

## Seismic survey — Windermere subdivision

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### Introduction

A subdivision has been proposed at Windermere, on Windermere Farm owned by R. H. Harris. In accordance with landslip legislation doubtful risk properties must be closely examined in order that a recommendation for subdivision may be made. The property is located west of the Windermere to Swan Bay road at Windermere. The land slopes gently to the River Tamar but does have two distinct benches within the boundaries of the property.

Apart from a few small clay outcrops beneath basalt talus along the river banks and some gravel-rich soils at the eastern side of the property the slopes are covered by basalt soils and talus. No definite basalt outcrops have been recognised on the property.

A seismic survey was undertaken to determine whether in fact basalt was present, how much talus was involved and if the main materials present were Tertiary clay and sand.

### Details of the survey

Spreads were located at the northern edge of the property on the high points in order to locate the basalt source. The distinct step to the high areas is suggestive of a basalt/clay situation. Other spreads were located on the benches between the river and the high points. All spreads were 170 m long with shot points at 15 metres.

### Results

Detailed below are typical velocity profiles, and thicknesses in each zone of the property.

#### *High level areas (20% of the area):*

$V_0 = 400\text{--}500$  m/sec;  $t = 3\text{--}5$  m  
 $V_1 = 1100$  m/sec;  $t = 0\text{--}6$  m  
 $V_2 = 1600\text{--}1650$  m/sec;  $t = >30$  m

#### *Slope change at back of bench:*

$V_0 = 450$  m/sec;  $t = 4\text{--}6$  m  
 $V_1 = 1450$  m/sec;  $t = 3\text{--}4$  m  
 $V_2 = 1500$  m/sec;  $t = 12\text{--}13$  m/sec  
 $V_3 = 1000\text{--}1900$  m/sec;  $t = >30$  m

#### *Wide bench to river (70% of the area):*

$V_0 = 400\text{--}600$  m/sec;  $t = 3\text{--}5$  m  
 $V_1 = 1500\text{--}1700$  m/sec (1650 m/sec);  $t = >30$  m

Velocities in the range 400 to 750 m/sec represent soil and talus. The thickness of this material appears to be very uniform with the exception of the slope areas. It is likely that this low velocity layer may also include weathered clay. Several holes dug for shot points revealed clay at less than 2 m depth.

Velocities in the range 1100 to 1500 m/sec represent weathered Tertiary sediments. Significant weathering profiles were only recorded uphill of the bench areas. Even so there are wide variations in thickness.

The velocity of 1650 m/sec was most commonly recorded across the property and is considered to represent consolidated Tertiary clay. A higher velocity was recorded in one small area but is unexplained.

An apparent high velocity layer (3000 m/sec) was suggested by one group of geophones at the group of trees high on the slope near the boundary fence between the two sections of the property. As results in spreads to the southeast, southwest and northwest do not reveal any such layer it is concluded that these geophones were located on outcrop, or near outcrop, of basalt resulting in early arrivals. The width of the outcrop is about 30 metres.

## **Conclusions**

There is virtually no outcropping basalt within the property area and the source of the 3–5 m thickness of talus must be still further upslope. The predominant material present is Tertiary clay. No basalt is interbedded within at least 30 m of the surface.

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