TASMANIA
DEVELOPMENT
AND RESOURCES

Mineral Resources Tasmania

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Monitoring of landslides at Windermere

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PICKETT — 1986–1993

In September 1986 a line of nails, approximately 263 m long, was placed in the bitumen road in front of Mrs Pickett's house at Windermere. The approximate location of this investigation was 501 500 mE; 5 426 060 mN. The line extended 100 m to the west of the house and 163 m to the east of the house (fig. 1).

The '00' nail was at the western end of the line. The results of cumulative movement, taken approximately every three to four months, were:–

Distance	*Cumulative downhill movement*
88 m nail (opposite the west side of the house)	-10 mm
103 m nail (opposite the east side of the house)	-8 mm
140 m	-58 mm
164 m (last nail)	-27 mm

Therefore the most movement took place 40 m to the east of Mrs Pickett's house.

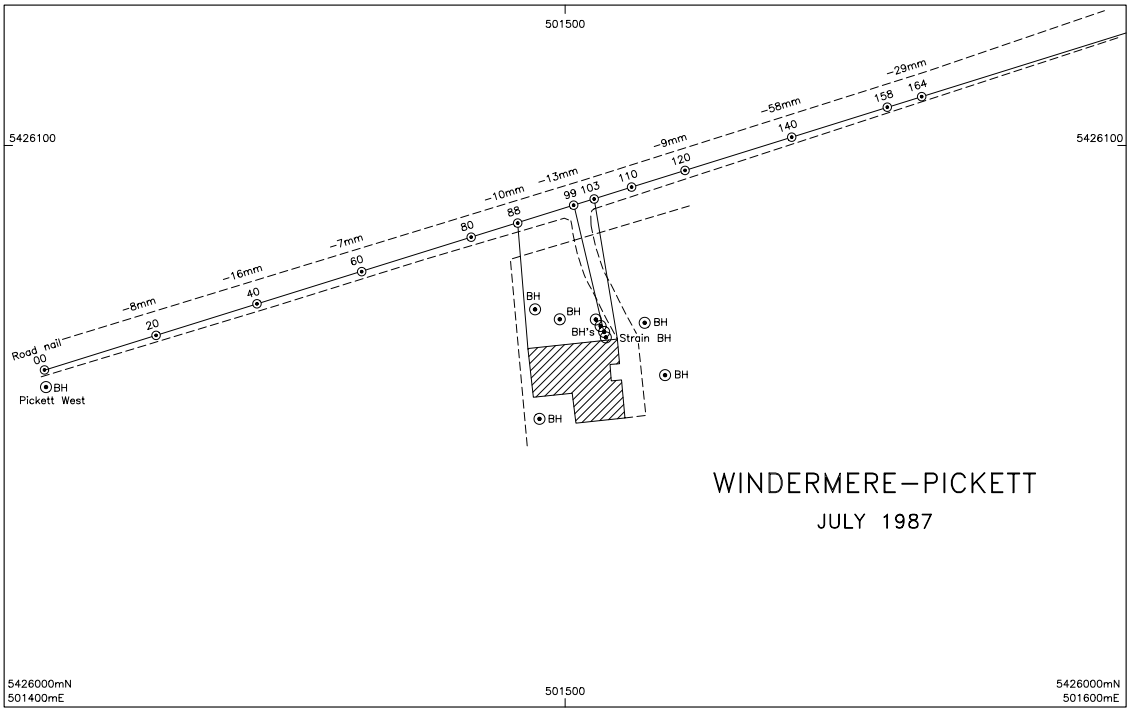
Measurements were taken with a steel tape to the house from the 88 m nail and the 103 m nail. Temperature corrections were applied and tension used, by applying a spring balance.

These distances shortened correspondingly to the downhill movement of the road nails, therefore suggesting the house did not move downhill.

Levelling was carried out around the house to nails put in the brick courses on each corner. This gave a good indication of the rise and fall of the house due to the clay expanding and contracting over winter and summer. This range of movement was approximately 20 mm relative to the borehole rod/west opposite the '00' nail, this rod being used as an arbitrary datum.

The levelling did seem to indicate that the right side of the house (west) did not subside overall, whilst the left side of the house (east) did, especially the left front (NE) corner. The front left corner appeared to subside approximately 40 mm over the period 1986 to 1993.

With all monitoring surveys, the end points and the level datum are assumed to be stable and the results are based on this assumption.



ASPINALL — 1987–1993

In 1987 a line of nails were placed in the bitumen road outside Mr Aspinall's house.The approximate location of this investigation was 501 720 mE; 5 426 120 mN.

The line extended 25 m to the west to the '00' nail and eastward 102 m to the 127 m nail. The 25 m nail was opposite the west side of the house and the 37 m nail opposite the east side of the house (fig. 2).

The results of measurement of cumulative movement taken every three to four months from 1987 to 1993 were:–

Distance	*Cumulative Movement*
16 m	-10 mm
25 m	-125 mm
37 m	- 75 mm
51 m	-12 mm

Most movement took place opposite the west side of the house, evidenced by the distinct 'bump' in the bitumen road.

Measurements were taken to the front corner of the house from the 25 m and 36 m road nails. Tension and temperature correcting were applied. The house did not appear to have moved downhill. Measurement to the house was made difficult as the front bushes grew larger.

Levelling was also carried out to nails in each corner of the house and gave the following results:–

1. The rear of the house may have lowered overall approximately 12 mm. Winter to summer variation due to expansive clays was approximately 10 mm to -26 mm.

2. The front of the house may have lowered overall approximately 5 mm, with its winter to summer variation due to the expansive clays being approximately 6 mm to a maximum -9 mm lowering.

The levelling was carried out using the west BH rod of Pickett's as its datum. As with all monitoring surveys, the end stations are assumed to be stable, and the results are based on this assumption.

When comparing the datum points from Pickett BH rod/west (the datum used for both houses), the following observations were noted:–

1. The Pickett gauge in front of the house moved up and down because of expansive clay, with observations of +4 mm and -14 mm respectively.

2. The Pickett BH rod/east lowered less than 7 mm.

3. The Aspinall BH rod/west moved +4 mm to -20 mm.

4. The Aspinall strain gauge BH/rod moved +2 mm to -6 mm.

5. The Aspinall road nail/east moved -24 mm to +24 mm.

This shows that borehole rods, three metres long inserted into the ground, are far more stable than surface nails in the bitumen.

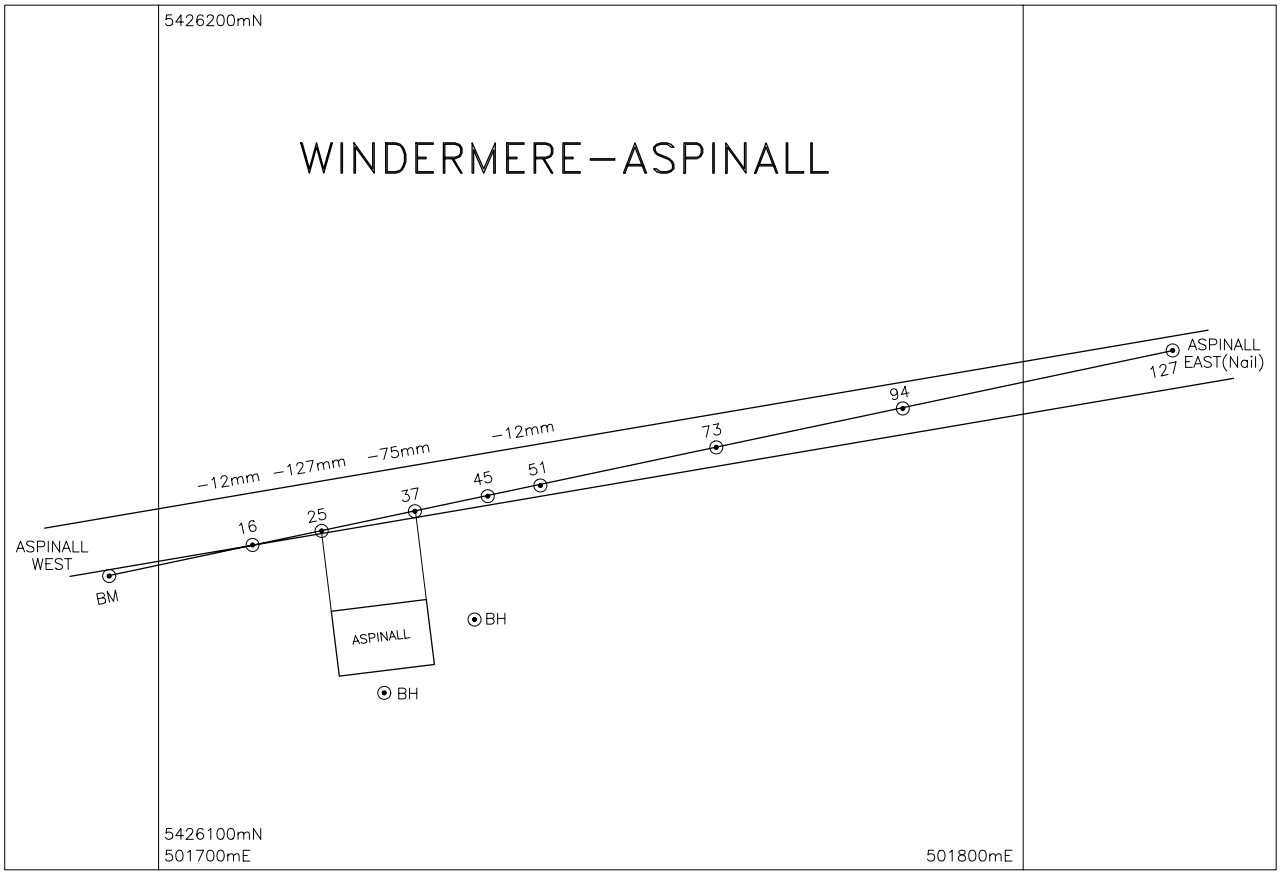


Figure 2

BOYLES — 1986–1993

In 1986 a line of nails was placed in the bitumen road in front of Mr Boyles house from a '00' nail to 109 m nail.The approximate location of this investigation was 502 403 mE; 5 425 945 mN. (fig. 3)

The '00' nail was 25 m west of the west side of the house over the borehole rod, while the 109 m point was 69 m to the east of the eastside of the house.

Surveys were carried out approximately every three to four months. Cumulative movement details were as follows:–

Distance	*Cumulative Movement*
20 m	-12 mm
28 m (opp. west side of house)	+21 mm
40 m (opp. east side of house)	-2 mm
50 m	+20 mm
60 m	+1 mm

Distances were also taken to the front corners of the house, applying tension with a spring balance and applying temperature correction. These measurements showed that there was no apparent downhill movement of the house.

Levelling was also carried out to the corner of the house, nails being drilled into the concrete foundations of this weatherboard house. The results showed that the right hand side of the house moved up and down from winter to summer, due to the expansive clays, approximately - 8 mm to +60 mm.

The left hand side of the house moved -18 mm to +13 mm. The datum for the levels was a BH rod approximately 160 m to the west of the house, along the road.

As with all landslip monitoring, the end stations are assumed to be stable, as is the BH rod for height control, and all the results are on this basis.

[17 July 1993]

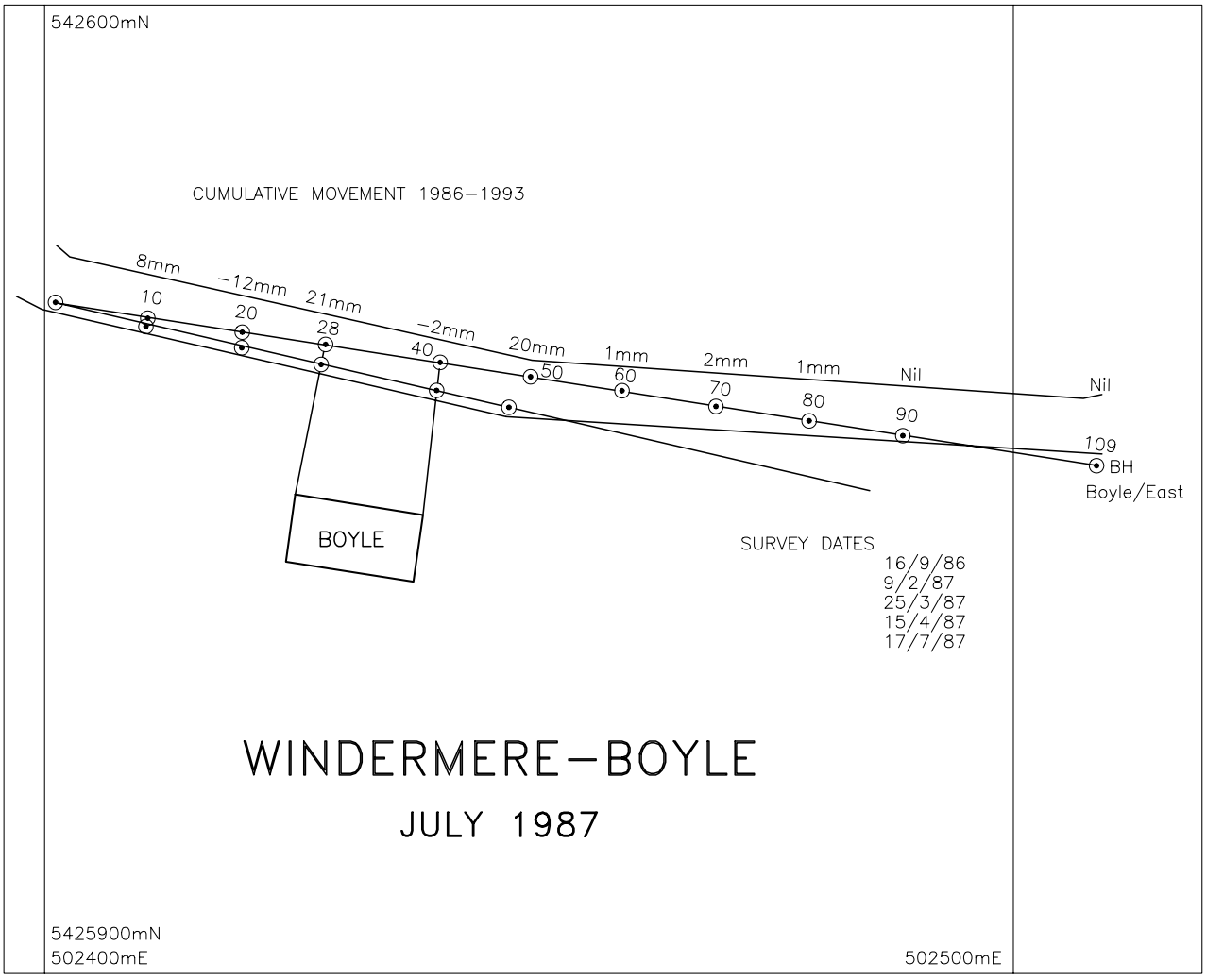


Figure 3