# Mapping and Preliminary Biological Description of DCLTA Keystone Project Property

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Report prepared for
the Denman Community Land Trust Association
by

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## Acknowledgements

The author wishes to thank Guy Marion, Harlene Holm and Concha Dennis for their assistance with this contract. In addition, gracious thanks to Pam Brons who allowed us to wander the land. Lastly, apologies and thanks to all the species, disrupted in their daily activities by my presence, and especially to those trampled, bumped or scared by my activities.

## Note

**High-lighting**: This report is high-lighted rather than having a summary abstract. It is hoped that in this way the reader can still scan for the major points but may also easily read the context for those points in the surrounding text.

# Mapping and Preliminary Biological Description of DCLTA Keystone Project Property

During December 2010-January 2011, the subject property of the Keystone Project of the Denman Community Land Trust Association (DCLTA) was measured with hard chain/compass with the assistance of Guy Marion. In addition, a handheld GPS unit[1] was used to describe the property's topography and features.

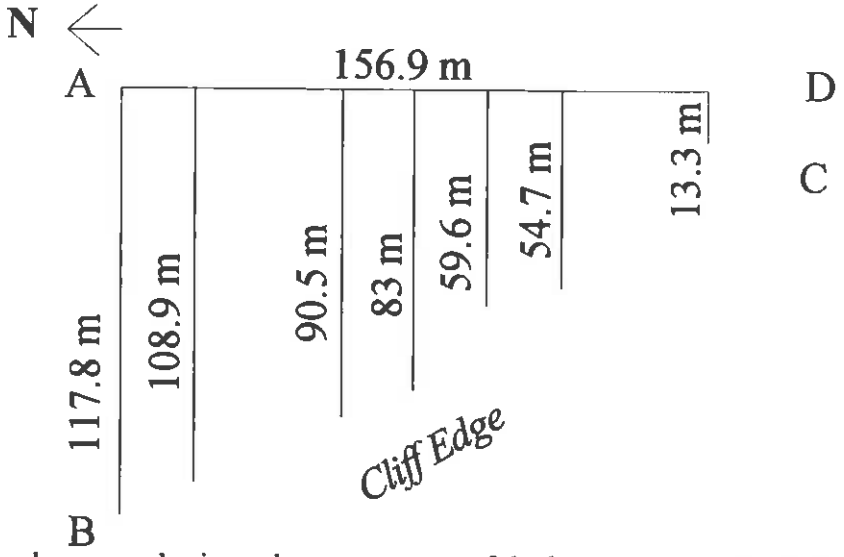
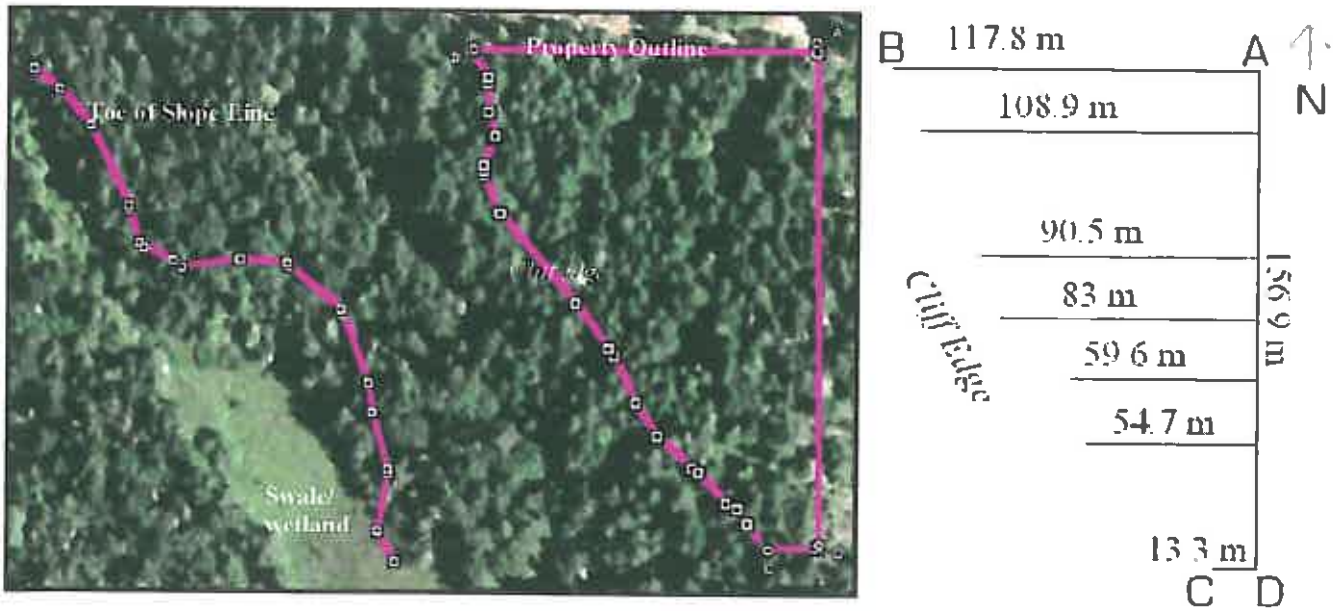



**Figure 1.** Chain and compass horizontal measurements of the keystone property. East-west transects starting from the eastern border were used to illustrate the cliff edge and property gradient (see Appendix 1).




**Map 1.** Property outline, also shown: toe (bottom) of steep slope bordered by a swale (using Google Earth). Also, measurements, from figure above, are included beside Map 1 of property.

[1] Garmin 60CSX : Key way points were averaged for a stated accuracy of less than ± 5m. Overall accuracy limited by forest cover & cliff slope.

## GPS Mapping Data and Biological Description

### Land Features

The Keystone Project property is located in the zone-classification - Coastal Douglas-fir moist maritime (CDFmm) biogeoclimatic zone, as well as in the BC Environment Ministry's classification of Georgia Depression-Ecoprovince, Georgia-Puget Basin-Ecoregion, and Strait of Georgia-Ecosection.

**Size & Topography**: The property is approximately **1.3 ha in a roughly triangular shape**. The land is approximately 160 m from north to south and varies from ~ 118 m along the northern border to ~13m along the southern border.

The **west-facing cliff** of the **Denman Island spine** forms the **western border of the property**. The cliff edge is not straight but instead has a slightly concave portion immediately south of the northwest corner, then the cliff edge bows out in a convex section and continues with slight undulations throughout the remaining length. The character of the cliff crest edge was probably formed by varying degrees of erosion and fracture of the tilted and resistant sandstone block that makes up the DI spine's surface geology. The **alternating beds of sandstone and conglomerate** typical of Denman's **de Courcy formation** can be seen on the cliff face (Photo 1). Very large moss-covered sandstone boulders can be seen lower on the cliff face, particularly beyond the north end of the property. The cliff face is made up of shear sections (Photo 1), as well as moderate to steep portions, ledges and tumbled rock slopes.

The **cliff crest**, at the property's western border, is a narrow, 1-3m, **roughly flat plateau**. In some cases the western edge of the cliff crest plateau dips slightly to the west before dropping over the cliff edge, as a major cliff/steep slope. To the east of this cliff crest plateau, the **property slopes down towards the east, with a general aspect** (direction) **of 60 degrees** (East-North-East). The steepest gradient of 9 to 16%, is east of the crest plateau for a distance of 12 to 30m and then the property flattens out to an average gentle grade of 4 to 7% to the eastern property border. There are **several fairly flat plateaus** across the land, especially just below the initial drop from the crest plateau. The **lowest** portion of the property appears to be a shallow dip near the northeast corner. The **highest** point seems to be on the crest plateau near the northwest corner (Map 2.)

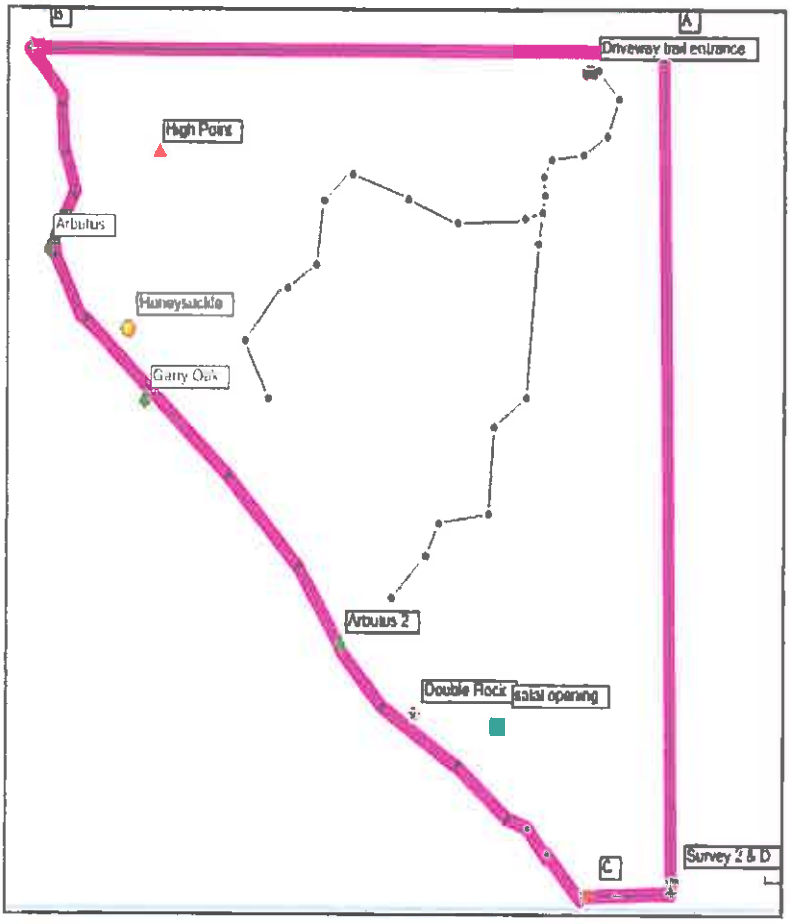
**Table 1**. Property features - GPS coordinates (Latitude/longitude & UTM)

| Feature | Location (Lat/Long) | Location (UTM) |
|---|---|---|
| A * | N49 32.648 W124 48.816 | 10 U 368803 5489527 |
| Arbutus | N49 32.627 W124 48.910 | 10 U 368689 5489491 |
| Arbutus 2 | N49 32.586 W124 48.866 | 10 U 368741 5489414 |
| B * | N49 32.648 W124 48.912 | 10 U 368687 5489530 |
| C * | N49 32.560 W124 48.828 | 10 U 368785 5489364 |
| D * | N49 32.561 W124 48.815 | 10 U 368801 5489366 |
| Double Rock | N49 32.578 W124 48.854 | 10 U 368754 5489400 |
| Driveway trail entrance | N49 32.645 W124 48.828 | 10 U 368789 5489523 |
| Garry Oak | N49 32.611 W124 48.896 | 10 U 368706 5489462 |
| High Point | N49 32.637 W124 48.893 | 10 U 368709 5489510 |
| Honeysuckle | N49 32.619 W124 48.898 | 10 U 368703 5489475 |
| Salal opening | N49 32.577 W124 48.842 | 10 U 368769 5489397 |
| Survey 1 | N49 32.653 W124 49.059 | 10 U 368510 5489543 |
| Survey 2 & D | N49 32.561 W124 48.815 | 10 U 368801 5489366 |

*(GPS points noted as * were collected by averaging 50 readings.)*

Overall, the property slopes through **upper and middle slope positions**. On these slopes, there is a small water-receiving site at the northwest corner of the property and other small water receiving sites on portions of the plateaus and also in depressions left by up-rooted trees. Soil pits were not dug but the soil was examined in eight perc test holes (Appendix 2). These holes had been dug down until a relatively impermeable layer was encountered and the depths ranged from 0.43 to 0.97m. The **soils were predominantly sand to loamy-sand with a large component of gravel** (Photo 2). The soil in one hole also had a cobble component and pieces of fractured sandstone were present in most holes. The soil **humus layer was very thin**, less than 4 cm.

**Map 2**. Property features.




**Vegetation**: Denman Island is situated at the northern limits of the **Coastal Douglas-fir biogeoclimatic zone** (CDFmm) and tends to have characteristics of both this zone and the zone immediately to the north, the Coastal western hemlock very dry maritime zone (CWHxm). The vegetation on this property is characteristic of plants in a fairly dry, moisture-shedding, fairly nutrient-poor site. The dominant site association and site series is between zonal (01) CDFmm (Douglas-fir salal) and 03 CWHxm (Douglas-fir Western hemlock salal).

The **vegetation on the property is fairly uniform** and consists of a young, 40-50 year old, regenerating, primarily **Douglas-fir** *Pseudotsuga menziesii* **forest** (Photo 3). The most noticeable characteristic of this forest is the **extensive blowdown** (Photo 4) of predominantly the smaller-diameter suppressed trees. However, more mature trees have blown down along the cliff crest and there are even some old growth veteran trees amongst the forest floor woody debris. The dominant Douglas-fir trees are approximately 40m high, with diameters at breast height (DBH) ranging from 210

to 480mm. Western redcedar *Thuja plicata* make up a smaller portion of the trees and are approximately 35m high with DBH measurements from 490 to 775mm. At least one of the redcedar has extensive fire-scarring. There are a few Western hemlock *Tsuga heterophylla*, primarily in the understorey and a few very young Grand fir *Abies grandis* in openings. A few Western redcedar snags are prominent and their death may have been due to lack of sufficient moisture in very dry-summers. Several of the conifers have bent trunk-bases but in varying directions. A few Red alder *Alnus rubra* are present in openings and most are quite small, except in two water-receiving sites, where they are 10 to15m high with DBH measurements from 160-190mm.

The forest **understorey is a mixture of mosses, Oregon grape** *Mahonia nervosa* **and salal** *Gaultheria shallon*, with the mosses being the most abundant and also covering much of the fallen woody debris. Step moss *Hylocomium splendens* is the dominant moss with large uniform patches (Photo 5). Other prominent moss species that mix with the step moss in some sites include Oregon beaked moss *Kindbergia oregana* (Photo 6) and electrified cat's-tail moss *Rhytidiadelphus triquestrus*. Many other moss species cover the bases of the trees, rocks and other small sites. Twin flower mixes with the mosses throughout the forest and the remains of last year's coral root orchid was seen. A few sword ferns *Polystichum munitum* occur intermittently, a very small amount of braken *Pteridium aquilinum* is present and occasional shrubs include baldhip rose *Rosa gymnocarpa* and red huckleberry *Vaccinium parvifolium.*

The cliff crest and cliff face, along the western property border, have other significant species, including a fairly large **Garry oak** *Quercus garryana* (Photo 7), which is just beginning to become overgrown and suppressed by young firs. Other tree species here include **arbutus** *Arbutus menziesii* **and big-leaf maple** *Acer macrophyllum*. **False box** *Paxistima myrsinites*, **licorace fern** *Polypodium glycyrrhiza*, **ocean spray** *Holodiscus discolour*, **honeysuckle** *Lonicera ciliosa* and a few grasses are found in the understorey along the crest. In addition, there are a number of old chainsaw-cut stumps up to 1m high and 260 to 750mm in diameter, as well as a few small holly plants on the crest. Adjacent to the property, at the toe/bottom of the cliff, there is a narrow wetland with both open-water and emergent vegetation, including cattails *Typha latifolia*.

**Trails:** The remains of several apparent old **skid trails** suggest that the property was probably clearcut logged, perhaps twice. The trails remain either as narrow primarily moss-covered corridors between the larger trees (Photo 8) or as small patches of very young trees with Dougals-firs up to 6m high with DBH up to 190mm. The trails tend to go across the property and then angle up the slope. One such trail is proposed as the driveway and this trail has a slope of 1% over 32m through the centre of the property.

**Wildlife:** No inventory assessments for wildlife species were undertaken, however species noted by sight, sound or sign during the property inspections were recorded (Table 2).

## Other Features:

**Borders/** The **northern** border is near the driveway of the adjacent property and the bordering land to the north has been extensively cleared and altered. Very young conifers are taking root in the cleared area along the border; however there are several other alterations including a large gravel pile, a pile of unwanted cement and a plastic drainage pipe, positioned over the cliff. The **southern and eastern** borders back onto a 40 ac lot that was clearcut, although a variety of trees, primarily of lower merchantable value, were left. Due to southeast prevailing winds and the exposure created with this neighbouring cleartcut, the southeast corner and border area of the Keystone property has considerable blowndown. The **western** border, as noted above, is the cliff on the Denman spine.

A red survey tag "RN Glover BCLS 634" was found on a redcedar at the toe of the cliff slope, near the wetland. A Bazett 6475 suvey tag is in the southeast corner of the Keystone property.

**Table 2.** Wildlife species noted on property.

| |
|---|
| Bald Eagle *Haliaeetus leucocephalus* |
| Chestnut-backed Chickadee *Parus rufescens* |
| Common Raven *Corvus corax* |
| Golden-crowned Kinglet *Regulus satrapa* |
| Hairy Woodpecker *Picoides villosus* |
| Pacific Wren *Troglodytes pacificus* |
| Pileated Woodpecker *Dryocopus pileatus* |
| Red-breasted Nuthatch *Sitta canadensis* |
| Spotted Towhee *Pipilo erythrophthalmus* |
| Ants *Formica sp.* |
| Black-tailed deer *Odocoileus hemionus* |
| Mink *Mustela vison* |
| Raccoon *Procyon lotor* |
| Pacific treefrog *Pseudacris regilla* |

**Conclusions:**

This property lies within a **Visually sensitive area** and in a **Development permit area**, as shown in Photos 9 &10. Thus, retention of the natural vegetation will be an important aspect of creating a dwelling area on this property.

**Visual sensitivity** can be retained by protecting the vegetation on the adjacent cliff and on the property's cliff crest from damage, disease, pollution and wind-throw forces. Wind-throw will be lessened if openings created on the property are small, not near large crest trees and generally away from the crest. Putting the dwelling in an existing opening or placing it behind the initial drop from the crest will help. A small forest opening for the dwelling will preserve the "forest appearance" of the Denman spine. Also, placing buildings at least 15m back from the cliff and not or very minimally disturbing surface vegetation in this buffer strip will help to protect the cliff and crest vegetation from other impacts.

Unfortunately as the trees grow, because the roots are fairly shallow, especially on the crest, and the trees demand for water will increase with size, they will become increasingly susceptible to weather effects such as high winds and droughts. Thus blow-down is likely to be a significant factor in this forest naturally and will be accentuated by human actions, unless care is taken.

The **development permit** over this property is intended to apply to land with **slopes of 60% or greater** and the goal is to **protect the natural ecosystems and biological diversity**, particularly to retain large trees. This property and the proposed dwelling area are not on the steep slope, however the setback of 15m from the cliff edge (steep slope) applies. In order to protect the adjacent cliff ecosystem, sensitivity to this property's cliff crest vegetation, as noted above, is recommended. Significant attention needs to be paid to the fact that down slope vegetation is highly influenced by

changes in light exposure (increased light will kill many forest mosses), moisture (such as runoff from any roof, driveway, drainage- tile or big-O-pipe), nutrients /pollutants (such as organic debris or nitrogenous run off or garden/lawn chemical runoff) and species composition (especially invasive species seed sources from disturbances above). Thus minimizing human-induced changes will assist in allowing intact native ecosystems to continue to develop.

Overall, over much of this property, the surface vegetation surface is very sensitive to disturbance. Due to the relatively shallow soils, fractured rock near the surface, low moisture and fairly low nutrient levels, recovering natural vegetation will be slow growing. The largely clear skid trails suggest that machine damage to the land surface many years ago has been followed by a slow recovery. The natural species composition of the site reflects these site characteristics and preserving these species will result in well-adapted natural ecosystems.

# Appendix 1

## DCLTA Keystone Project Measurement Data Summary

### Dimensions from Jan 8 2011 Data

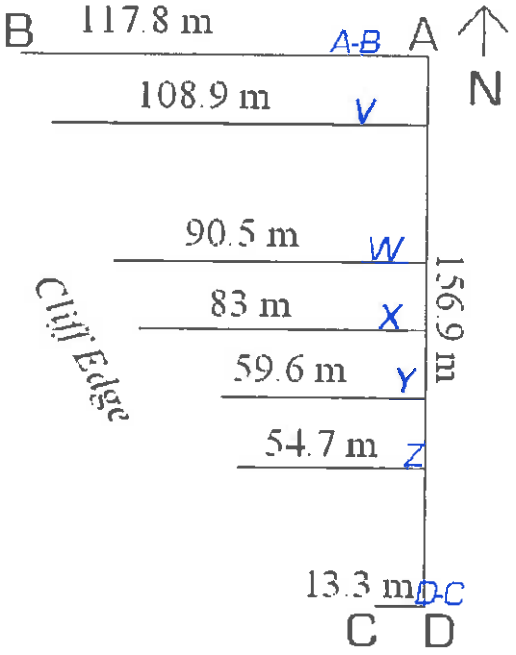
| Transect | D-C** | Z | Y | X | W | V | A-B |
|---|---|---|---|---|---|---|---|
| Location on Back Line (m) | 160m | 120m | 100m | 80m | 60m | 20m | 0 North border |
| Measure # 4° to # 5 | | | | 4.5 | 2.8 | 6.5 | |
| Slope* 5 to 4 | | | | 20 | | 43 | |
| Hor.^ Distance 4 to 5 | | | | 3.6 | 2.8 | 3.7 | |
| Measure # 3 to # 4 | | | 7.5 | 18 | 33.1 | 30.2 | |
| Slope 4 to3 | | | 43 | -3 | -11 | -9 | |
| Distance 3 to 4 | | | 4.3 | 17.5 | 29.5 | 27.5 | |
| Measure # 2 to # 3 | | 8.4 | 9.4 | 14.3 | 11.3 | 33.1 | 23.9 |
| Slope 3 to 2 | | 44 | -2 | -16 | -5 | -4 | 11% |
| Distance 2 to 3 | | 4.7 | 9.2 | 12 | 10.7 | 31.8 | 21.3 |
| Measure # 1 to # 2 | | 14.8 | 23 | 9.3 | 50 | 21.8 | 50 |
| Slope 2 to 1 | | -2 | -13.5 | -5 | -5 | -4 | -3 |
| Distance 1 to 2 | | 14.5 | 19.9 | 8.8 | 47.5 | 20.9 | 48.5 |
| Measure # 0 to # 1 | 15.2 | 39 | 28.2 | 42.25 | 32.7 | 26 | 50 |
| Slope 1 to 0 | -12.5 | -9 | -7 | -5 | -5 | -4 | -4% |
| Distance 0 to1 | 13.3 | 35.5 | 26.2 | 41.1 | 31.1 ~ | 25 | 48 |
| Total Transect Distance | 13.3 | 54.7 | 59.6 | 83 | 90.5 | 108.9 | 117.8 |

| Back Line | D to A |
|---|---|
| Slope & Distance Between East Border Stakes | |
| Measure 160 to 120 | 40 |
| Slope 120 to 160 | 0.5 |
| Distance^ 120 to 160 | 38.8 |
| Measure 120 to 70 | 50 |
| Slope 70 to 120 | 2 |
| Distance 70 to 120 | 49 |
| Measure 70 to 40 | 30 |
| Slope 40 to 70 | 0 |
| Distance 40 to 70 | 30 |
| Measure 40 to 20 | 20 |
| Slope 20 to 40 | 2.5 |
| Distance 20 to 40 | 19.5 |
| Measure 20 to 0 | 20 |
| Slope A to 20 | -2 |
| Distance 0(A) to 20 | 19.6 |
| Back Line Distance | 156.9 |

** Transect east-west line, see drawing below.

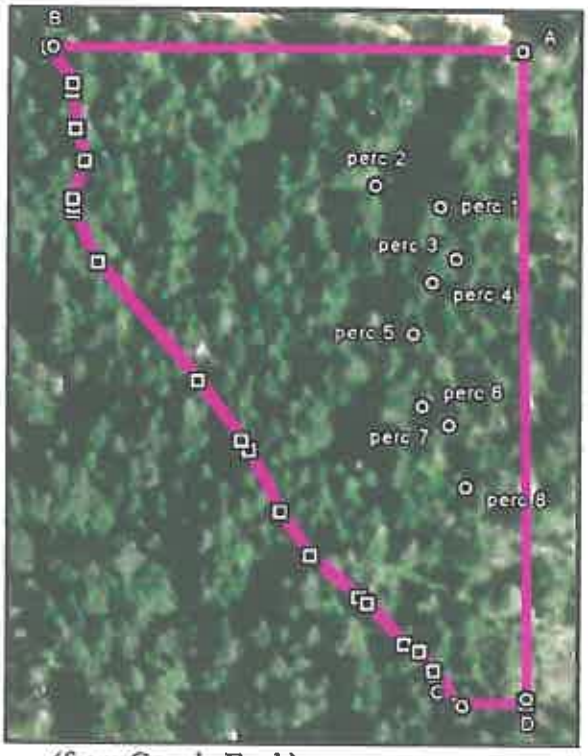
° Measurement sites along transects went from # 0 along back line (E border) to # 5 at cliff edge (West border).

* Slope is % & "-" = down from west to east, otherwise up ^ Horizontal distance in m ~ distance to trail/future driveway



# Appendix 2

## DCLTA Keystone Property Perc Test Holes




**Map 3.** Perc test hole locations (from Google Earth).

**Table 2.** Perc test holes – GPS coordinates (UTM & Latitude/longitude).

| Perc Hole Number | Location (UTM) | Location (Latitude/Longitude) |
|---|---|---|
| perc 1 | 10 U 368782 5489488 | N49 32.627 W124 48.833 |
| perc 2 | 10 U 368766 5489494 | N49 32.629 W124 48.846 |
| perc 3 | 10 U 368785 5489475 | N49 32.620 W124 48.830 |
| perc 4 | 10 U 368779 5489470 | N49 32.616 W124 48.835 |
| perc 5 | 10 U 368775 5489457 | N49 32.610 W124 48.838 |
| perc 6 | 10 U 368776 5489439 | N49 32.600 W124 48.836 |
| perc 7 | 10 U 368783 5489434 | N49 32.598 W124 48.831 |
| perc 8 | 10 U 368787 5489419 | N49 32.589 W124 48.828 |

Perc test hole locations were determined from GPS findings taken on three different days. For each GPS finding at least 50 three readings were average.

## Epilogue Note

**Personal comment**: I feel it is necessary, as a biologist, to personally comment on my difficulty in completing this preliminary biological assessment as part of a dwelling-permitting process. My difficulty relates NOT to this property and its intended alterations, but to the surrounding landscape, particularly to the human impact on the biology of the adjacent property to the north. If visual protection and environmental sensitivity, including retaining trees and protecting sensitive ecosystems and biological diversity, are the intended goals of the permitting process in a visual sensitive and steep slope development permit area, then how could this have occurred...

## DCLTA Keystone Project Report Photos

**Photo 1** Sandstone / conglomerate adjacent cliff face.

**Photo 2** Perc hole and exposed soil.

**Photo 3** Douglas-fir forest.

**Photo 4** Trees blow down, both small and large.

**Photo 5** Step moss predominates on forest floor.

**Photo 6** Oregon beaked moss combines with Step moss.

**Photo 7** Garry oak on cliff face adjacent to property.

**Photo 8** Driveway trail.

**Photo 9** Visually Sensitive Area.

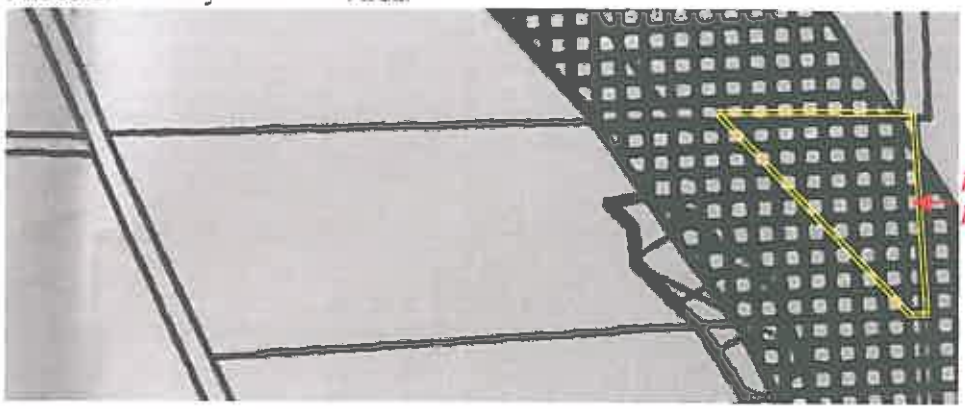



**Photo 10** Development Permit Area #2. Steep slopes.