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Addendum

ADDENDUM NUMBER ONE

RFP 12-1989
Chehalem Forest Stand Management

In the interest of fairness, this information is being provided to all interested proposers.

Below is the Pre-proposal meeting questions and answers and who attended the meeting.

Chehalem Forest Stand Management RFP 12-1989 November 9th Pre-Proposal Meeting Questions:

1. **Question:** Is there additional access to the site?

   Answer: If you want access to the site please contact Kate Holleran, kate.holleran@oregonmetro.gov, 503-813-7543 for information on access. We also request a courtesy call/message to Ryan Jones when going up to the property. Ryan's number is 503-964-0513.

2. **Question:** Can you provide the Geotech report?

   Answer: See attached Pacific Geotechnical Memorandum dated July 26, 2010.

3. **Question:** GIS data: Can you provide aerials, contours, roads, streams, LiDAR and stand type.

   Answer: Metro is investigating what GIS information it can make available in a timely fashion. However, Metro does not intend to extend the proposal due date, so please plan accordingly.

4. **Question:** Regarding the last paragraph of the sample Personal Services Agreement attached to the RFP. Do proposers need to complete that item as part of their proposal?

   Answer: No

Pre-Proposal meeting attendees:

Mark Scott, Scott Land and Timber Co.
Scott Ferguson, Trout Mountain Forestry
Brent Keller, Mason, Bruce and Girard, Inc.
Marc Barnes, Integrated Resource Management

Issued November 16, 2011

Darin Matthews, CPPO, C.P.M.
Procurement Officer

Pacific Geotechnical, LLC
Geotechnical Engineering and Engineering Geology
with a Focus on Sustainability

MEMORANDUM

Date: July 26, 2010

To: Kate Holleran, METRO

From: Tim Blackwood, PE, CEG

Regarding: Preliminary Geotechnical Evaluation
Chehalem Ridge Property
Project No. 1344-002-00

INTRODUCTION

This memorandum provides our preliminary geotechnical evaluation of a portion of the Chehalem Ridge Natural Area which was recently acquired by METRO. The site is located in Yamhill County, Oregon, about 3 miles east of the town of Gaston, as shown on Figure 1. A portion of the property south of Dixon Mill Road has been affected by ground movement in the past. METRO is concerned about the potential for future ground movement and requested that Pacific Geotechnical evaluate the area. Our scope of work was described in our Personal Services Agreement with METRO, authorized on June 7, 2010, which included the following tasks:

- Walk the affected area with METRO staff,
- Assess the stability of the area and the potential for future ground movement,
- Recommend best practices to minimize slope instability,
- Provide a written report detailing the above scope.

Our evaluation and recommendations are provided in the following sections.

GEOLOGY AND GEOLOGIC HAZARDS

The geology of the site is mapped in DOGAMI Bulletin 60, Engineering Geology of the Tualatin Valley, Oregon (Schlicker and Deacon, 1967). The site is near the contact of two units: "Columbia River Basalt" (Tcr) and "Oligocene Marine Sediments, Undifferentiated" (Tos). The exact location of the contact is not clear, but Tcr forms the upper slopes at or above the site and Tos lies beneath it on the lower slopes. Tcr is described as weathered and unweathered basaltic lava flows with interflow zones of breccia, ash, and baked soil. Unweathered flows are blue-black, dense, and finely crystalline basalt with massive columnar to close cubic joints. Weathered flows are reddish-brown to gray-brown, crumbly to medium dense basalt. Tos is reported to consist of a variety of volcaniclastic marine sediment types, including tuffaceous sandstone and siltstone, shale, quartzitic sandstone, basaltic sandstone, limy sandstone and conglomerate. The unit weathers to a silt and clay soil of moderate to high plasticity and locally to plastic bentonitic clay.

Three large landslides are mapped within less than a quarter mile of the site by Schlicker and Deacon (1967). Two are located on the hillslope below the site to the southwest. The third is across Hill Creek on a northwest-facing hillside. Two of the three landslides occur coincident with the contact of the Tcr over the Tos. All three are within the Tos unit.

Engineering properties reported by Schlicker and Deacon (1967) for the Oligocene sediments include USCS soil classifications from silt (ML) to elastic silt (MH) and lean clay (CL). The material is predominantly fine, with between 75 and 97 percent passing the U.S. No. 200 sieve. Silt content ranges from 41 to 61 percent, clay from 26 to 60 percent. Reported Atterberg limits include liquid limits ranging from 38 to 63 with plasticity indices ranging from 13 to 24. Moisture-density (proctor) results provide optimum moisture contents ranging from 22 to 38 percent; a single maximum dry density of 98 pounds per cubic foot (pcf) is reported. Shear strengths are reported as low to moderate, and cohesion as "variable".

We found several logs for wells drilled along SW Dixon Mill Road, roughly one-half to one mile west of the site, in the Oregon Water Resources Department (OWRD) well log database. The Sussman log from 39953 SW Dixon Mill Road notes 40 feet of clay and decomposed claystone, overlying 146 feet of claystone and gravels to 186 feet below ground surface, the maximum depth drilled. The static water level was reported as 49 feet below ground surface (bgs). Further west, the Canon well (40011 SW Dixon Road) drilled 22 feet of clay over 123 feet of claystone, gravel and clay. Groundwater was encountered at 92 feet, which is also reported as the static water level. Other well logs from this area report a similar profile of clay and decomposed claystone over intact claystone with sand and gravel interbeds to as much as 400 feet bgs.

SITE HISTORY

We discussed the history of ground movement at the site, as understood by METRO staff. Ground movement occurred at the subject location when held by the previous owner, Stimson Lumber Company. An evaluation of the ground movement was completed for the site by AKS Engineering and Forestry for Stimson Lumber Company. In a report of their evaluation, dated April 21, 1999, AKS noted that a roughly 150 foot square rotational-slump type failure was present in the subject area. This feature was estimated to be relatively shallow (< 12 feet deep) and included internal slump blocks, saturated soil debris, and several sag ponds, seeps, and springs. Much of this water was linked to drainage from the adjacent road, which included "... a ditch draining surface water into the slide area". The report included recommendations for remediation of the existing slide, including redirecting the water flow away from the slide and construction of trench drains. Further investigation was recommended to determine the actual depth of sliding. If this proved to be deeper than estimated, construction of a toe buttress fill was discussed as one possible means of remediation. It is not known if these measures were undertaken. The culvert for the road at the head of the slide area has been removed; however, no trench drains are visible.

A home is located below the area evaluated by AKS. We understand the homeowner reported that a ground crack recently developed within their driveway. We did not see the ground crack, but understand that it crossed the driveway between the house and nearby barn, located east of the house. This would be 100 to 200 feet southeast of the subject slide area. We know of no other specific information on the history of the landslide.

SITE CONDITIONS

We conducted a visit to the site on June 11th, 2010. Our visit included a visual reconnaissance of the affected area and areas below the site on the adjacent property to the south. Our observations are documented below, with specific locations of significant findings shown on Figure 2.

- An unsurfaced logging road leads to the subject area from a recent clearcut. The road surface was wet during our visit and surface water appears to be routed to the subject area from the existing road network. The subject area is outside the clearcut and vegetated with mature conifer and deciduous trees.
- The area of the subject ground movement is a recent landslide which appears to be mostly translational. The average slope gradient in the landslide area is about 40 to 50 percent. The head of the slide occurs beneath the road and approximately centered on a small swale/ephemeral stream and coincident with a culvert outfall from the roadway. The head of the slide is defined by about a 5 feet high vertical scarp, as shown at Station 1, on Figure 2. The scarp exposes silty soil, is slightly weathered but is not yet revegetated, consistent with a landslide occurrence of within about the last 10 to 15 years. The scarp continues downslope on the west side where its height decreases to about 2 feet, transitioning to the toe of the landslide. The toe is comprised of a deposit of soil and vegetation that rode over in-place ground downslope of it. The toe did not liquefy and continue as a debris flow, but deposited on an approximately 50 percent slope. Trees within the landslide area included straight conifer as well as some tilted and bowed conifer, probably from past movement. Some trees exhibited multiple crooks suggestive of multiple episodes of ground movement. The size of the slide appears generally consistent with the 1996 AKS report, although not all limits of the slide are well-defined.
- The home below the landslide is situated on a flat bench just below the area of recent movement. The ephemeral stream within the slide turns west at the north edge of this bench, directing water away from the house. No indications of recent landsliding were observed to extend to the bench from the recent landslide. The house appears generally plumb and lacking obvious damage from movement, based on our observations from off the property. We did note that at least one deck post on the west side of the home is out of plumb and some siding and flashing appears displaced/damaged, possibly due to movement of the deck/deck cover. It is not clear if the post has moved due to ground movement, wood decay or some other cause. We are unaware of any reports of structural damage. However, we understand that the driveway recently was affected by a ground crack as noted elsewhere in this report. We did not observe this cracking and we did not note any ground cracking near the home or that extended upslope to the recent landslide.
- Southwest of the home, a recent landslide was observed, again, centered on the stream that the subject landslide is centered on, but off of METRO property. This feature is labeled as Station 2 on Figure 2. This lower recent slide is defined by bare earth side and headscarps, similar to the subject side. The scarps expose similar soils and the soils and vegetation appear similar in type and age, suggesting that this lower slide happened approximately coincident with the subject landslide. Bowed trees are also present on this lower slide. The lower slide is on slopes that are about 50 to 60 percent gradient, on average.
- We did not observe other indications of recent landsliding at the site or nearby areas we traversed.
- When leaving the subject landslide, we observed a large graben feature, noted as Station 3 on Figure 2. Such a feature is typically associated with deep landslide movement such as that mapped southwest of the site.

CONCLUSIONS

Based on our evaluation and site observations, ground movement at the subject site is caused by a relatively deep translational landslide. The landslide is likely a natural feature which is primarily caused by the geologic conditions at the site and in the area in general. Although large landsliding is mapped south of the site, it is likely that this landsliding is larger than mapped and extends upslope to include the subject area. Alternatively the subject area could be a separate landslide caused by similar conditions. A depth of 12 feet as estimated by the AKS report is reasonable if the landslide is localized. If part of a larger feature, however, movement is likely complex and may include both shallow movement as well as displacement at a depth of many tens of feet. We believe the latter case is the more likely situation.

In addition to the geologic conditions, other natural factors that affect stability of the area include slope gradients, stream erosion, vegetation, and water conditions (rainfall and groundwater). Such landslides typically move when any of these factors are significantly altered, and in particular during years of extreme precipitation and/or periods of high ground water. They sometimes only move episodically in direct response to these extreme conditions, while at other times, ground movement may be ongoing with the rate varying with changes in these factors.

Anthropogenic factors can alter the rate of movement and/or expand the extent of such landslides. Changes in surface water drainage is generally the most significant, for example, by surface water that would normally flow into a separate stream but that is captured by the road network and routed to the landslide area. Significant grading (cuts and fills) can alter the landslide characteristics as well. Removal of vegetation can affect landsliding, but this is usually limited to shallow slides, and it has less of an affect on deeper sliding, such as that at the site.

From our experience with such landslides in similar soils, ground movement is likely to continue at the site in the future. Ground movement may not occur for many years, or may occur too slowly to be perceptible, until a year of extreme precipitation. During such a year ground movement is likely to accelerate and would be expected to reach a few feet to tens of feet in such a year. The area of active movement could also expand, either upslope or laterally. Movement could also include the bench upon which the home below is situated. Under some conditions, portions of the slide could move more rapidly than others causing severe distress to roadways or structures which cross zones of differential movement. Ground cracks and differential movement would be expected to affect roads. Foundation cracks, structural distress and cosmetic distress such as damaged interior finishes would be typical affects to structures.

Typically movement of deep landsliding such as that at the site is slow enough that there is sufficient time for people to evacuate areas at risk, so the threat to human safety is low. Although the risk of a rapid catastrophic failure is low, the toe or a portion of the toe of the landslide could liquefy and move as a debris flow. No METRO facilities are located within the path of such a landslide if it were to happen, so there is no risk to METRO facilities from such ground movement. The potential for such a landslide to damage the house below is present, however, although the risk is considered low due to site conditions.

RECOMMENDATIONS

Options to mitigate deep landslides, such as the large landslide we interpret as most likely present at the subject site, are limited due to the large mass of soil involved. Mitigating sliding of the shallower localized area only is possible, but would still require substantial effort. Options we discussed for consideration with METRO staff at the site include the following:

- Take no action. The landslide is largely a natural event. The culvert at the head of the ephemeral stream feeding the landslide has been removed as has the culvert at the drainage just west of it. Water routed to the slide area from the road between these two drainages may have some adverse affect on the subject landslide, but it is not likely to have a large impact on it. If no action is taken, the landslide will likely continue to move episodically during years of high precipitation. The landslide may expand both upslope and laterally, as well as downslope. The rate and magnitude that expansion and displacement will occur is unknown. It is not likely that catastrophic movement will occur.
- Complete road drainage improvements. As noted above, the existing road between the two drainages routes some water to the landslide area. The water could be routed outside of the subject landslide area and east of it. From our field reconnaissance, it appears that this option is feasible, but additional work would be needed to confirm grades are suitable and that the drainage to the east is sufficiently stable to receive the additional water. If this work is completed, it is expected to have a small stabilizing affect on the landslide. We do not have sufficient information to quantify the stabilizing benefit of these efforts, but we estimate it to be small. We would expect that the landslide area will still move in the future, even if this work is done. However, this measure may decrease the magnitude, severity and frequency of such movement.
- Install inclinometers in and adjacent to the landslide. Installing inclinometers has no stabilizing affect on the landslide. However, the inclinometer allows collection of data that would be needed for a more accurate understanding of the landslide and for use in mitigation. The inclinometers are also used to monitor the landslide to determine if it is expanding and/or movement is increasing which might indicate an increased threat to public safety.
- Complete more extensive stabilization efforts. Although not discussed in detail in this report, more aggressive stabilization measures could be undertaken. Such measures might include horizontal drainage, significant grading, or buttressing. For any of these options, inclinometer installation in conjunction with other exploratory work would be necessary prior to further consideration of such options.

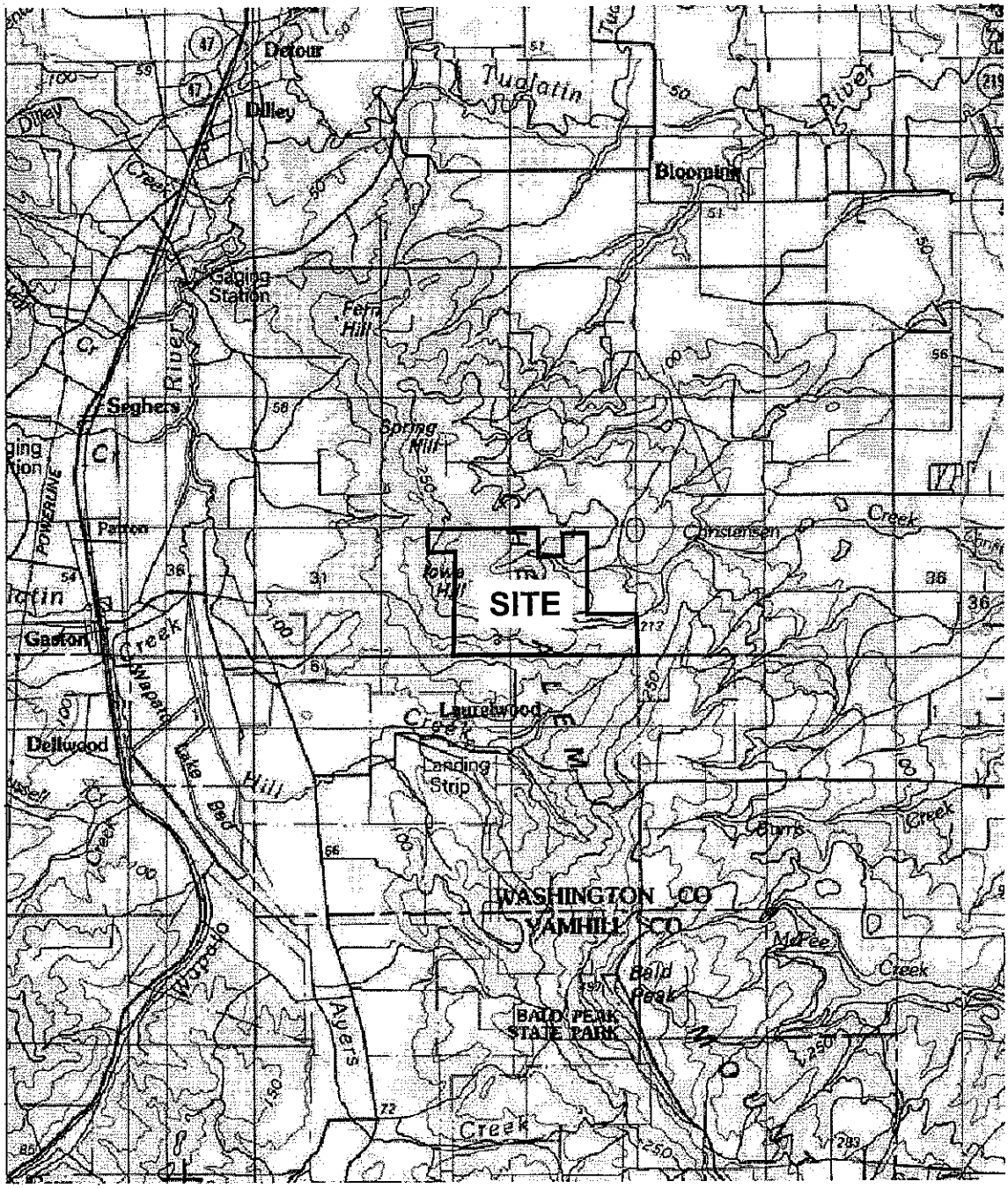
We can be contacted to further discuss any of the above options with METRO.

LIMITATIONS

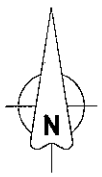
We have prepared this memorandum for the exclusive use of METRO and their authorized agents for evaluating geotechnical risk at the subject site. Our work was completed in general accordance with our services agreement. Our memorandum is intended to evaluate these specific geotechnical hazards as they relate to the subject site only. However, all development on slopes involves risks, only part of which can be mitigated through qualified geotechnical evaluation, engineering and construction practices. Favorable performance of structures in the near term does not imply a certainty of long-term performance, especially under conditions of adverse weather or seismic activity.

Our opinions are based solely on evaluation of existing information and our observations of site conditions at the time of our site visit. Subsurface explorations would be necessary to increase our confidence in actual site conditions and interpretation, and we can provide such services if requested. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty, expressed or implied, should be understood.

Document ID: 134400200Memo.doc



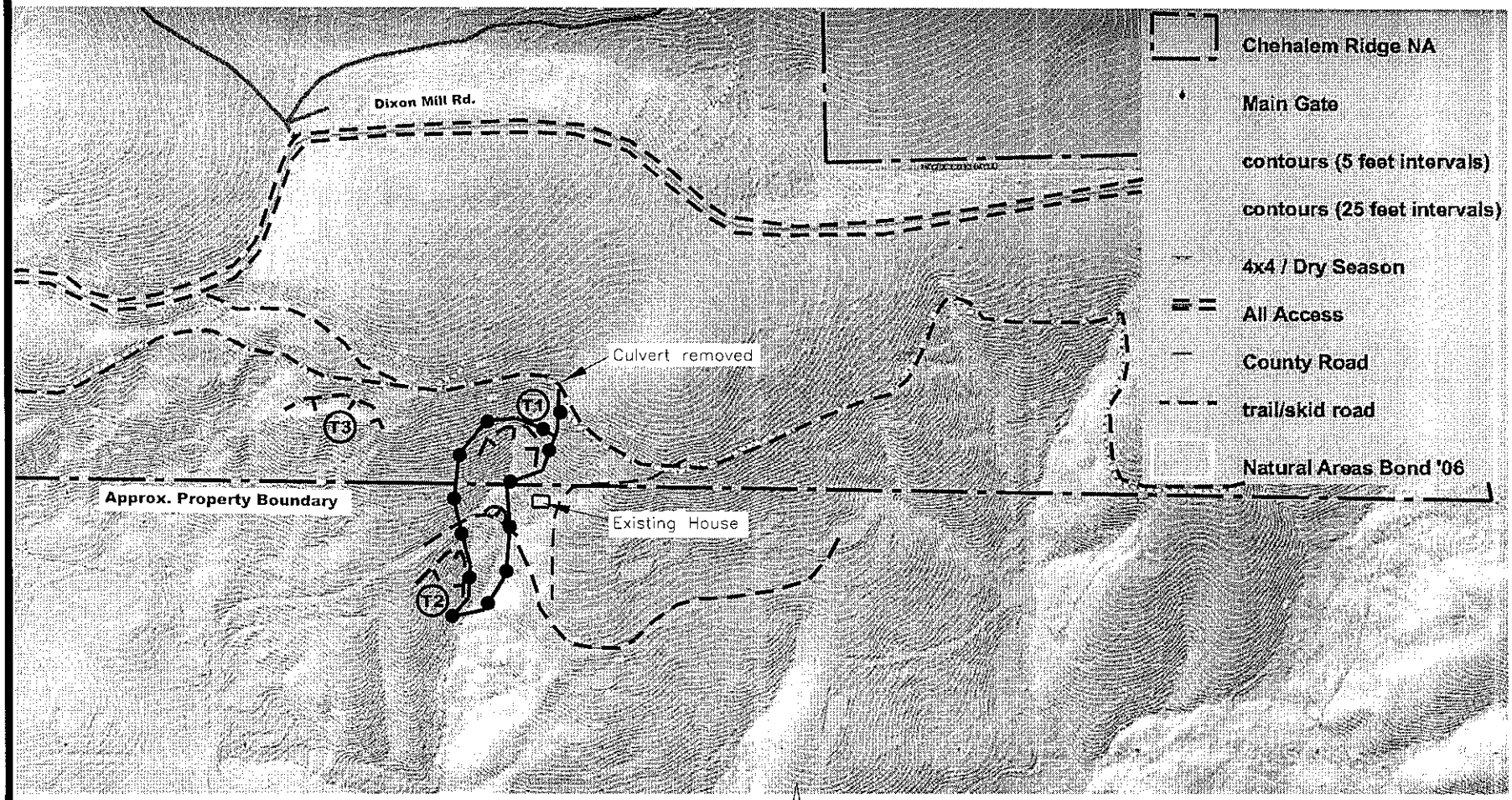
Base map created using National Geographic TOPO mapping application
Locations are approximate



0 1.0 2.0

Approximate Scale in Miles

DWG NAME:	Vicinity Map	
DESCRIPTION:	Chehalem Ridge Washington County, Oregon	
JOB NO.: 1344-002-00		DATE: 7/15/10
FILE NAME: 134400200F1 Vicinity Map.dwg		FIGURE 1



Legend

- Approximate alignment of field traverse
- Approximate location/extent of observed landslide
- (T2) Traverse Station (see text for discussion)

N

600 0 600

APPROXIMATE SCALE IN FEET

Base map adapted from "smChehalemLIDARHillshade.pdf"", prepared by METRO, undated. Original scale 1" = 666.7'. Traverse alignment and field observations from site sketch prepared by Pacific Geotechnical staff; all locations approximate.

DWG NAME:	Site and Traverse Map		
DESCRIPTION:	Chehalem Ridge Washington County, Oregon		
JOB NO.:	1344-002-00	DATE:	7/15/10
FILE NAME:	134400200F2 Siteplan.dwg	FIGURE	2