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June 9<sup>th</sup>, 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 1-09-108 HUM (Unit 2) in the Elk River WWDR, "Tier II"

Dear: Ms. Kuhlman

HRC is requesting Tier II enrollment under Watershed-Wide Waste Discharge Requirement (WWDR) Order No. R1-2006-0039 for unit 2 of THP 1-09-108 HUM. This Tier II portion of the unit is comprised of 41.9 acres of selection (21.0 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 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.

Unit 2 of the South Elk Ridge THP is located on moderate to gently inclined slopes extending from midslope elevations down to an adjacent landowner. The underlying geology is undifferentiated Wildcat Group which is comprised of silts, clays, and sands in varying stages of consolidation. Legacy harvest practices included clearcut harvesting of the entire area and ground based skidding of the felled old growth timber. The mass wasting response to this aggressive method appears to be limited to two landslides. This harvest proposes a cable yarded / tractor long-line option single tree selection with a retention standard that meets 60% canopy closure post harvest. Overall, we anticipate the harvesting of about 1/3 of the stand. Based on the limited amount of harvest, the adoption of yarding methods that result in minimal surface disruption and the limited response to mass wasting following significant impacts, we consider this unit appropriate for Tier 2 enrollment.

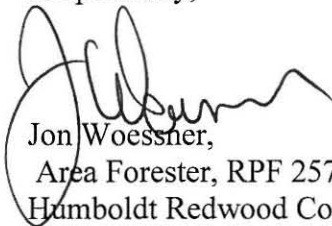
The THP proposes an uneven-age silviculture retaining 75 sq.ft. of basal area. The post harvest stand will more than likely exceed this standard in order to comply with the NSO HRA standards. The

entire unit is a habitat retention area for a level 1 nso. 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 yarding are 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,

A handwritten signature in black ink, appearing to read 'Jon Woessner', is written over a circular stamp or seal.

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

**THP: South Elk Ridge    THP 09-108    Unit # 2            June 9, 2010**

<b>Tools Used in This Assessment</b>	<b>Figure Number</b>
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:**

<b>Geologic Review</b>	<b>Forestry Silviculture/Site Prep Plan</b>	<b>Operational Design Plan</b>
2-1	<p>THP approved silviculture within polygon 2-1 is single tree selection, consistent with Habitat Retention Areas for the Northern Spotted Owl.</p> <p>No site preparation will occur due to partial harvesting.</p>	<p>The approved THP proposes cable and tractor long-line yarding within polygon 2-1.</p> <p>No change to approved yarding methods.</p>

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

Unit 2 occupies a Habitat Retention Area for the Northern Spotted Owl. As such, where outside of the current owl center, the proposed harvest is single tree selection with a post-harvest canopy closure of 60%. A significant no harvest area is located central to the unit and is mitigation for the owl center.

The unit is located mid to low slope in position. The overall slope morphology is irregular with broad gently inclined benches interrupted by more steeply inclined planar slopes. Watercourse incision varies from moderate to well considering the typically gentle slopes crossed by the low power creeks.

The southern boundary of the unit is boarded by Headwaters Reserve land. This area is also more steeply inclined and appears to be in response to Elk River downcutting through time.

Figure 3 shows the unit to be underlain by undifferentiated Wildcat Group sediments. These sediments are composed of silts, sands, clays, and infrequent gravels that are moderately to well consolidated. Figure 3 essentially maps the entire unit to be underlain by a dormant mature rock slide. The scarp occupies approximately 1/3 of the unit.

Figure 6 is consistent with the near-unit sized dormant mature rock slide mapping. Figure 6 also shows the eastern portion of the unit within the right lateral margin of a Rotational / Translational / Earthflow.

Figure 2 (Hillslope shade) reveals shadows indicative of very old and dormant deep seated mass wasting consistent with Figure 3 and 6. The shadows also show significant watercourse channel incision through the inferred scarps and steep toe slopes adjacent Elk River. This provides evidence of the dormant activity classification.

The THP included a Note 45 Geology report to address several unstable areas within the THP. The report identified two unstable areas within Unit 2 and debris slide slopes downslope and outside of the unit. For a more comprehensive review of the geology associated with this harvest unit, please see the report in Section 5 of the THP.

The area has been previously clearcut and ground-based logged with bulldozers. Significant ground disturbance is observable throughout the unit in response to past harvest practices. The unit has been addressed as one polygon.



**THP Unit: # 2****Polygon: 2-1****A) General Observations**

The entire unit is to be enrolled as Tier II acres.

The unit includes one short Class II watercourse along the western boundary and a long branching Class II central to the unit. Several Class III watercourses are also located within the unit.

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. For this unit, the entire Class II RMZ has been established as a no harvest zone.

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 50' RMZ has been established and maintaining 75 sq. ft (or the unit wide retention standard if greater) evenly distributed in the buffer. Where side slopes are less than 50% employ a 25' RMZ that maintains 75 sq. ft (or the unit wide retention standard if greater) evenly distributed in the buffer and no group opening greater than ¼ acre immediately above the terminus of class III with slopes greater than 40% or immediately above a headwall swale. 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.

SHALSTAB modeling (Figure 2) highlights convergent slopes consistent with the lateral margins of the dormant mature rock slide central to the unit (Figure 3). The highest value modeled is 2. A western association of Value 2 shalstab is located across a forking Class III watercourse. This area is also landslide G4. As modeled, we would expect the Shalstab to identify the main scarp of the dormant historic to active block glide. The scarp area is essentially a no harvest due to recent windthrow and a deficiency in canopy. A patch of Value 2 shalstab is mapped encompassing a short length Class III watercourse along the southern boundary of the unit. The watercourse crosses the steeply inclined slopes carved by years of Elk River flow. The area is well vegetated mature 2<sup>nd</sup> growth redwood trees, insitu old growth stumps, and is currently within a no harvest zone for the NSPO. Additional Value 2 shalstab located adjacent a watercourse is located adjacent the eastern harvest boundary. Three pixels are oriented parallel to the watercourse and intersect the watercourse. The area is moderately inclined, albeit moderately convergent but well vegetated with mature 2<sup>nd</sup> growth redwood and includes insitu old growth stumps. Legacy skid roads also cross through the area. We found no indication of potential instability. The 60% canopy closure retention standard will result in the harvest of about 1/3 of the existing stand. Based on our review of the proposed activities, we found no

A) General Observations

indications that greater than 60% canopy closure would be needed.

Mass Wasting Potential (MWP) modeling for the unit includes low with two areas of moderate.

In addition to landslide G-4, the project geologist identified landslide 2-1. The landslide is an active-suspended translational landslide complex located essentially atop the right bank of a Class II watercourse. The RMZ for the Class II watercourse has been expanded to include the landslide within a no harvest zone.

B) Harvest Related Impacts and Hillslope Sensitivity

Significant surface disturbance has occurred within the unit in response to past logging activities. The disturbance is the culmination of road and layout construction. Following that impact, the area appears to have adjusted through minor slumping and settling.

The degree of mass wasting placed sediment within the watercourses appears insignificant when compared to the construction of roads and crossings within the channels.

Current planned operations will result in less ground disturbance than previous operations and are unlikely to increase 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 to the whole unit.

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 cable with a ground based long-line option. As delineated, the proposed yarding methods appear 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](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.

Table 1. Proposed 2010 Harvest in South Fork Elk River.

THP Name	THP Number	Unit Number	Silviculture					Hazard <sup>2</sup>		
			CC	ROW	Disp VR	SHR	SEL	CC Equivalent	Low	High
Tom Collins	07-189	5				187	0.0	140.3	185	2
Tom Collins	07-189	1					4.9	2.5	4.9	0
Tom Collins	07-189	2					24	12.0	24	0
Tom Collins	07-189	3					5.3	2.7	5.3	0
Tom Collins	07-189	4					2.3	1.2	2.3	0
South elk ridge	09-108	3					10.2	5.1	4.5	5.7
South elk ridge	09-108	2*					41.9	21.0	48.6	0
South elk ridge	09-108	1a					55.6	27.8	55.6	0
South elk ridge	09-108	1b					8.8	4.4	8.8	0
South elk ridge	09-108	1c					11.5	5.8	3.8	7.7
South elk ridge	09-108	4		1.6			45.7	24.1	37.0	10.3


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

THP Name	THP Number	Unit Number	Yarding System			Site Preparation	
			Ground Based	Yarder	Helicopter	Mechanical	Broadcast
Tom Collins	07-189	5	145.6	40.4			
Tom Collins	07-189	1	4.9				
Tom Collins	07-189	2	24				
Tom Collins	07-189	3	5.3				
Tom Collins	07-189	4	2.3				
South elk ridge	09-108	3		10.3			
South elk ridge	09-108	2		41.9			
South elk ridge	09-108	1a	55.6				
South elk ridge	09-108	1b		8.8			
South elk ridge	09-108	1c		11.5			
South elk ridge	09-108	4	33.8	18.92			



## Professional Certification of Design

I, Tagg Nordstrom, P.G. 7950, 6/9/10,  
Name license # Date

  
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. 1-09-108 HUM (South Elk Ridge) Unit # 2

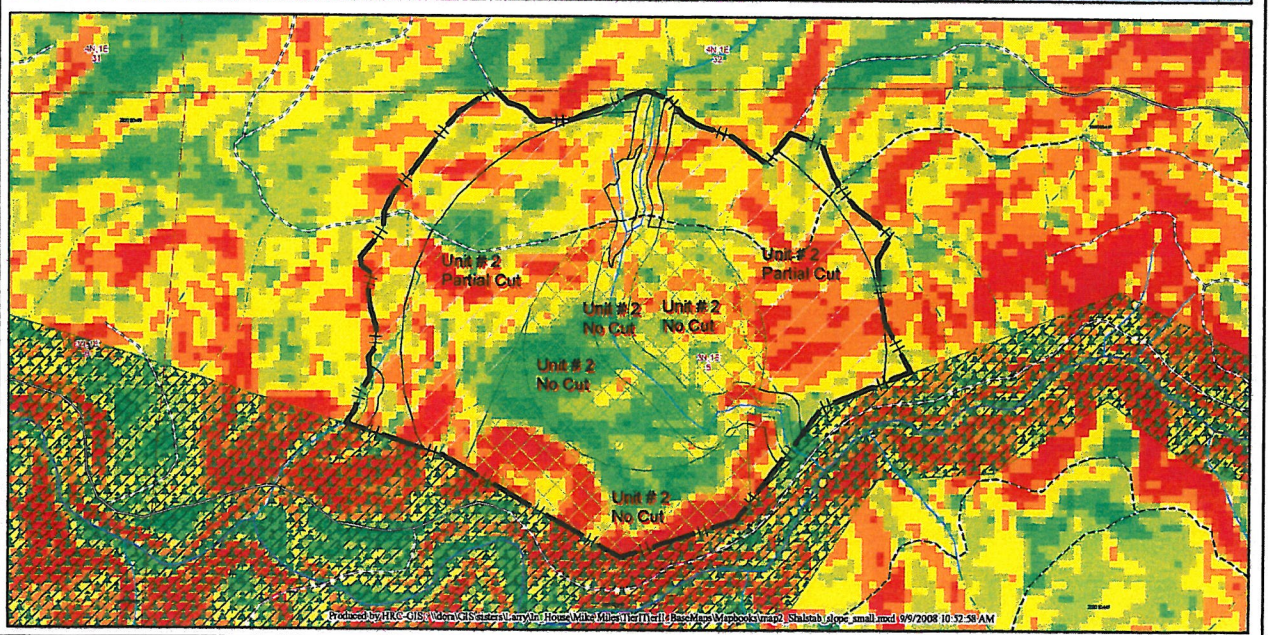
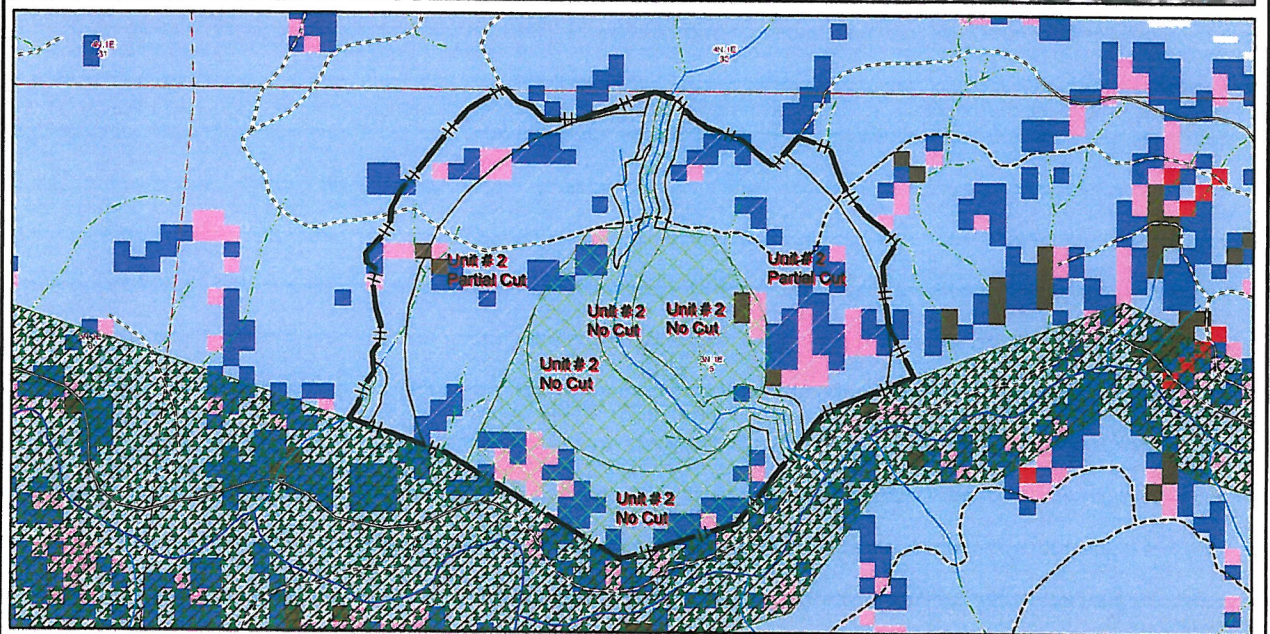
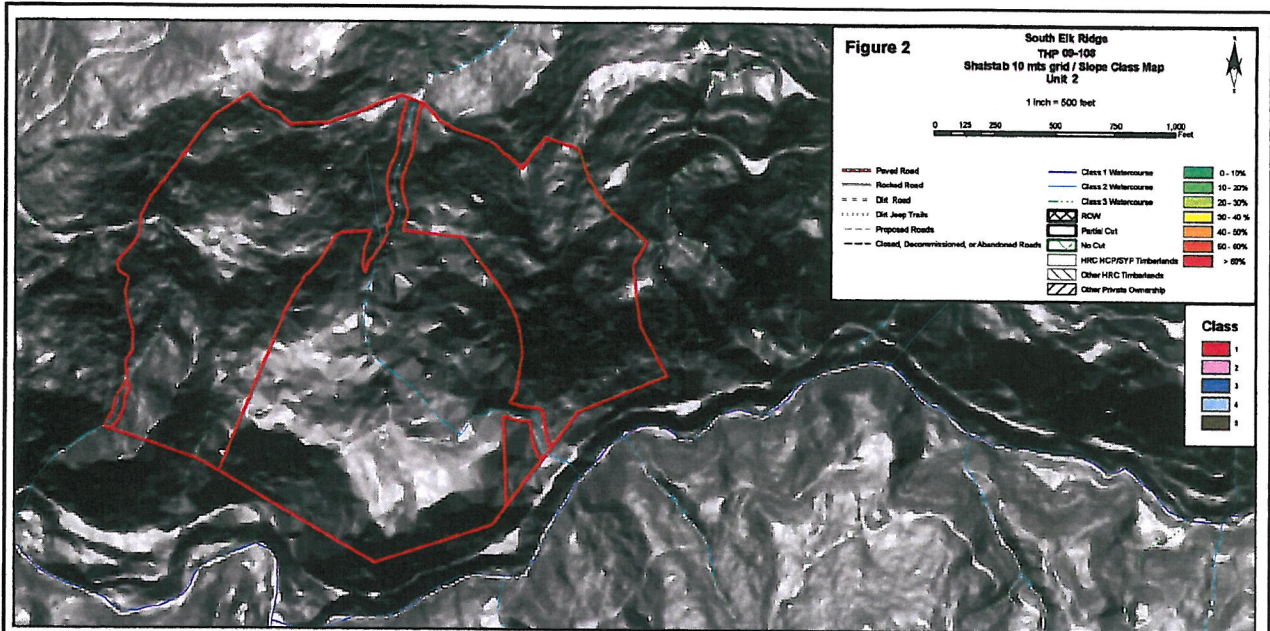
- a. are in accordance with accepted practices, and recognized professional standards;
- b. comply with the requirements of the Monitoring and Reporting Program No. R1-2008-0071, approved by the Executive Officer of the North Coast Regional Water Quality Control Board; and
- c. provided that the THP 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.

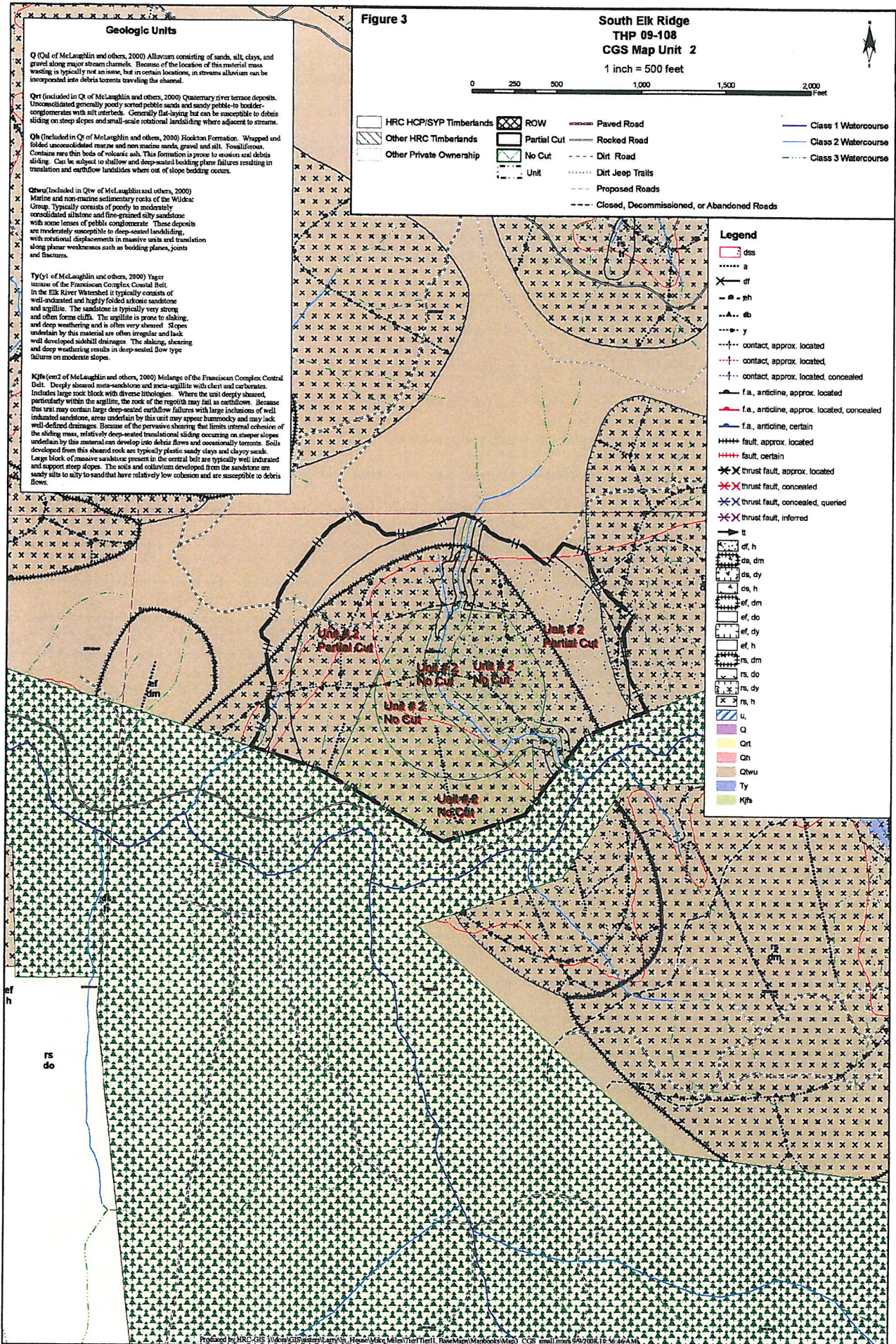












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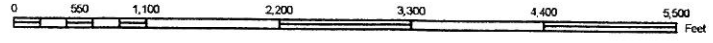
Figure 7

### South Elk Ridge

THP 09-108

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                  |  |                |                |

