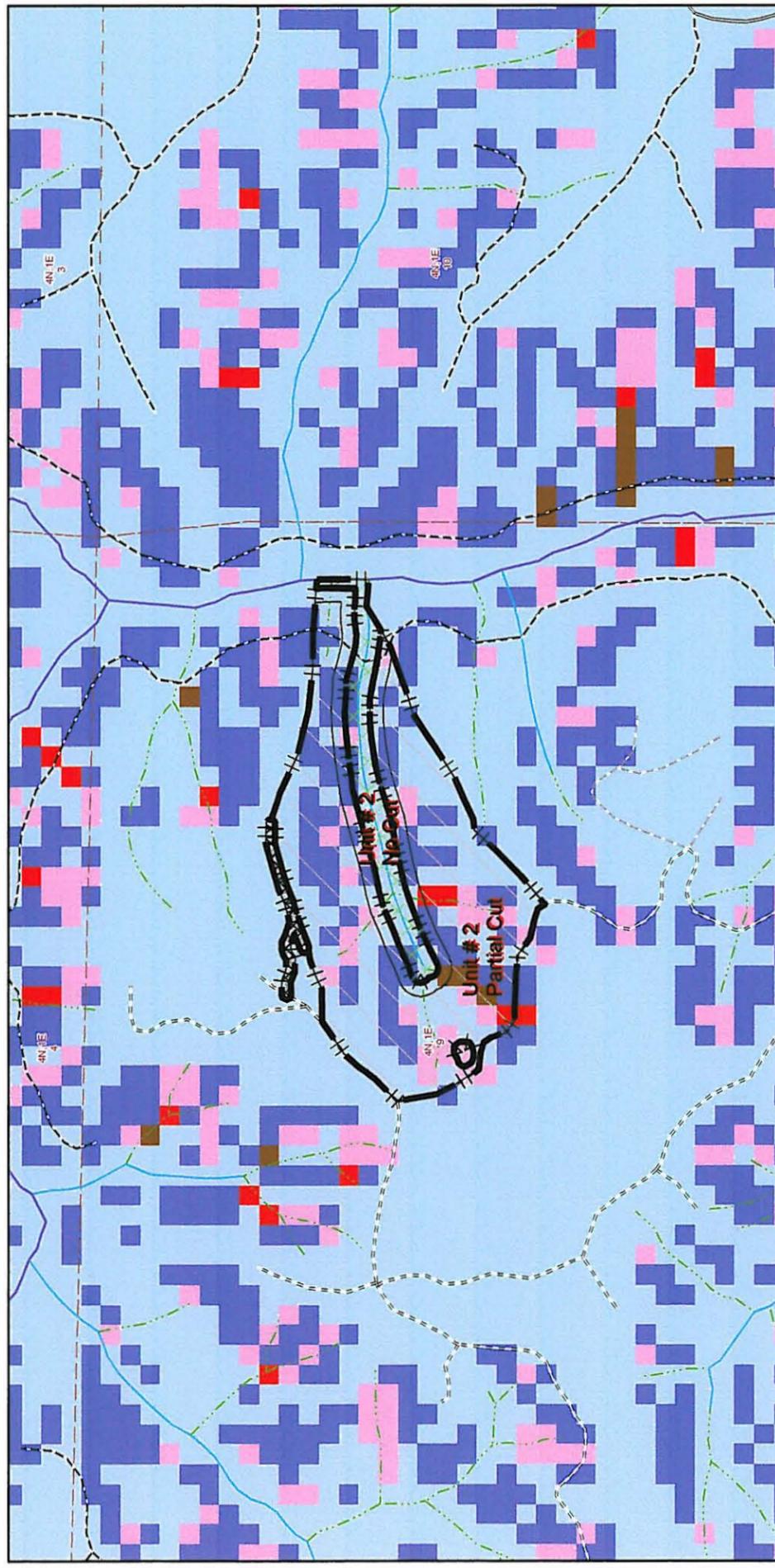
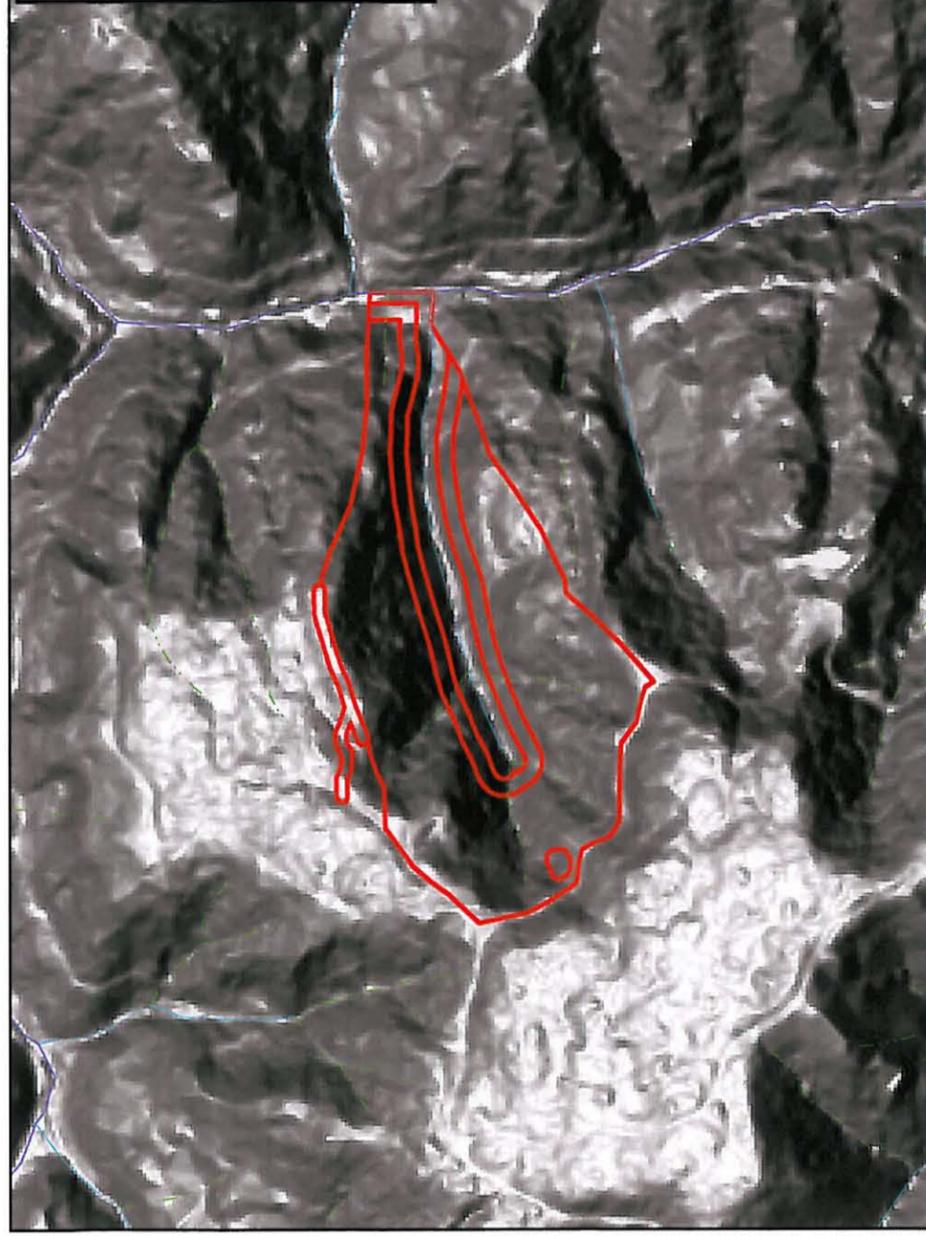
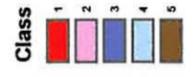
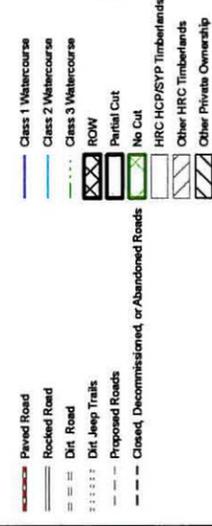
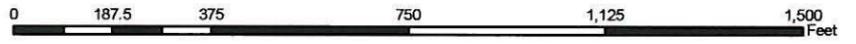


Figure 3

Little Little
THP 09-100
CGS Map Unit 2

1 inch = 350 feet



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

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- Legend**
- CGS Freshwater structure**
- FEATURE**
- anticline, approx. loc.
 - fault, approx. loc.
 - fault, concealed
 - thrust fault, approx. loc.
 - thrust fault, concealed
 - thrust fault, queried
 - lineament
- CGS Freshwater lines**
- TYPE**
- ig
 - ti
- CGS Freshwater LS**
- INIT_TYPE, ACTIVITY**
- df, h
 - ds, d
 - ds, h
 - ef, d
 - ef, h
 - rs, d
 - rs, h
 - dss
- CGS Freshwater symbols**
- <all other values>**
- ACTIVITY**
- ah
 - d
- CGS Freshwater geology**
- UNIT**
- Q
 - Qfa?
 - Qrt
 - TWu
 - Twl
 - Ty
 - Kjfs
 - Kjfm
- CGS Freshwater contacts**
- CONTACT**
- approximately located
 - certain location
 - queried location

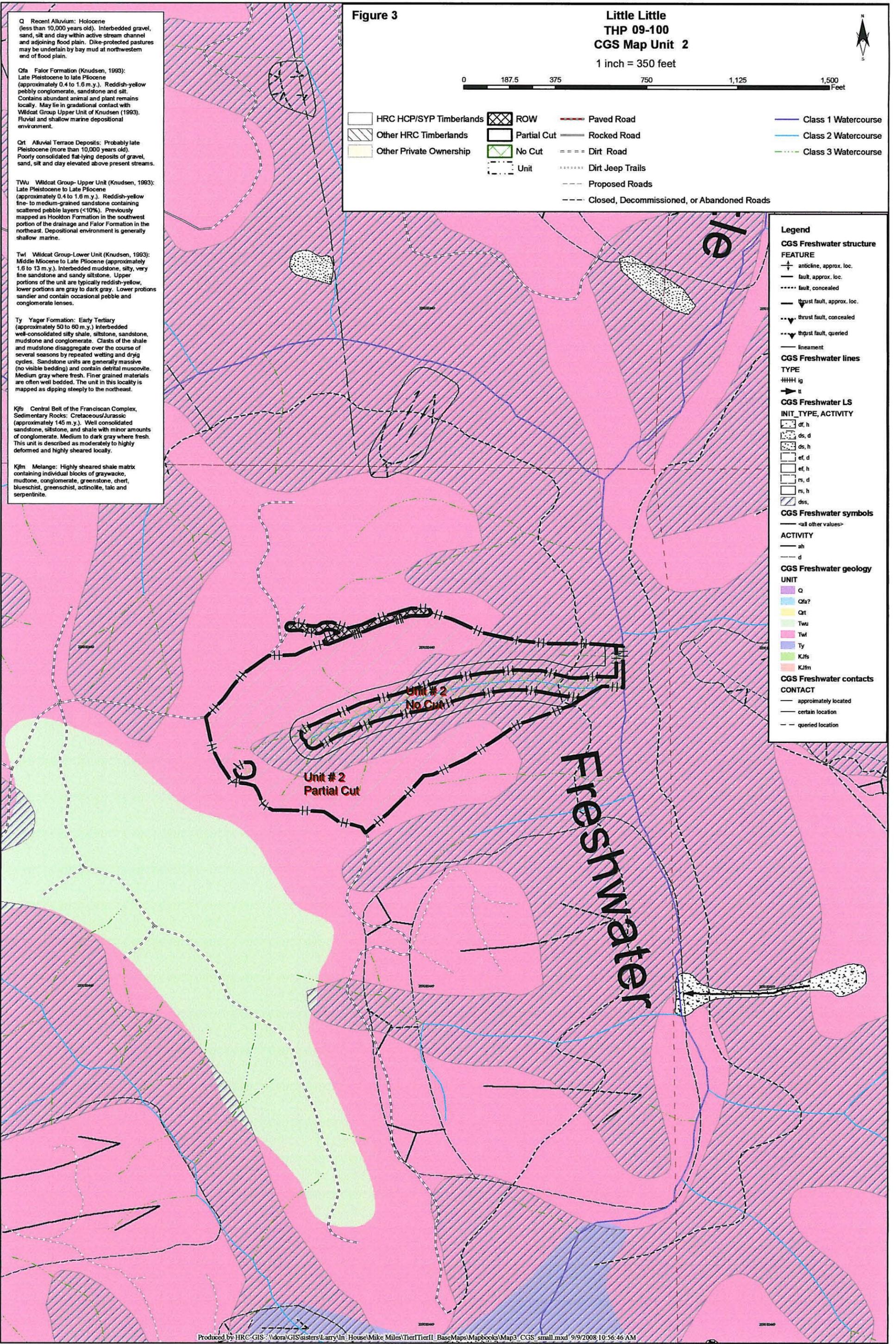


Figure 4

Little Little
THP 09-100
Mass Wasting Potential
Unit 2

1 inch = 350 feet



- | | | | |
|-------------------------|---------------------------|--|---|
| HRC HCP/SYP Timberlands | Class 1 Watercourse | Paved Road | Potential
Very Low
Low
Moderate
High
Very High
Extreme |
| Other HRC Timberlands | Class 2 Watercourse | Rocked Road | |
| Other Private Ownership | Class 3 Watercourse | Dirt Road | |
| ROW | DS & Amphitreatre / Slope | Dirt Jeep Trails | |
| Partial Cut | Proposed Roads | Closed, Decommissioned, or Abandoned Roads | |
| No Cut | Unit | | |

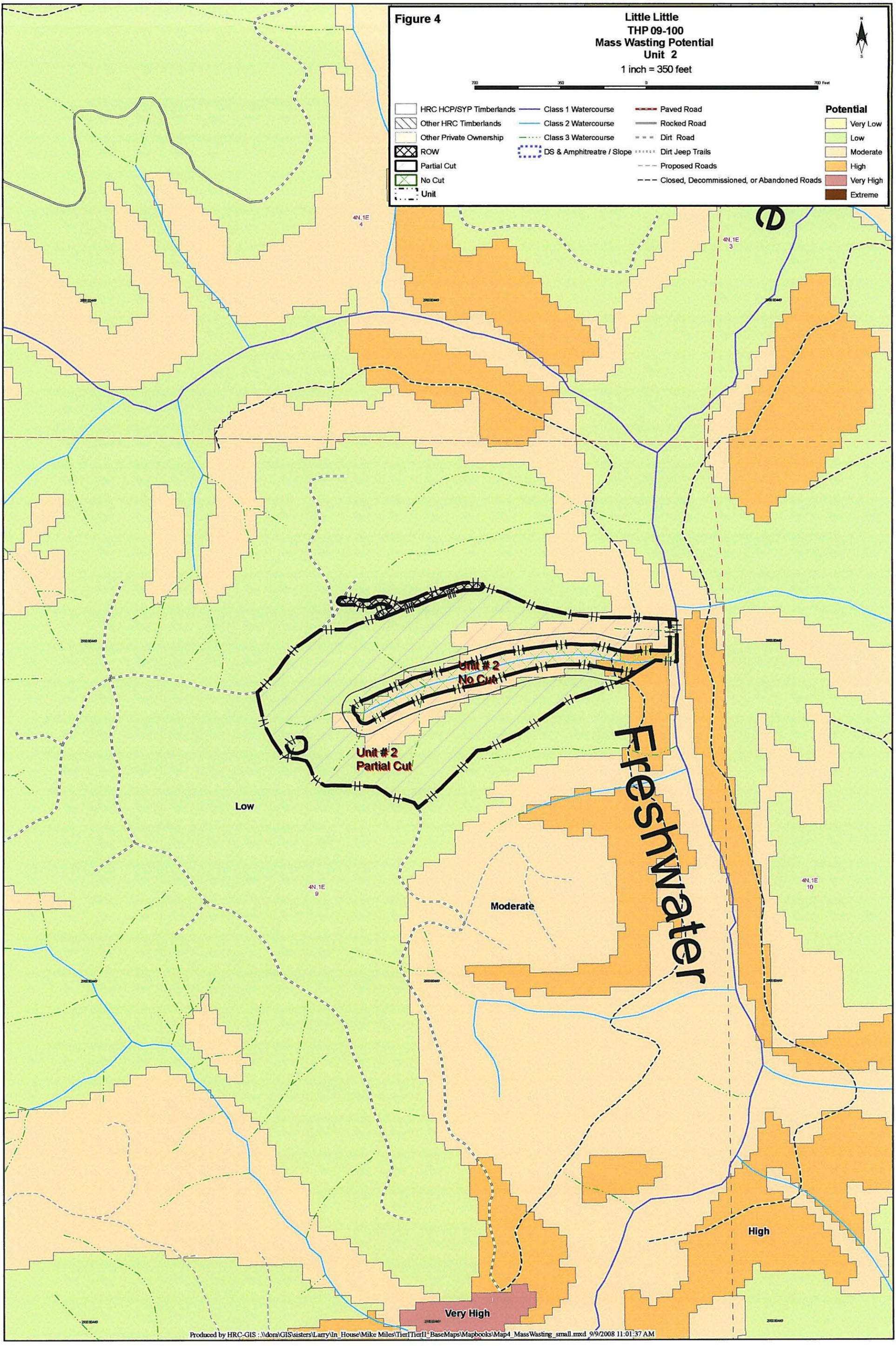


Figure 5

Little Little
THP 09-100
Aerial Photo Map - Unit 2

1 inch = 300,000 feet



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

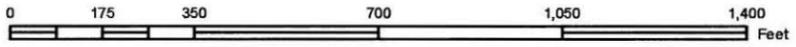


Figure 6

Little Little THP 09-100 Watershed Analysis Deep-Seated Landslide Inventory Unit 2



1 inch = 350 feet



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

- Crown of Deep-Seated Landslides
- Hazard for Reactivation or Acceleration of Movement**
REACT_HAZARD
- N/A (landslides in grassland areas)
 - Very Low
 - Low
 - Low to Moderate
 - Moderate
 - High

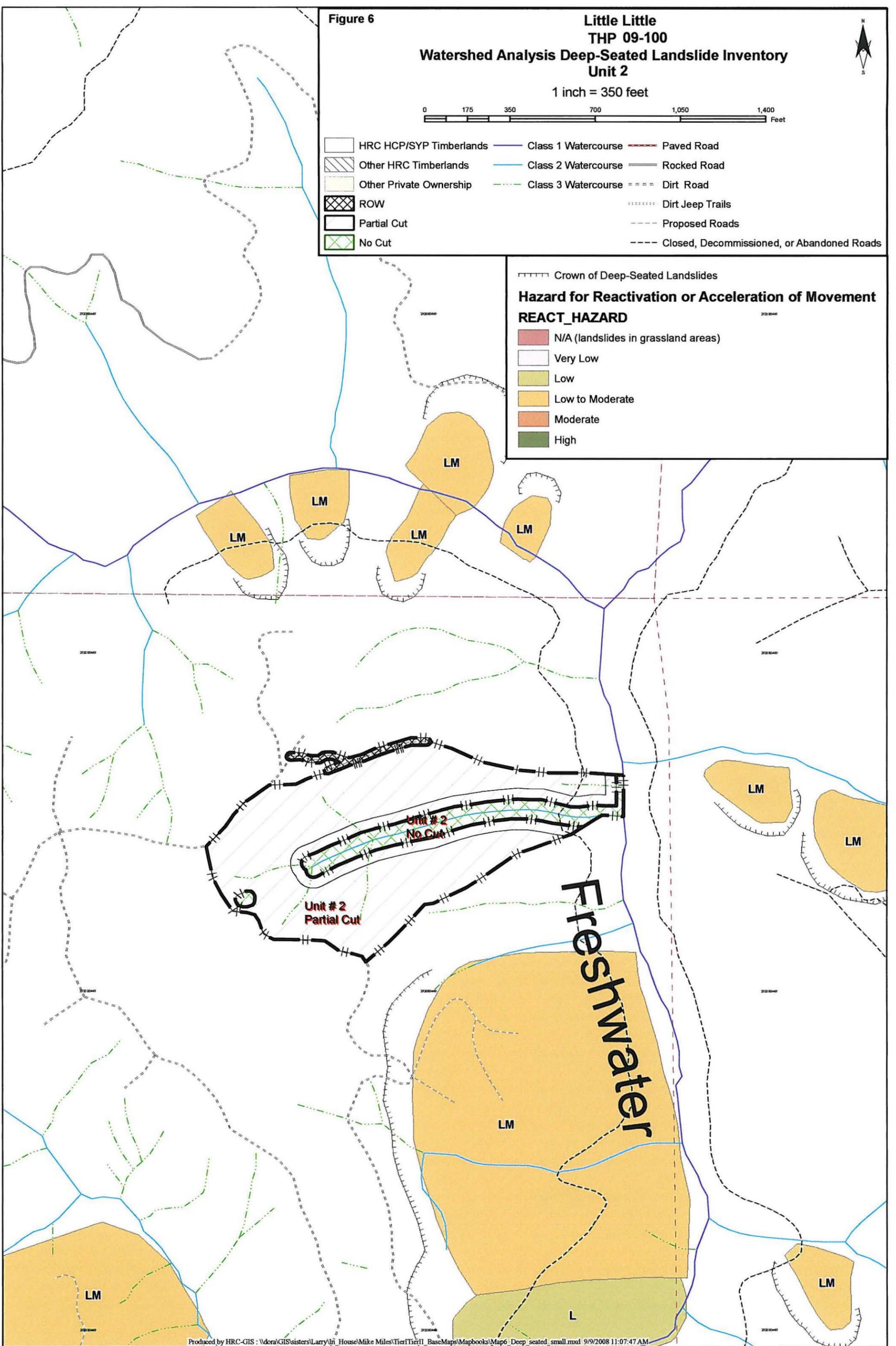


Figure 7

Little Little
THP 09-100
Road Map
1 inch = 1,000 feet



- | | | | |
|-------------------------|--|----------------|----------------|
| 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 | Decommissioned |
| ROW | Dirt Jeep Trails | Proposed Roads | |
| Partial Cut | Closed, Decommissioned, or Abandoned Roads | | |
| No Cut | | | |

