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March 12, 2009

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 1-05-123 HUM (Unit 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 unit 2 of THP 1-05-123 HUM. This unit is comprised of 31.5 acres of Selection (15.8 clear-cut equivalent acres). Total acres currently enrolled or proposed for enrollment under Order No. R1-2006-0041 Tier II is shown in the Attached Pre-Harvest Planning Report provided by Forester, Mr. Wayne Rice. 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.

In summary the Unit occupies interfluvial ridges upslope of Class II watercourses. The unit is underlain by the lower unit of the Wildcat Group. The young sedimentary rock is comprised of moderate to well consolidated silts, clay, and sands, with infrequent lenses of gravels. Hillslope weathering appears uniform throughout. One area was removed from harvest as a result of Tier 2 review. The area measures about 6.75 acres and is currently vegetated with dense brush and infrequent merchantable timber. This area was removed due to limited viability with respect to the harvest and the expressed unique ground disturbance. No other modifications were made in response to tier II review. Based on our review, the limited mass wasting observed in this unit suggests that aggressive, turn of the century logging did not strongly influence mass wasting. What is proposed under this enrollment is an amended selection harvest that will retain 100 ft² of basal area per acre with HCP implemented Class II Riparian Management Zones (RMZ) and a Forester implemented Class III RMZ. This harvest is considered by us to represent a fraction of the potential impacts that

occurred in response to the initial harvest. We consider the proposed harvest consistent with the requirements for Tier II enrollment.

The THP proposes an uneven-age silviculture retaining 100 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 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 R1-2006-0041 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,



Wayne D. Rice,
RPF
Humboldt Redwood Company, LLC

Attachments:

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

Professional Certification of Design

I, Tagg S. Nordstrom, P.G. 7950, 3/12/09,
Signature license # Date



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. 1-05-123 HUM (Mid Incline) 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. R1-2006-0103, 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: Mid Incline THP 05-123 Unit # 2 3-10-09

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, 1999)	3
Mass Wasting Potential Map (HRC, 1999)	4
Aerial Photo Map (HRC, 2007)	5
HRC Freshwater WA deep-seated LS inventory (HRC, 2001)	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
2-1	<p>For reasons other than slope stability hazard, silviculture is now group selection.</p> <p>Removed an ~6.75 acre area from harvest due to low conifer component and irregular ground surface.</p> <p>No site preparation will occur due to</p>	No change to approved yarding methods.

	partial harvesting.	
2-2	<p>For reasons other than slope stability hazard, silviculture is now group selection.</p> <p>No site preparation will occur due to partial harvesting.</p> <p>Designated 'no-harvest' area that encompasses ~8.7 acres currently vegetated with brush and includes four Class III watercourses.</p>	No change to approved yarding methods.

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

The harvest unit occupies a west-facing ridge that is predominantly underlain by the lower unit of the Wildcat Group. A small portion of the unit in the east may be underlain by Mélange of the Central Belt within the Franciscan Complex. The contact is mapped as a fault (figure 3). Debris slide slopes are mapped within the unit (figure 3).

Watershed Analysis mapping (Figure 6) shows one low to moderate hazard deep-seated landslide located in the southwestern portion of the unit. Approximately ½ of the landslide is located within the unit. It is within an area that has been excluded from harvest.

Review of Figure 2 (Hillslope Shade) shows a texture correlation consistent with the mapped geologies. The Lower Unit of the Wildcat Group appears as smooth rounded slopes with apparent uniform weathering. The areas mapped as mélange appear smooth but include an irregular surface exposing the many erratics common to mélange. The prominent watercourses appear well entrenched and include long flanking slopes. The watershed analysis mapped low to moderate deep-seated landslide is marginally observable.

Geologic review during THP layout did not find any active or potential unstable areas. The THP was reviewed by various agencies during PHI and found to be compliant with the Forest Practice Rules with respect to the disclosure of all known unstable areas. The reviewing agencies were not concerned about harvesting timber atop the low to moderate hazard deep seated landslide mapped within the unit. Since

that time this area has been removed from harvest due to low conifer volumes.

The THP was developed and assessed with respect to clearcut silviculture. New management has amended the silviculture to selection with a target retention of 100 square feet of basal area. The harvest requires the construction of new ridge top roads to accommodate the proposed yarding methods.

The harvest unit has been broken into to two polygons for discussion purposes. The polygon designation essentially differentiates northward draining slopes from southward draining slopes.

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

The polygon occupies all slope form classes (planar, convergent, divergent, and irregular) with inclinations that vary from flat to over 60%. The slopes exceeding 50% typically define the flanking slopes of watercourses and are north-facing.

The polygon includes a well entrenched Class II basin adjacent the eastern boundary of the polygon (1a). The Class II extends about 750 feet into the unit, includes seven Class III tributaries and drains approximately 15 acres.

The well entrenched Class II sub-basin is flanked from the south by predominantly 40 to 50% inclined, planar to concave slopes. The slopes appear smooth with limited incision of the numerous Class III and single Class II tributaries. Slopes in excess of 50% are scattered in distribution, limited in acreage, and appear to correlate with the subtle interfluvial ridges upslope of the watercourses. Two areas of elevated SHALSTAB (Value 2) are located atop the southern flanking slopes of the basin. Both are individual pixels located at the mapped heads of Class III watercourses, however, the geomorphic expression of the corresponding channels extend upslope beyond the watercourse termination point. No specific protection was afforded the two areas of elevated SHALSTAB during THP development, other than the exclusion of ground-based yarding operations. The downslope Class II watercourse is buffered with a 30-foot no harvest inner band and an outerband that extends to 75/100 feet. Harvest is permitted within the out band where 60% canopy closure can be retained. Our field review of the SHALSTAB areas revealed moderately inclined swales, distributed old growth stumps and abundant 2nd growth timber. The watercourses did not reveal extensive erosion, undercutting, or anything suggesting that fluvial erosion was decreasing slope stability.

A) General Observations

The multiple Class III watercourses that drain to the Class II sub-basin (1a) are typically short in length and terminate well before the ridgetop.

A second Class II watercourse (1b) extends about 150 feet into the polygon from the northwestern edge of the unit. The Class II transitions to a forked Class III watercourse that extends about 150 feet further upslope. The watercourses drain approximately 5.5 acres. The watercourses are flanked by broadly convergent slopes inclined about 40 to 50 %. A short segment of slopes measuring 50 to 60% are located along the left bank of the Class II watercourse. The slopes are located within the outerband of the Class II RMZ and are approved for a harvest that will retain 60% canopy closure.

Debris slide slopes are mapped (Figure 3) along the northern boundary as encompassing the south forking Class II watercourse (1c). Review of the slope map (Figure 2) shows the area to be inclined between 40 and 60%. No unstable areas including any evidence of previous landslide activity was observed in this area during THP development or the subsequent Tier 2 field investigation. Of note, a significant portion of this area is within the Class II watercourse RMZ.

Debris slide slopes are also mapped along the right flanking slopes of the western Class II watercourse (1b). These slopes are inclined 20 to 60%.

The location of SHALSTAB modeled moderate rating is not consistent with CGS mapped debris slide slopes.

Mass Wasting Potential modeled for the unit is predominantly low (Figure 4). Segments of moderate mass wasting potential are modeled coincident with the more steeply inclined slopes. These slopes include the left bank of the eastern Class II sub-basin (1a), a few portions of the right bank of the same watercourse, and the flanking slopes of the western Class II watercourse (1b).

No unstable areas were recorded during THP layout.

The stand is predominantly redwood and fir. The original harvest was ground based and apparently yarded to the ridge top. Old yarder roads and extensive large woody debris can be observed within the polygon.

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. The new silviculture has bolstered Class III mitigations to include a 50' RMZ where side slopes greater than 50% exist and maintaining 75 sq. ft evenly distributed in the buffer. Where side slopes are less than 50% employ a 25' RMZ that maintains 75 sq. ft 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.

The stand includes fir and redwood trees, typically in a dense stand.

B) Harvest Related Impacts and Hillslope Sensitivity

The lack of observed landslides or other evidence of instability (i.e. leaning trees, scarps, tension cracks, exposed soils, disrupted ground) within the proposed operational portions of the unit, including in the two areas of elevated SHALSTAB and CGS mapped potential debris slide slopes, suggest that past ground-based logging activities did not exceed slope stability thresholds. The slope has experienced clearcut, burning and donkey yarding (a legacy method that dragged the large diameter, felled timber to railroads).

Regionally, the catchment areas for the corresponding watercourses are low; and do not appear significantly altered by past ground disturbance. Often, extensive road construction in the form of skid roads may increase the drainage area of a small watercourse resulting in increased runoff through the channel. The increased runoff could result in more rapid channel scour that could lead to bank failure.

No evidence of past instability was observed in the CGS mapped debris slide slopes. Typically, we find that their designation suggests potential source areas as opposed to actual slopes that are debris sliding.

The potential for the development of shallow debris slides increases significantly where roads are constructed across steeply inclined slopes and incorporate fills. These activities are not proposed.

The potential for shallow mass wasting also increases when removing all of the vegetation from the slope such as a clearcut. This polygon is proposed as a selection harvest and will retain a significant number of trees post harvest.

The extensive RMZs were designed to provide sediment filtration bands adjacent the watercourses should extensive sediment be generated

B) Harvest Related Impacts and Hillslope Sensitivity

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.

C) Forestry / Silviculture Plan

In response to a management change, the silviculture has been changed to selection with a target retention of 100 square feet per acre.

Site preparation has been changed to none.

D) Operational Design Plan

THP approved yarding method is both ground based across the ridge tops and cable where more steeply inclined. Given the steeply inclined slopes and interfluvial ridges, deflection is good and minimal ground disturbance is anticipated.

THP Unit: # 2

Polygon: 2-2

A) General Observations

Polygon 2-2 occupies western-facing, irregular slopes, and is bound to the north by a gently inclined and west trending ridge top, to the east by a gently inclined ridge top, and to the south by a Class II watercourse (2h).

In addition to the Class II sub-basin central to the polygon (2c), and the southern boundary Class II watercourse, the polygon includes a Class III watercourse that drains through the western boundary of the unit. This northwestern-most Class III watercourse (2a) extends approximately 75 feet into the polygon and drains an area of approximately 1/3 of an acre. The watercourse is flanked by slopes that measure between 20 and 50% in inclination. The watercourse is completely encompassed within CGS remotely-mapped potential debris slide slopes (Figure 3). SHALSTAB modeled hazard is rated as low (value 4), and MWP (figure 4) is modeled moderate.

An adjacent Class III watercourse located to the south (2b) extends about 400 feet into polygon 2-2. Figure 6 suggests that the lower

A) General Observations

elevations of the watercourse traverse the deposit of a low to moderate hazard deep-seated landslide (dormant mature). The upper elevations of the watercourse cross the main scarp of the same landslide. This mapped landslide is poorly expressed by the LiDAR topography and vague in representation when viewed in the hillshade map (Figure 2) and from the ground. The watercourse drains roughly 3 acres. The watercourse is flanked by slopes inclined between 20 and 40% in the lower elevations and increase to 40 to 60% in the upper elevations. The watercourse is encompassed within CGS mapped potential debris slide slopes (Figure 3). SHALSTAB modeling places one pixel of value 2 at the head of the watercourse. MWP modeling shows moderate hazard rating occurring along the right bank of the watercourse in the upper elevations. The remainder of the MWP modeling suggests low mass wasting potential. The slopes encompassing the watercourse are predominantly vegetated with advanced, very dense huckleberry.

The sub-basin central to the polygon drains four Class III watercourses to a Class II. The Class II watercourse measures about 875 feet in length. The drainage area of the sub-basin is approximately 17 acres.

Moderate (40-50%) to steeply inclined (>60%) slopes define the right bank in the middle to upper elevations of the Class II (2c). CGS (Figure 3) mapping of the potential debris slide slope includes these moderate to steeply inclined slopes.

The westernmost Class III tributary (2d) to the Class II is in acute alignment with the Class II watercourse. The watercourse traverses moderately inclined slopes (30 to 50%) and terminates at a slope segment that is inclined between 50 and 60%. The upper extent of the watercourse is located within the CGS mapped debris slide slope. SHALSTAB modeling ranks this area as a value 2. Modeled MWP for this area is low. This area is also predominately vegetated with advanced and dense understory brush.

Watercourse 2e is a Class III watercourse measuring about 250 feet in length and draining to the upper 1/3 of the Class II watercourse. The watercourse is flanked by well-defined, mostly planar slopes that are inclined between 40 and 60%. The watercourse is completely encompassed within the CGS mapped debris slide slope. Three linear SHALSTAB value 2 pixels encompass a portion of the watercourse along with adjacent slopes. MWP is modeled as low for the slopes immediately flanking the watercourse. Extensive brush populates the surface of the channel and the watercourse, which does not exhibit a defined bed or bank at its upper extent. The swale may have been used as a yarding corridor during the initial harvest.

Watercourse 2f is short Class III (75' total length) that drains to the head of the Class II watercourse. The watercourse is flanked by moderately inclined slopes (40 to 50%). The watercourse is located within the potential debris slide slope delineated by CGS. SHALSTAB modeling places two pixels at the head and upslope of the watercourse. MWP modeled for the area is low. The majority of the watercourse is enclosed within the adjacent Class II RMZ. About 10 feet of the watercourse is located outside of the RMZ.

A) General Observations

Watercourse 2g measures about 525 feet in length. The Class III watercourse is flanked by predominantly planar slopes that consistently vary from 40 to 60% percent in inclination and include a few locations of slopes exceeding 65%. The lower-half of the watercourse is within the CGS delineated debris slide slope. SHALSTAB hazard rating for the immediate flanking slopes varies from 3 to 4. MWP models the lower elevations of the watercourse as low and upper half of the watercourse as moderate.

The southern boundary Class II watercourse (2h) measures over 1500 feet in length. The lower reaches of the watercourse are flanked by slopes typically inclined between 20 and 30%. A short segment central to the reach is inclined between 40 and 50% and upper reach is inclined between 40 and 60% with locations exceeding 65 %. Four-fifths of the watercourse is located within the CGS-delineated debris slide slope. SHALSTAB modeling identified one value 2 pixel adjacent to the watercourse and within the RMZ. MWP is modeled as low throughout the watercourse channel and flanking slopes.

Two locations of value 2 SHALSTAB are modeled within the polygon distant to watercourses. Their locations occur between watercourses 2b and 2c and are bound downslope by a broad bench.

No other mass wasting hazards have been mapped or modeled within the polygon.

No unstable areas were recorded during THP layout or subsequent Tier 2 field investigation.

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.

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. The new silviculture has bolstered Class III mitigations to include a 50' RMZ where side slopes greater than 50% exist and maintaining 75 sq. ft evenly distributed in the buffer. Where side slopes are less than 50% employ a 25' RMZ that maintains 75 sq. ft 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.

The stand includes fir and redwood trees, typically in a dense assemblage. However, an area encompassing watercourses 2b through 2f is

A) General Observations

marked by extensive ground disturbance. The area includes numerous shallow and irregular swales common to ground based donkey yarding. In addition to the irregular ground surface, the stand is primarily comprised of dense brush.

B) Harvest Related Impacts and Hillslope Sensitivity

The lack of observed landslides within the planned harvest portions of the unit suggests that legacy ground based activities did not exceed slope stability thresholds. The slope has experienced clearcut, burning and donkey yarding (a legacy method that dragged the large diameter, felled timber to railroads).

No indications of reactivation following the initial harvest were observed on the low to moderate hazard deep-seated landslide mapped during the initial HCP Freshwater Watershed Analysis.

Regionally, the catchment area for the corresponding watercourses appears to remain low.

The location of SHALSTAB modeled moderate rating is generally not consistent with CGS mapped debris slide slopes.

No evidence of past instability was observed in the mapped debris slide slopes. Typically, debris slide slopes occur where slope are more steeply inclined with the potential for the development of shallow debris slide increasing significantly where roads are constructed across steeply inclined slopes and incorporate fills. These activities are not proposed.

Field review of the modeled value 2 SHALSTAB indicates these areas have not demonstrated a mass wasting response to past harvest operations that included clearcutting, ground disturbing yarding methods, and burning.

The region encompassing watercourses 2b, 2d, and 2e, north of watercourse 2c is densely vegetated with Huckleberry and other non-merchantable species. The redwood component in this area is limited in number of stems per acre, and vitality. Although, exhibiting current slope stability, this vegetation patterns suggest that the south-facing slope did not response well to the initial harvest. This may be in response to extensive burning, southern exposure, and/or lack of reforestation activities. The return of the Huckleberry brush component as the primary slope vegetation suggests an overall reduction in root strength contributions to the soil relative to previous forested conditions. Granted that there is still some value of root strength from the woody shrub, it is reduced from that expected from a stand of timber. This long term reduction in root strength contribution, without the manifestation of shallow debris slides, suggests that the root strength component does not determine stability versus instability.

B) Harvest Related Impacts and Hillslope Sensitivity

The polygon was initially harvested by steam donkey. We were unable to determine the direction the logs were taken, but were able to determine that the logs were dragged. No roads were observed within the polygon other than those on the ridge tops.

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.

C) Forestry / Silviculture Plan

In response to a management change, the silviculture has been changed to selection with a target retention of 100 square feet per acre.

The area encompassing watercourses 2b through 2f has been included within a no harvest zone.

Site preparation has been changed to none.

D) Operational Design Plan

THP approved yarding method is both ground based across the ridge tops and cable where more steeply inclined. Given the steeply inclined slopes and interfluvial ridges, deflection is good and minimal ground disturbance is anticipated.

References:

CGS, 1999, Geologic and Geomorphic Features Related to Landsliding, Freshwater Creek, Humboldt County, California. DMG Open-File Report 99-10. Available via the web at <http://www.conservation.ca.gov/cgs/fwgp/Pages/fresh.aspx>

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, 2001, Freshwater Creek Watershed Analysis, prepared for Pacific Lumber Company (PALCO) dated January 2001, and acquired by Humboldt Redwood Company, LLC in 2008.

HRC, 2002, (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.

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 2009 Harvest in Freshwater Creek. Revised 3/13/09

THP Name	THP Number	Unit Number	Silviculture				CC Equivalent	Hazard	
			CC	ROW	CT	SEL		Low	High*
Little 34	08-048	1				22.4	11.2	22.4	0.0
Little 34	08-048	2				25.4	12.7	25.4	0.0
Little 34	08-048	3				30.3	15.2	27.4	10.8
McCready Ridge	07-132	1	0	0	0	15.6	7.8	15.6	0.0
McCready Ridge	07-132	2	0	0	0	15	7.5	13.1	7.3
Around gills	05-077	4		3.1		32	19.1	34.9	0.8
Mid Incline	05-123	1		0.4		24.7	12.8	3.3	83.7
Mid Incline	05-123	2				31.5	15.8	31.5	0.0
Mid Incline	05-123	3				28.3	14.2	23.4	18.8
Fresh 1	04-242	2				36.1	18.1	34.3	6.9
Fresh 1	04-242	3				27.4	13.7	27.1	1.2
Little Fresh	05-176	1				36.3	18.2	30.1	23.8
Little Fresh	05-176	2				20	10.0	12.4	29.2
Little Fresh	05-176	3				5.7	2.9	5.7	0
Little Fresh	05-176	5				39.6	19.8	39.6	0.0
Little Main	05-085	2				29.7	14.9	14.3	59.1
Little Main	05-085	3				25.3	12.7	16	35.7
Little Main	05-085	7				33.3	16.7	19.5	53.0
Whiskey	08-041	1				20.9	10.5	20.6	1.2
Whiskey	08-041	2				23.5	11.8	23.2	1.2
Whiskey	08-041	3				35.4	17.7	29.6	22.4
Whiskey	08-041	4				32	16.0	32	0.0
Whiskey	08-041	5				11.3	5.7	9.5	6.9
						Total	304.4		

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

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

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

Indicates tier 1 for ROW and tier 2 for remainder of the unit

Total Clear Cut Equivalent Acres enrolled or submitted for enrollment	289.1
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Table 2. Summary of THPs to enrolled prior to establishment of Zero Discharge Monitoring Plan for Freshwater Creek

THP Number	Unit Number	Harvest Acres	Hazard	
			Low	High*
08-048	1	22.4	22.4	0.0
05-077	4	3.1	3.1	0.0
05-176	5	39.6	39.6	0.0
08-041	1	20.9	20.6	1.2
08-041	2	23.5	23.2	1.2
08-041	4	32.0	32	0.0
Totals		141.5	143.3	

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
Little 34	08-048	1	3.9	18.5			
Little 34	08-048	2	8.2	17.2			
Little 34	08-048	3	6.9	23.4			
McCready Ridge	07-132	1	0	15.6			
McCready Ridge	07-132	2	10.1	4.9			
Around gills	05-077	4	19.7	15.4			
Mid Incline	05-123	1	0.4	24.7			
Mid Incline	05-123	2	11.5	23			
Mid Incline	05-123	3	14.1	14.2			
Fresh 1	04-242	2	10.9	25.2			
Fresh 1	04-242	3	0	27.4			
Little Fresh	05-176	1	0	36.3			
Little Fresh	05-176	2	7.3	12.7			
Little Fresh	05-176	3	0	5.7			
Little Fresh	05-176	5	0	39.6			
Little Main	05-085	2	0	29.7			
Little Main	05-085	3	0	25.3			
Little Main	05-085	7	0	33.3			
Whiskey	08-041	1	20.9	0			
Whiskey	08-041	2	11.7	11.8			
Whiskey	08-041	3	9.3	26.1			
Whiskey	08-041	4	19	13			
Whiskey	08-041	5	0	11.3			

Humboldt Redwood Company LLC

Erosion Control Plan (ECP) for the “Mid Incline” THP 1-05-123HUM

Updated ECP – for purpose of identifying **Tier 2** erosion control sites specific to units 1, 2 and 3 (2009 enrollment requests); Unit 2 has site 5969 (Road U91.24), and units 1 and 3 have no erosion control sites located on the spur road system leading specifically to These units.

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. R1-2006-0041 (Freshwater Creek) 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: **Mid Incline 1-05-123HUM**
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. R1-2006-0041 (Freshwater Creek).

"Controllable sediment discharge source" means sites or locations, both existing and those created by proposed timber harvest activities, within the Project area that meet all the following conditions:

1. is discharging or has the potential to discharge sediment to waters of the state in violation of applicable water quality requirements or other provisions of these WWDRs,
2. was caused or affected by human activity, and
3. may feasibly and reasonably respond to prevention."

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

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

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

I. Inventory and Treatment of Controllable Sediment Sources

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

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

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

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

II. General Prevention and Minimization Measures for Controllable Sediment Discharge

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

THP Section II:

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

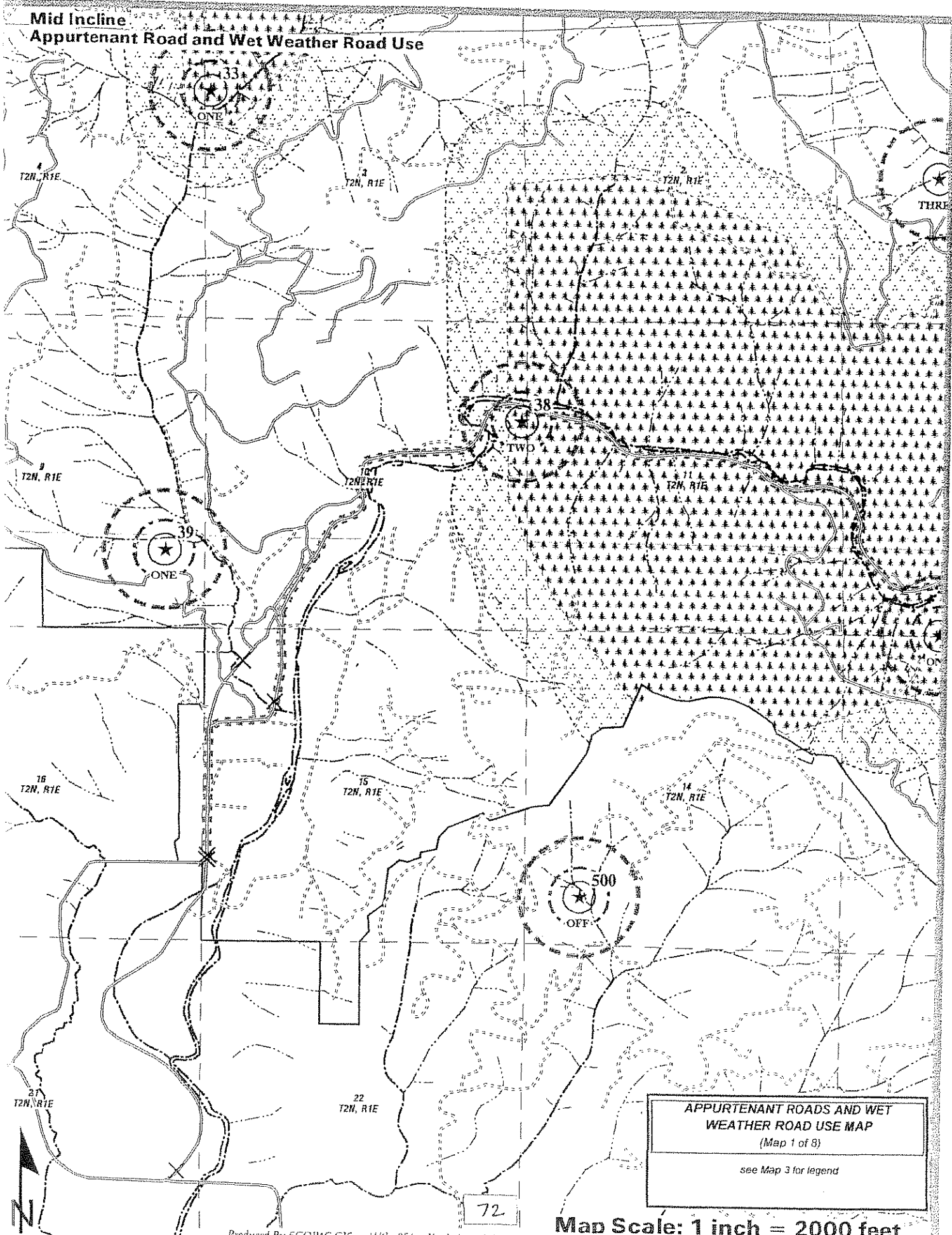
THP Section V:

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

Maps attached:

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

Mid Incline
Appurtenant Road and Wet Weather Road Use



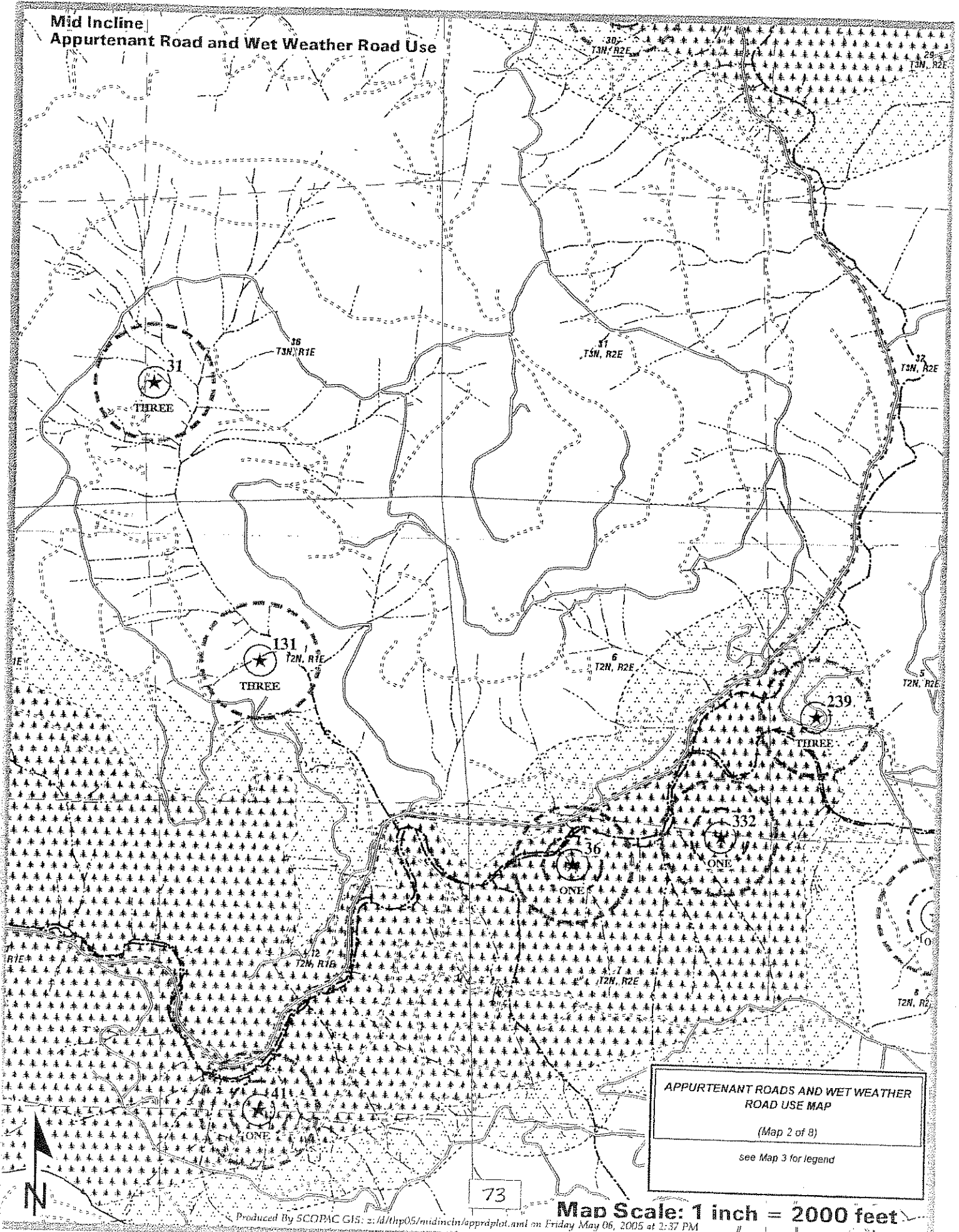
APPURTENANT ROADS AND WET
WEATHER ROAD USE MAP

(Map 1 of 8)

see Map 3 for legend

Map Scale: 1 inch = 2000 feet





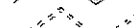












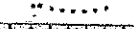

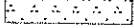
Mid Incline
Appurtenant Road and Wet Weather Road Use

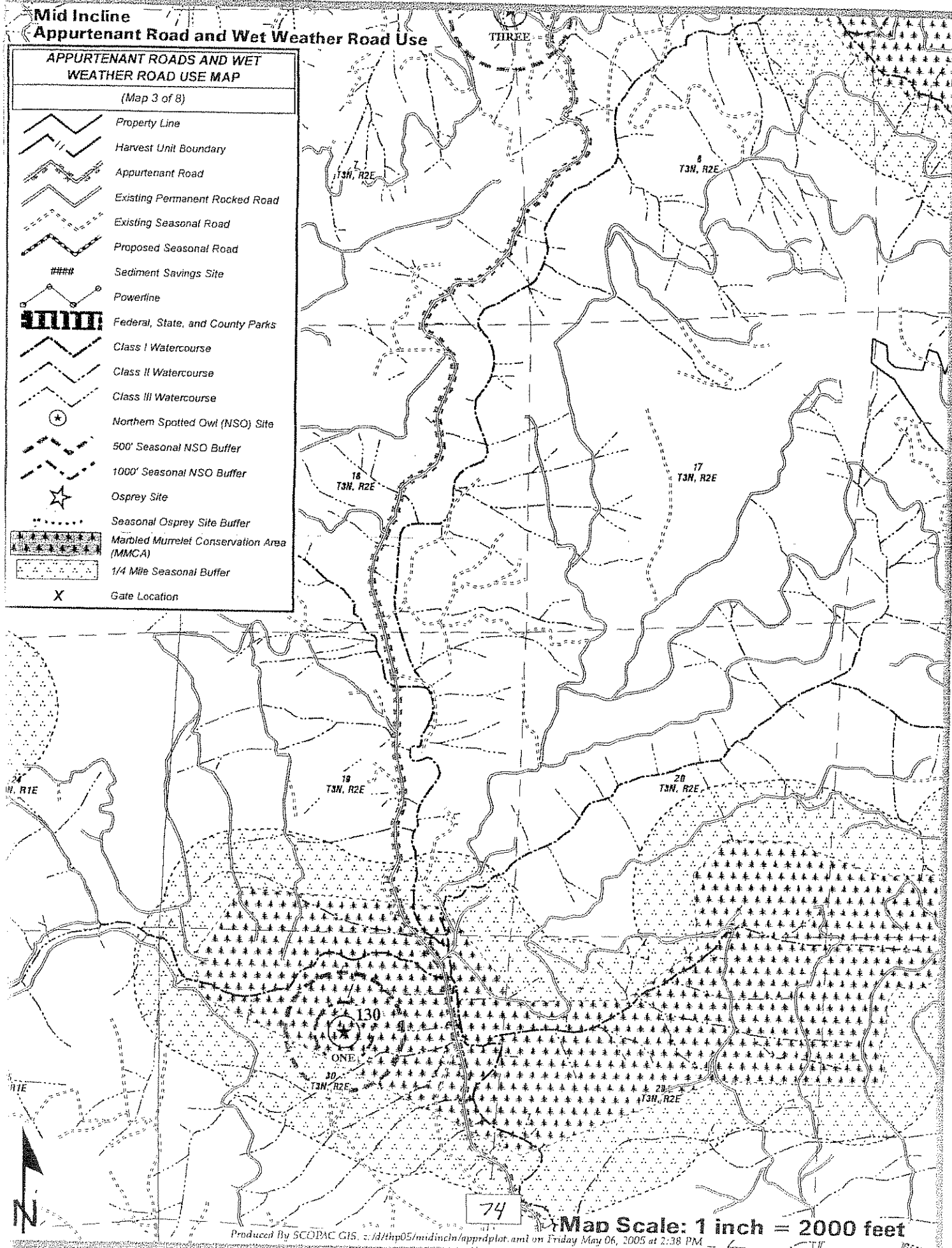


Mid Incline Appurtenant Road and Wet Weather Road Use

APPURTENANT ROADS AND WET WEATHER ROAD USE MAP

(Map 3 of 8)

-  Property Line
-  Harvest Unit Boundary
-  Appurtenant Road
-  Existing Permanent Rocked Road
-  Existing Seasonal Road
-  Proposed Seasonal Road
-  Sediment Savings Site
-  Powerline
-  Federal, State, and County Parks
-  Class I Watercourse
-  Class II Watercourse
-  Class III Watercourse
-  Northern Spotted Owl (NSO) Site
-  500' Seasonal NSO Buffer
-  1000' Seasonal NSO Buffer
-  Osprey Site
-  Seasonal Osprey Site Buffer
-  Marbled Murrelet Conservation Area (MMCA)
-  1/4 Mile Seasonal Buffer
-  Gate Location

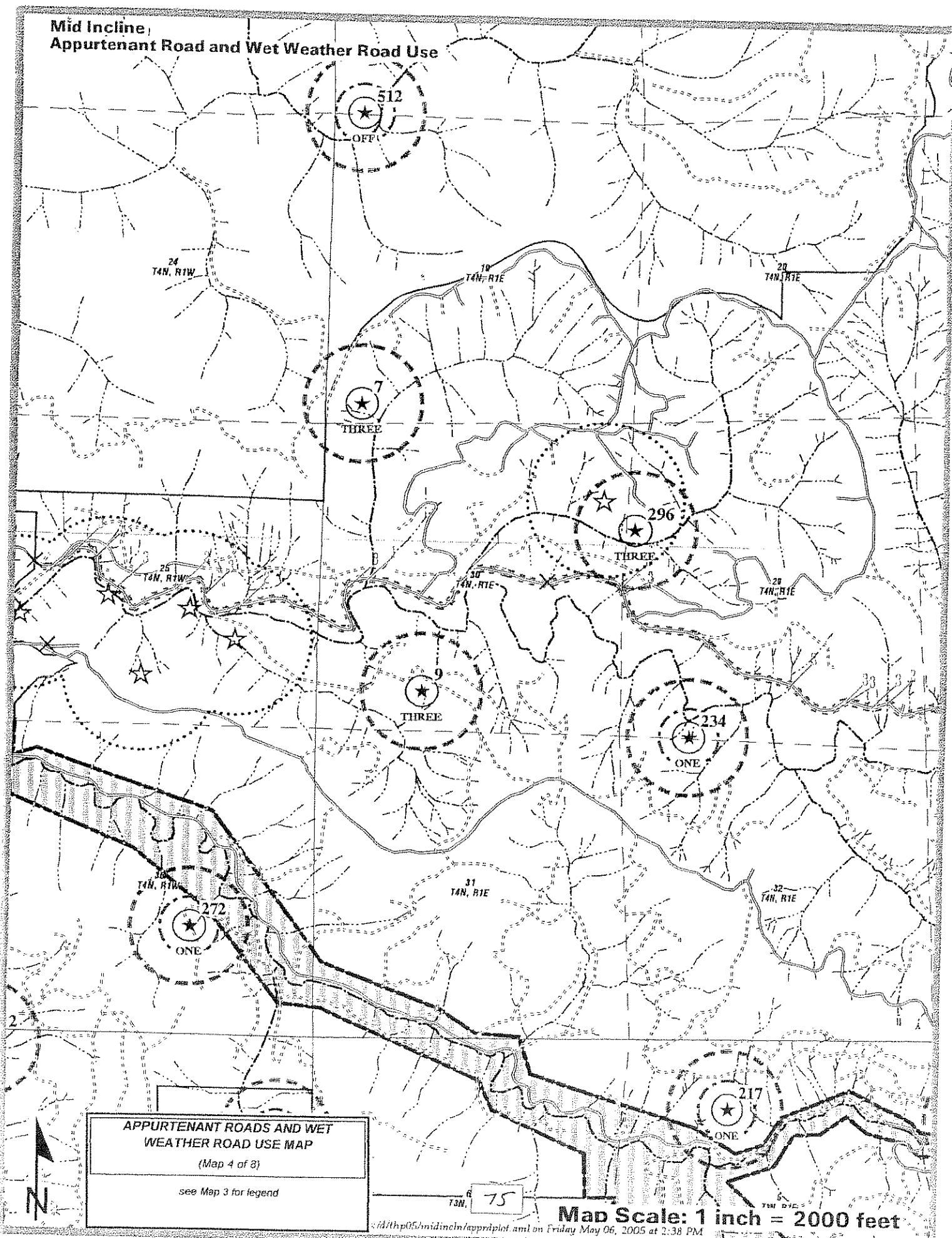


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Map Scale: 1 inch = 2000 feet

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Mid Incline
Appurtenant Road and Wet Weather Road Use

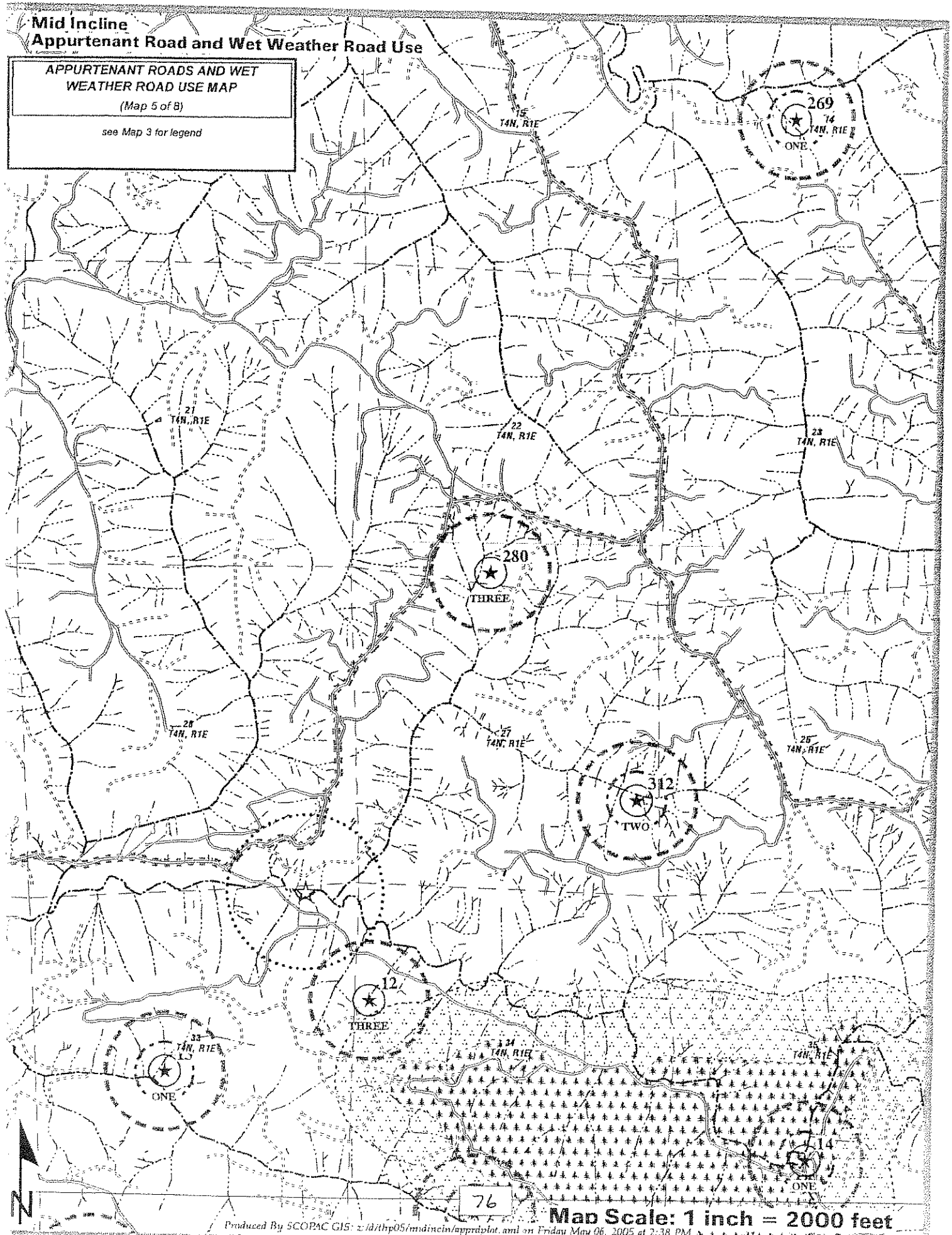


**Mid Incline
Appurtenant Road and Wet Weather Road Use**

**APPURTENANT ROADS AND WET
WEATHER ROAD USE MAP**

(Map 5 of 8)

see Map 3 for legend

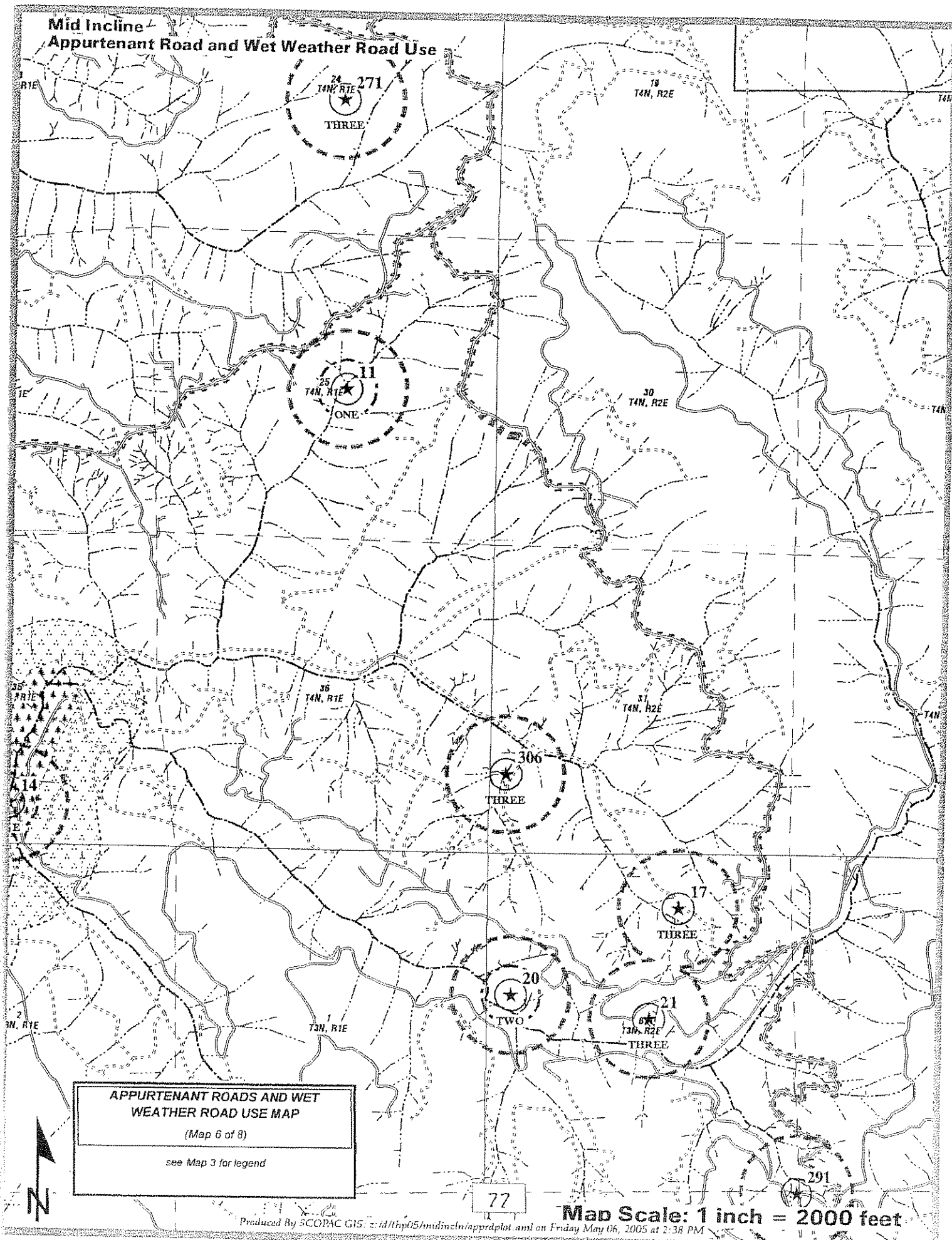


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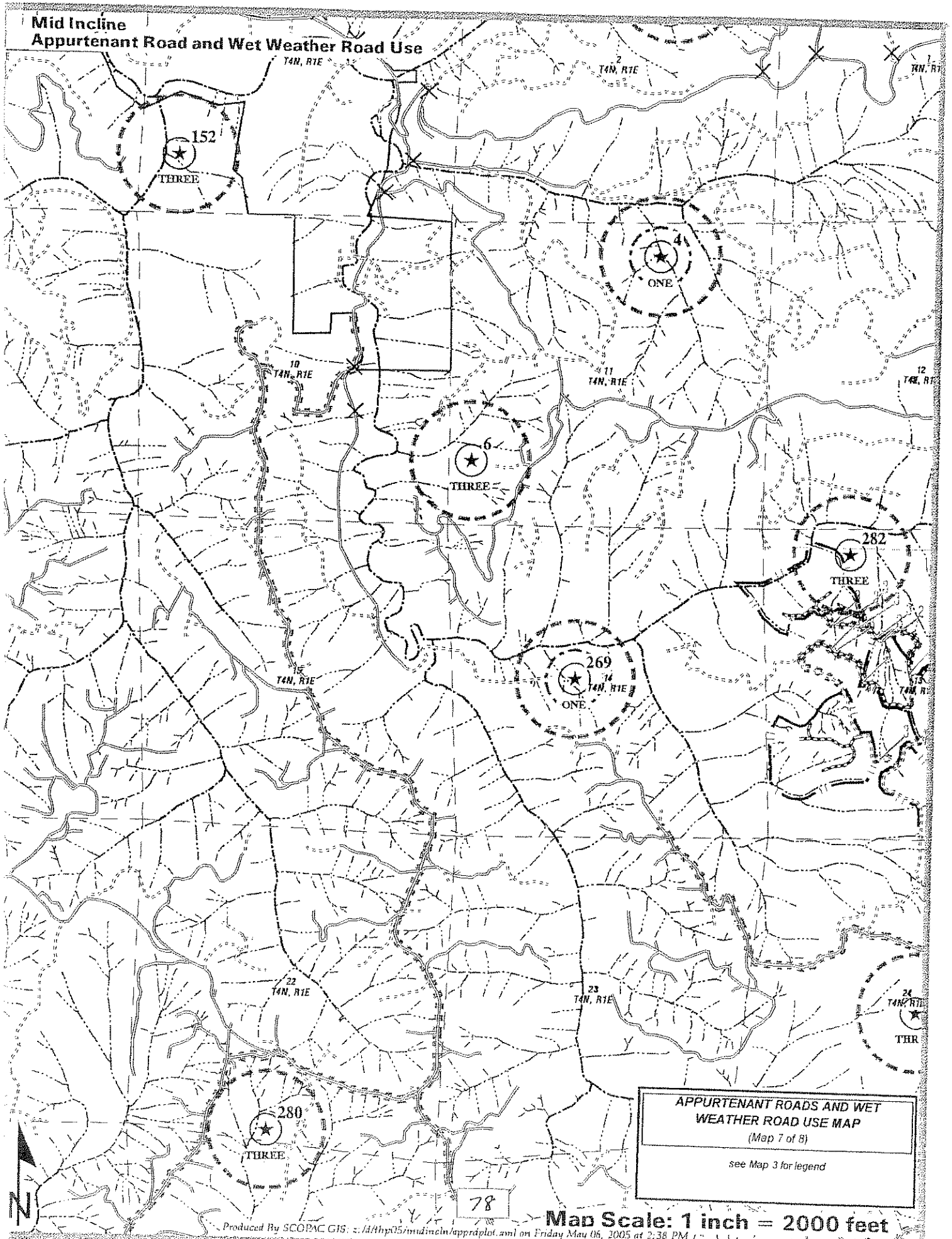
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Mid Incline Appurtenant Road and Wet Weather Road Use



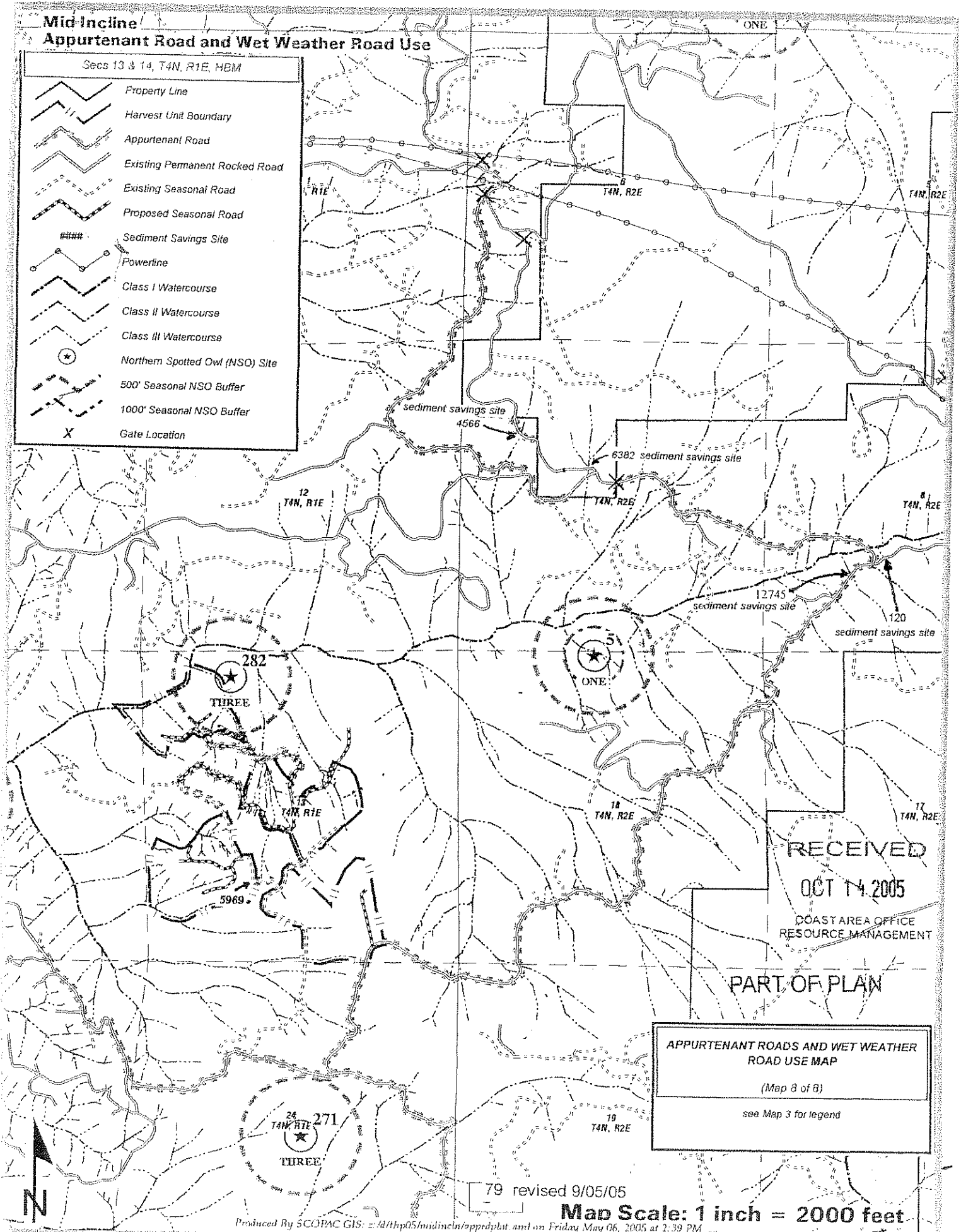
Mid Incline
Appurtenant Road and Wet Weather Road Use



Mid-Incline Appurtenant Road and Wet Weather Road Use

Secs 13 & 14, T4N, R1E, HBM

- Property Line
- Harvest Unit Boundary
- Appurtenant Road
- Existing Permanent Rocked Road
- Existing Seasonal Road
- Proposed Seasonal Road
- Sediment Savings Site
- Powerline
- Class I Watercourse
- Class II Watercourse
- Class III Watercourse
- Northern Spotted Owl (NSO) Site
- 500' Seasonal NSO Buffer
- 1000' Seasonal NSO Buffer
- Gate Location



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COAST AREA OFFICE
RESOURCE MANAGEMENT

PART OF PLAN

APPURTENANT ROADS AND WET WEATHER
ROAD USE MAP

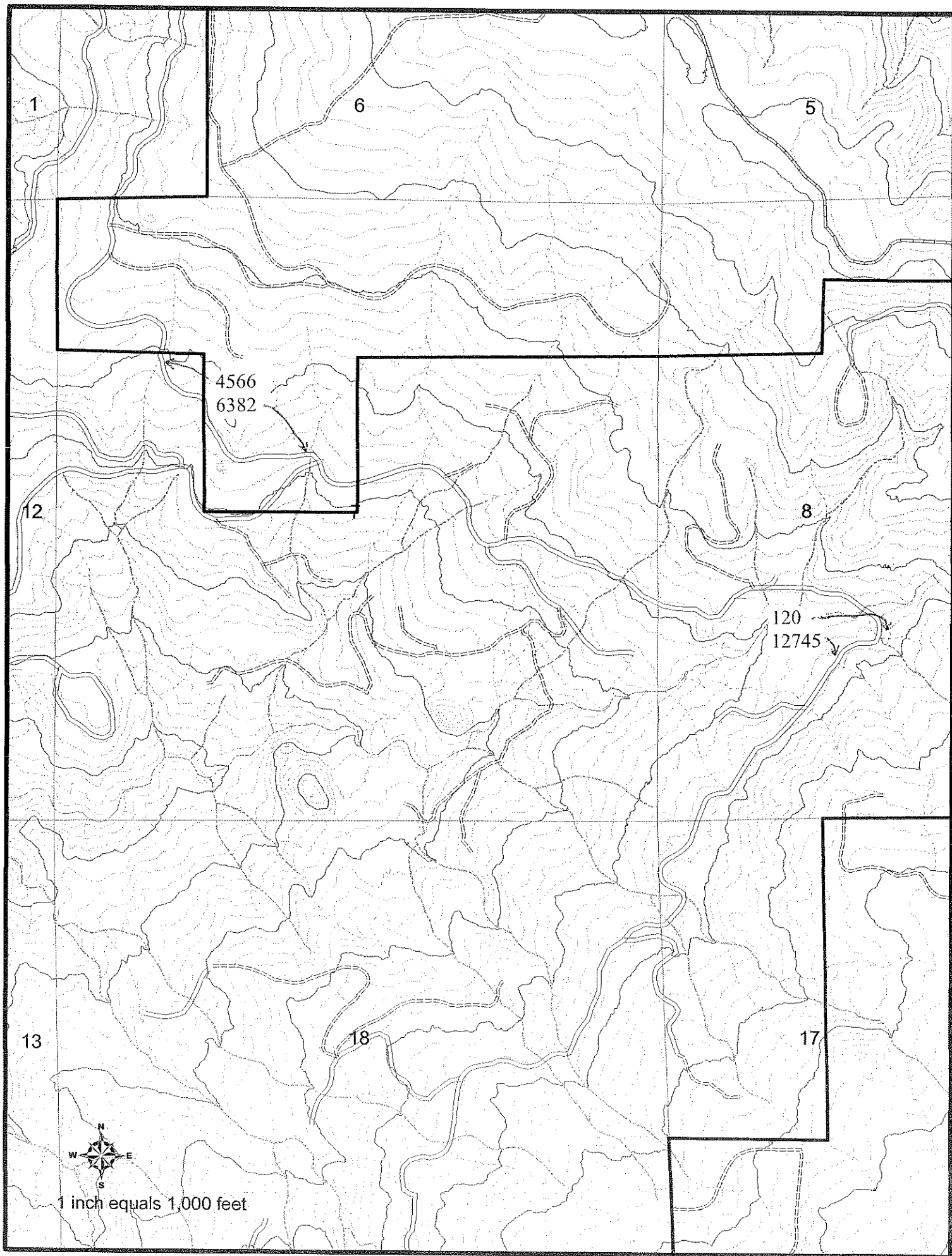
(Map 8 of 8)

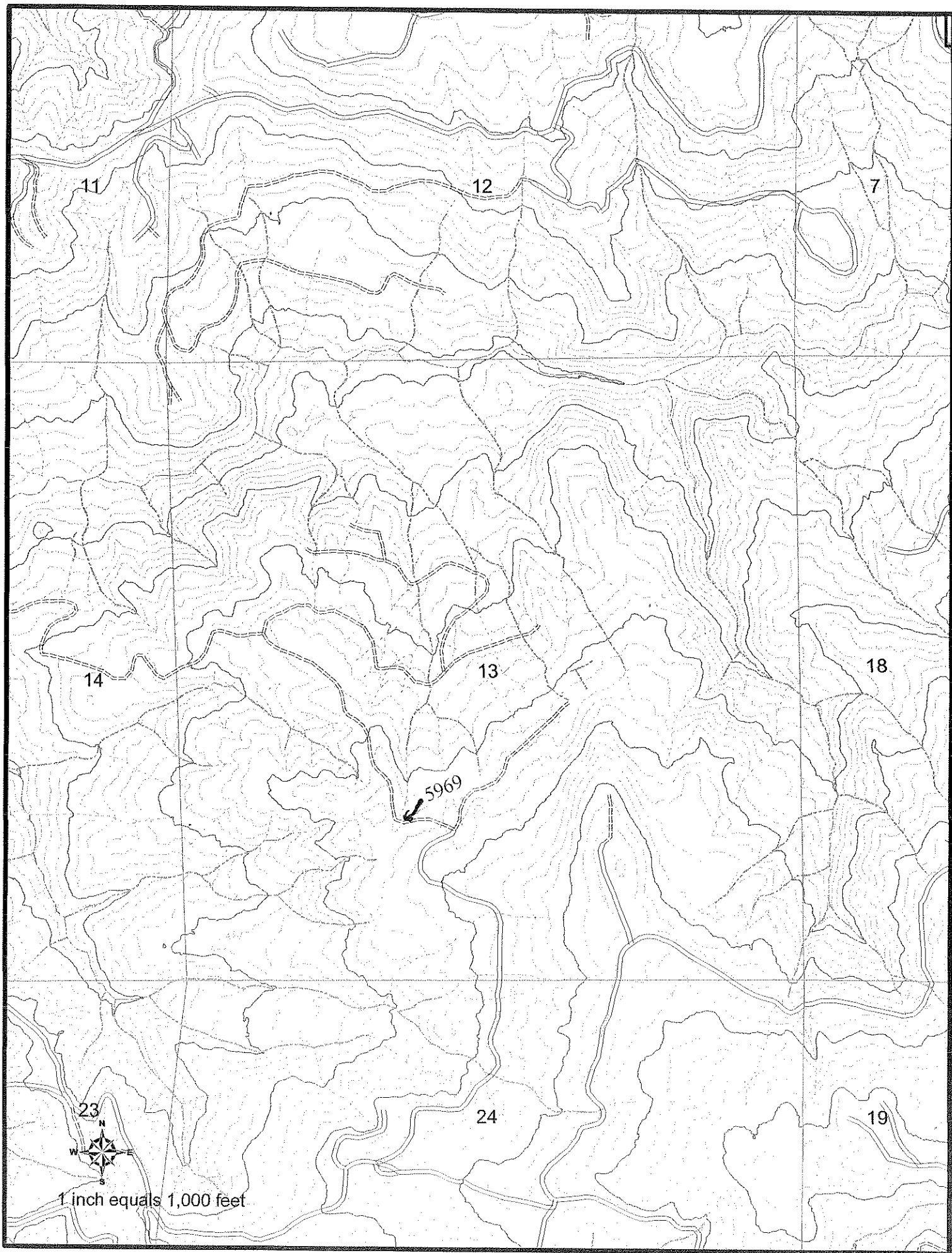
see Map 3 for legend

79 revised 9/05/05

Map Scale: 1 inch = 2000 feet

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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

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 Mid Incline							
RD: U91.24 STATION: 5969 SITE: WQ 1 WOID: -617032201 SEDID: 4N1E13C601 REPAIRED: NO	Surface Erosion	3	3 100%	Low	Prior to THP Final Completion.	crossing needs more rock or straw waddles placed to minimize erosion	Add rock over crossing and/or install straw waddles to minimize surface erosion related to sediment discharges.
RD: X65.50 STATION: 4566 SITE: UF79.2 WOID: 50003624 SEDID: 4N2E07B301 REPAIRED: YES	Critical Dip	60	60 100%	Med	Prior to Oct 15; FIRST year of operations. 10/15/08	Culvert outlet crushed. No critical dip present.	Install a critical dip on the left hinge line. Install 2 rolling dips to the right of crossing to break up ditch flow. Outlet of pipe is partially crushed replace with 24" CMP. Prior to October 15 of the first year of operations. Remove existing culvert and install a new culvert 10 feet upslope of the current location. Rock armor the inboard ditch over a distance of 15 feet upslope of the new culvert inlet.
RD: X65.50 STATION: 6382 SITE: UF80 WOID: 1760146313 SEDID: 4N2E07D401 REPAIRED: YES	Rolling Dip	120	120 100%	Low	Prior to THP Final Completion.	1180' of undrained road needs 4 rolling dips	1180' of undrained road needs 4 rolling dips, with one 50' to right of crossing.
RD: X65.50 STATION: 12745 SITE: UF1010 WOID: 5111425 SEDID: 4N2E08C602 REPAIRED: NO	Critical Dip	81	81 100%	Low	Prior to THP Final Completion.	Install critical dip	Install critical dip on right hingeline.
RD: X65.5051 STATION: 120 SITE: UF47.1 WOID: -1737556690 SEDID: 4N2E08C601 REPAIRED: YES	Perched Fill	89	89 100%	Med	Prior to THP Final Completion.	perched fill on outboard edge of pulled crossing	Excavate the remainder of the crossing restoring natural channel gradient from TOP to BOT. Lay back sideslopes 2:1. Store spoils on either side of the road.
Total Estimated Yards		353	353				

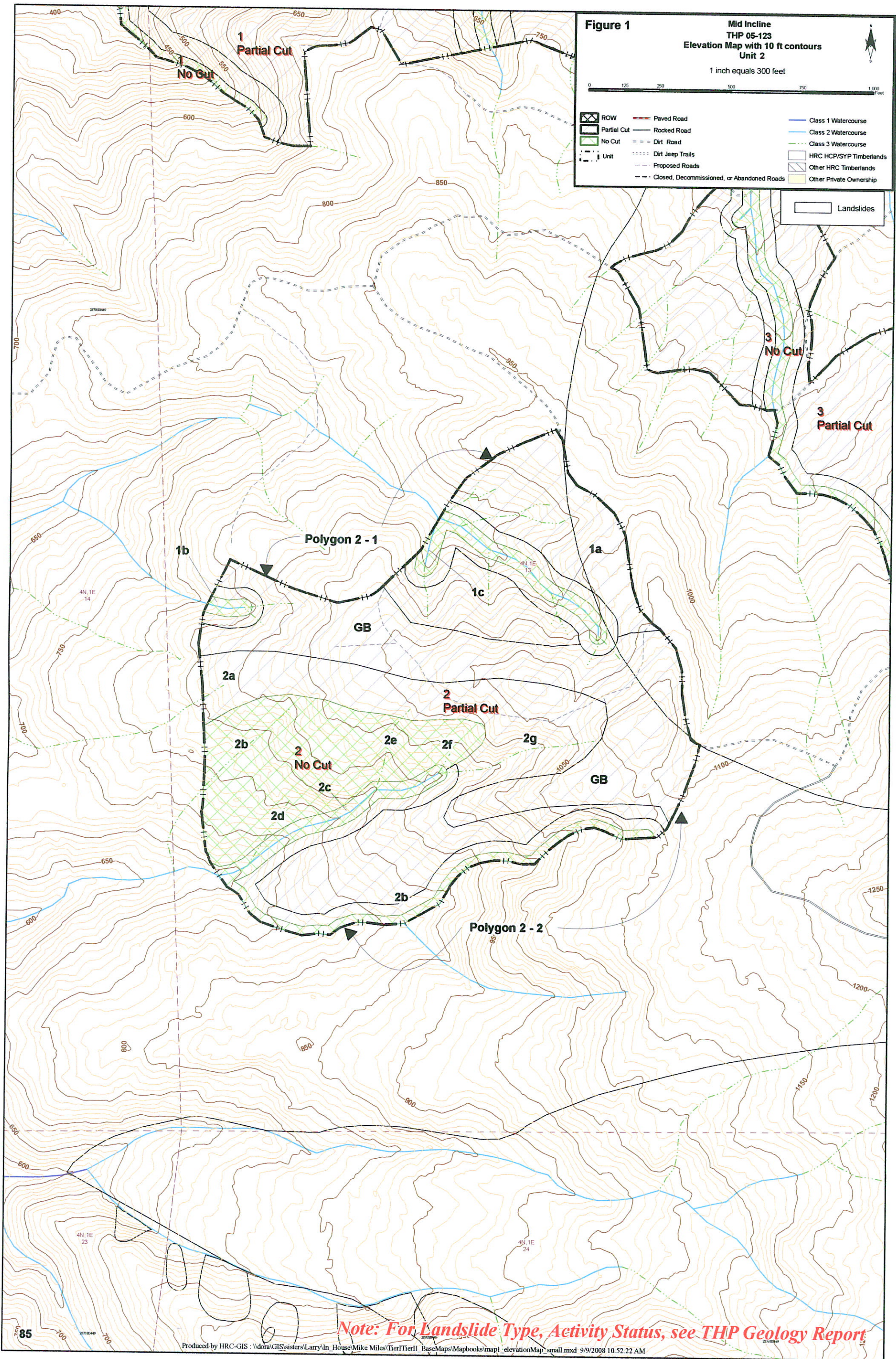
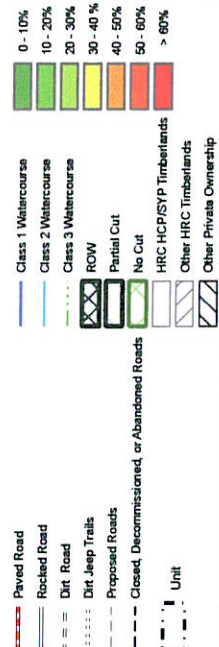


Figure 2

Mid Incline
THP 05-123
Shalstab 10 mts grid / Slope Class Map
Unit 2

1 inch equals 500 feet

0 205 410 620 820 1020 1230 1440 1645



Class

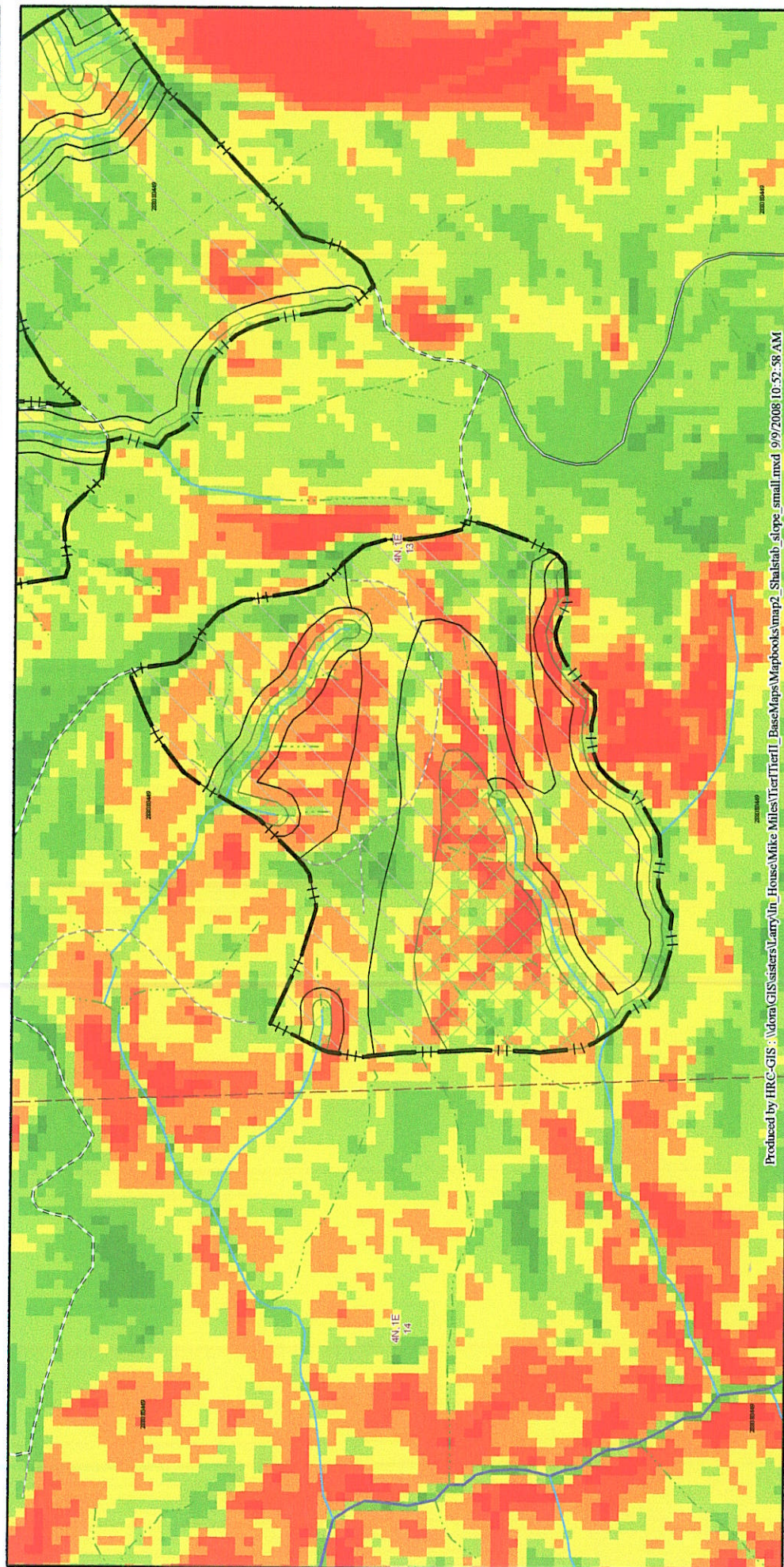
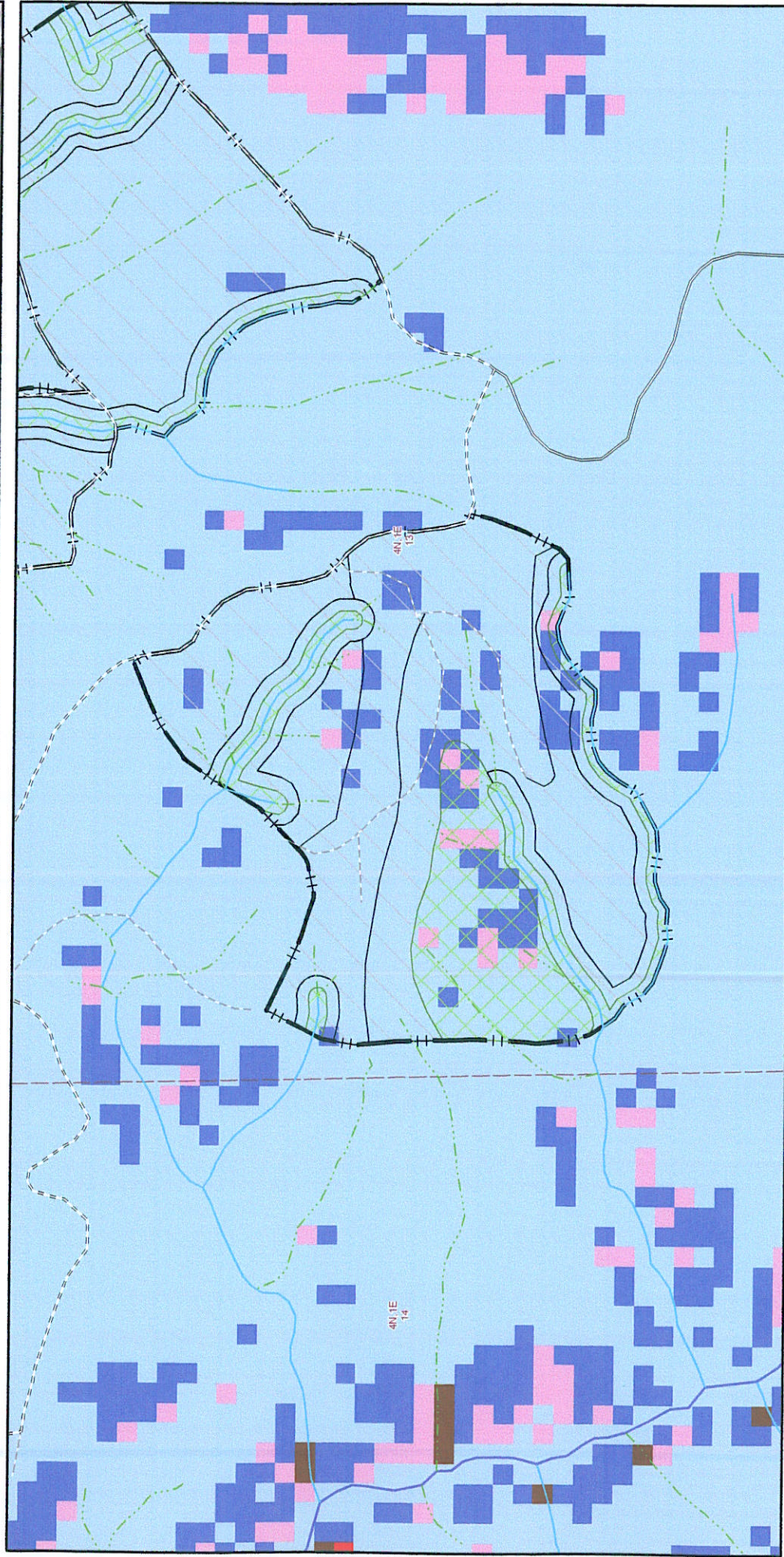
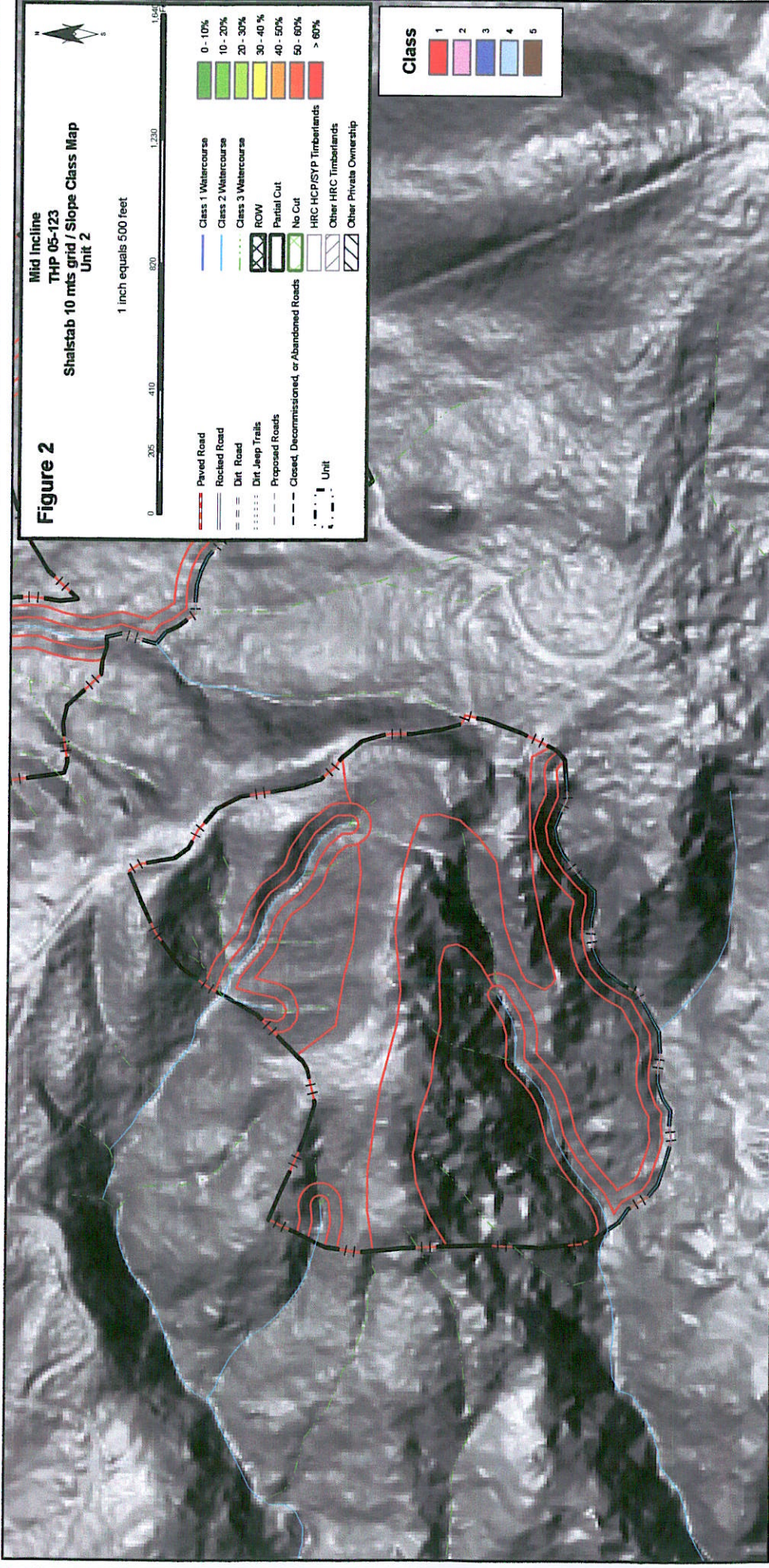
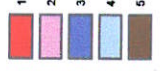
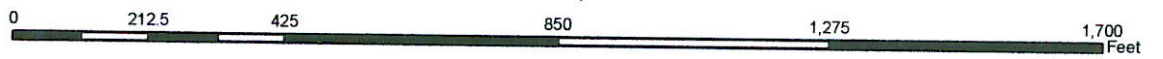


Figure 3

Mid Incline
THP 05-123
CGS Map Unit 2

1 inch equals 300 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 | |

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 ig

H

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

KJfm

KJfs

Q

Qfa?

Qt

Twl

Twf?

Twu

Ty

Ty?

u

CGS Freshwater contacts

CONTACT

approximately located

certain location

queried location

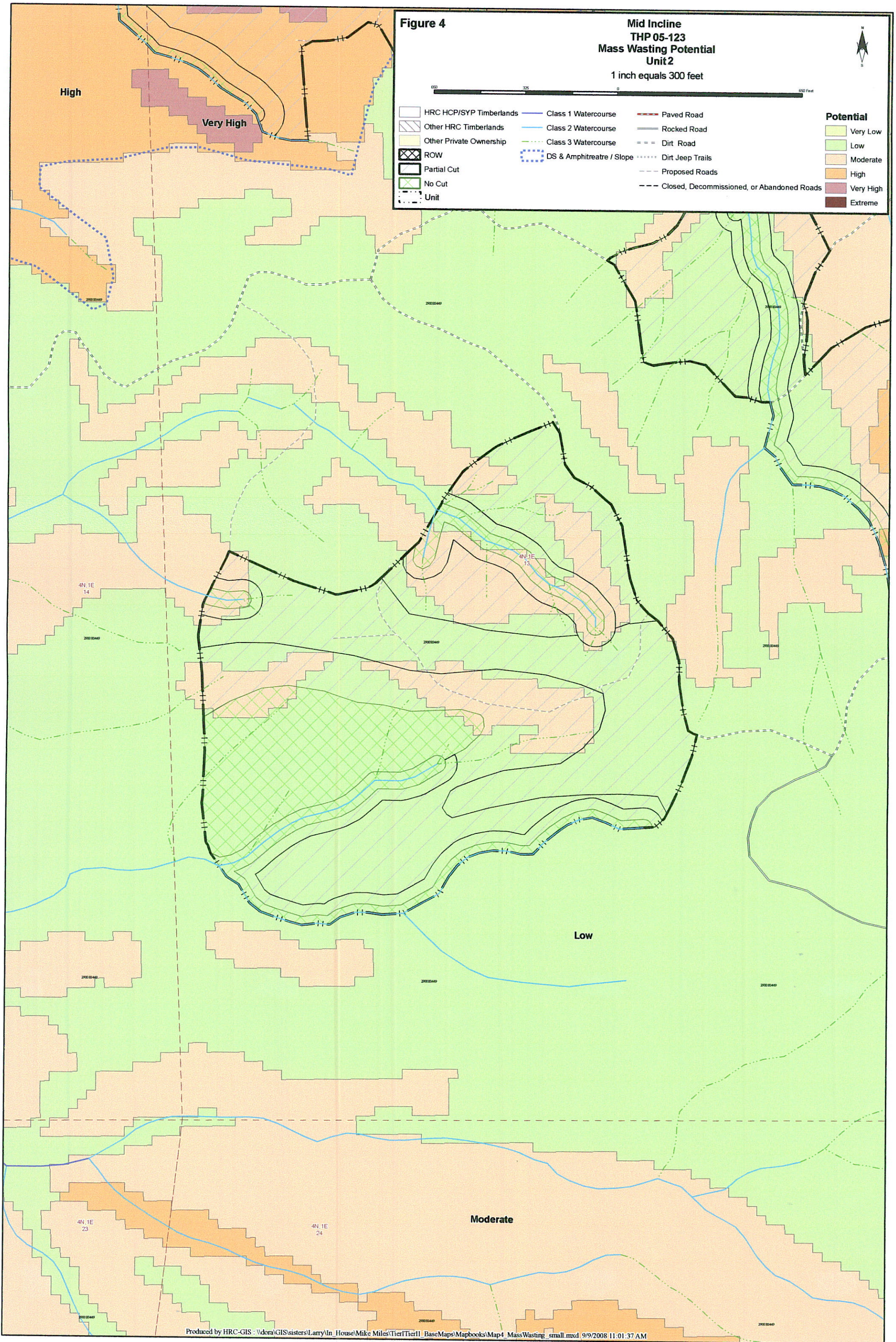
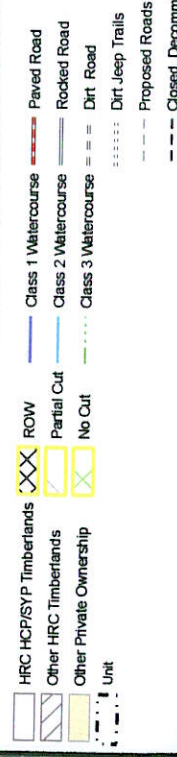


Figure 5

Mid Incline
THP 05-123
Aerial Photo Map - Unit 2

1 inch equals 300 feet



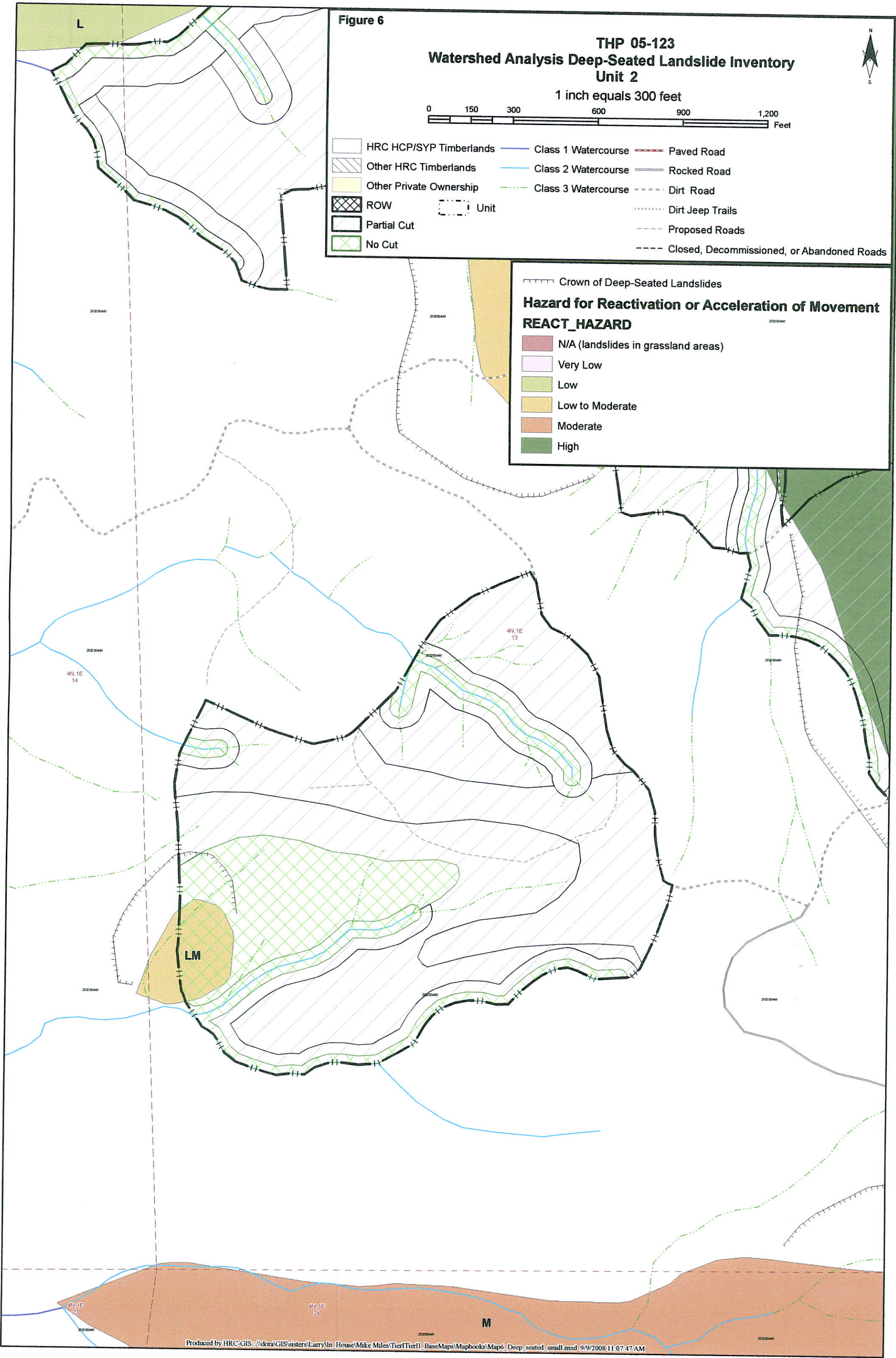


Figure 7

Mid Incline
THP 05-123
Road Map

1 inch equals 1,000 feet

