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Corangamite Catchment Management Authority and the City of Greater Geelong

A.S. Miner Geotechnical

Case Study for Erosion and Landslides.

Simpson - Princetown Rd, Princetown
(Bouwman's Slide)

Report No: 356.3/03/06

Prepared for Troy Clarkson
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and

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1. Site Description

1.1 Site I.D.

356.3/03

1.2 Site address

Lot 232 Simpson-Princetown Rd, Princetown

1.3 Brief site description

The landslide is situated in slightly to moderately incised, gentle to moderately sloping terrain where little of the native vegetation remains. The slide is located on the western flank of a north south ridge towards the crest. There is a limited catchment area for surface runoff.

1.4 Map datum/ Map projection/ Zone

AMG Zone 54 (AGD 66)

1.5 Easting

E685480

1.6 Northing

N5721290

1.7 Municipality

Corangamite

1.8 CCMA landscape zone

Gellibrand

1.9 Previous ID

Not previously recorded

1.10 Previous Data Source

Not previously recorded

2. Hazard Description

2.1 Soil degradation type

Landslide

2.2 Soil degradation sub-class

Translational slide

2.3 Description of hazard present on site or threatening site from above or below

The landslide consists of two blocks with the southern block being defined by extremely fissured soil and encompassing very uneven ground. The northern block lies directly adjacent and is defined by tension cracks on its northern and eastern boundaries.

The slide is essentially a shallow translational landslide occurring on gentle slopes (8 to 10 degrees.) The slide extends to the north beyond the property boundary and intersects the Simpson-Princetown Rd. The toe of the slide is located in the lower paddocks of the site whilst the southern block intersected the dairy and shed. The northern block partially intersected the house.

2.4 Dimensions of Hazard (width, length and depth if appropriate)

80m (W) x 130 m (L) x 3.0 to 4.0 m (D). Later inclinometer monitoring showed the depth of failure may have been of the order of 7.0 m

2.5 Extent of Hazard (spatial area and volume if appropriate)

Approximately 1 ha and volume approx 40,000 m³

2.6 Magnitude of hazard (travel distance or rate of occurrence)

The toe of the slide is thought to have travelled approx 5 to 10 metres and movements of up to 2.0 metres have been measured on the slide body itself

2.7 List previous reports or studies relevant to this site

“Neilson JL and Cooney AM. 1981. Report of Reconnaissance Inspection of Landslides at J.A. Bouwman’s property near Princetown” GSV Unpublished Report.1981/27.

Cooney AM 1981. Preliminary report on landslide at J.A. Bouwman’s, Princetown-Simpson Rd Shire of Otway, approximately 6km north wets of Princetown. GSV Unpublished Report 1981/144.

Cooney AM 1983. Final report on landslide at J.A.Bouwman’s Princetown-Simpson Rd Shire of Otway, approximately 6km north wets of Princetown. GSV Unpublished Report 1983/15.

Giedl JG. 1984. Soil movements on the landslide at J.A.Bouwman’s property near Princetown between 1982 and 1984. GSV Unpublished Report 1984/83.

Miner AS 1999. An investigation of a landslide in Gellibrand Marl in the Heytesbury Region, Victoria. Master of Applied Science thesis University of Ballarat.

2.8 Custodian of previous reports and studies

All copies held by A.S. Miner Geotechnical

3. The Event Has Already Occurred

3.1 Date of first occurrence

Aerial Photo interpretation suggests initial occurrence in the early 1950's after clearing of the Heytesbury.

3.2 Date of most recent re-activation or acceleration

The small initiating slide to the current movement occurred circa 1972. Major movement then noted in October 1979 and again in August 1980. Significant movements were again noted in August to September 1981. The slide has continued to remain active although movements were probably only minor through the 1990's due to relatively dry conditions. The last inspection of the site after heavy rains in June 2006 indicated further movements are still occurring.

3.3 Actual or postulated trigger event including magnitude and duration

It is clear that the removal of native trees and vegetation probably initiated the initial movement in combination with frequent rainfall events. Subsequent rainfall events have triggered further movement. (Potential trigger events include 70.0 mm on the 21/01/1979 and 68.0 mm on 11/11/1979)

3.4 Frequency of Trigger Event if known

No specific research has been carried out into the return periods of these events. (70.0 mm is ranked 5th of 13748 daily rainfall records and 68.0 mm is ranked 6th out of 13,748 daily rainfall records. Both have Antecedent Rainfall Probability Exceedance Threshold (or ARPET) values = 0.035%)

3.5 What damage or impact occurred?

Ongoing damage to the road has occurred requiring regular maintenance

Vic Roads have also been involved with improving drainage at the site.

Loss of a dairy, garage and hay shed occurred in 1981. Fencing and gates were also affected. Significant disruption to dairying land also occurred requiring the fencing off and remedial planting. The viability of the property as a dairy farm was destroyed after 1981 and the site was sold to the penultimate owner as a hobby farm

Ongoing movements throughout the late 90's and early 2000's resulted in non serviceability of the dwelling and its removal circa 2005.

3.6 Was there a risk of injury or loss of life?

Early damage to the road could have been dangerous for unsuspecting vehicular travellers. Generally the slide does not seem to have posed an immediate threat to any of the inhabitants of the dwelling.

3.7 How important was it?

This is a significant occurrence in the district as it represents the total loss of a valuable farming property and ongoing maintenance issues for the Shire.

3.8 What asset classes were impacted?

Land use

Infrastructure

3.9 What asset sub classes were impacted and what are the asset values?

Dairying land=5

Road, buildings (house, dairy garage) and fencing=8

3.10 How severely were assets impacted?

Assets such as dairy pasture buildings were severely impacted to the point of catastrophic damage and total loss of assets.

Road damage is ongoing and moderate to high

3.11 Estimated cost of impact

3.11.1 \$ Cost of loss of asset

Loss of house estimated \$150,000

Loss of dairy, sheds and garage estimated \$60,000

Loss of viable dairy pasture estimated 5 ha at \$9,600 ha = \$48,000

3.11.2 \$ Cost of any investigation prior to failure of occurrence

GSV estimated \$50,000-100,000

A.S.Miner \$12,000

VicRoads \$25,000 (bores inclinometers readings)

3.11.3 \$ Cost of prior remediation works

Deep drain at head of slide and ongoing maintenance by Vic Roads \$454,000 (This value may possibly include buy out costs by VicRoad)

Tree planting 3 ha at \$1500/ha = \$4500

3.11.4 \$ Cost of any prior monitoring or maintenance

Survey monitoring (see VicRoads remediation costs)

3.11.5 Disruption to business (qual)

Loss of a viable farm

3.11.6 Social and cultural impact (qual)

Loss of home

3.11.7 Impact on environment (qual)

Minimal

4. Remediation Has Already Been Undertaken

4.1 What remediation option was used?

Tree planting and deep drainage at the head of the slide

4.2 How was the site initially assessed?

Geological Survey of Victoria

4.3 How was the remediation designed and by Who?

Initial tree planting initiated by the then owner Jos Bouwman. The deep drain was designed by the Shire.

4.4 Did it require specialist equipment or subcontractors?

The deep drain was installed by Shire contractors using standard excavators and trucks

4.5 How effective has the remediation been?

Not effective at all as the slide continued to move and in fact there is some suggestion that the deep drain may have added to the problem.

4.6 How was the effectiveness judged?

Ongoing survey monitoring through the mid 1980's and visually and with new instrumentation and survey in the late 1990's

4.7 Would other treatments worked here?

Yes as described in Miner 1999. these include possible slope geometry modification cut and fill, removal and replacement of poor quality low strength material, chemical modification to soil layers through osmosis, extensive subsurface drainage via mole drains or trench drains, anchoring, soil nailing and dowel piling

4.8 Was it early intervention or reactive?

All existing remedial works have been reactive

4.9 What was the cost of remediation (including design, construction and implementation)?

Information obtained from VicRoads indicates \$454,000 has been budgeted and spent at the site since 1999

4.10 How was the remediation funded?

The previous owner Mr Jos Bouwman probably funded the tree planting himself to protect his property. The Shire appears to have funded the deep drain as part of the road maintenance budget.

5. Ongoing Review and Monitoring Requirements

5.1 What is the likely ongoing monitoring and review strategy?

No ongoing monitoring program is planned by the Shire although VicRoads intend to continue to monitor inclinometers installed in 2004

No plans by University of Ballarat to continue any student projects but this cannot be ruled out in the future if the right student was available.

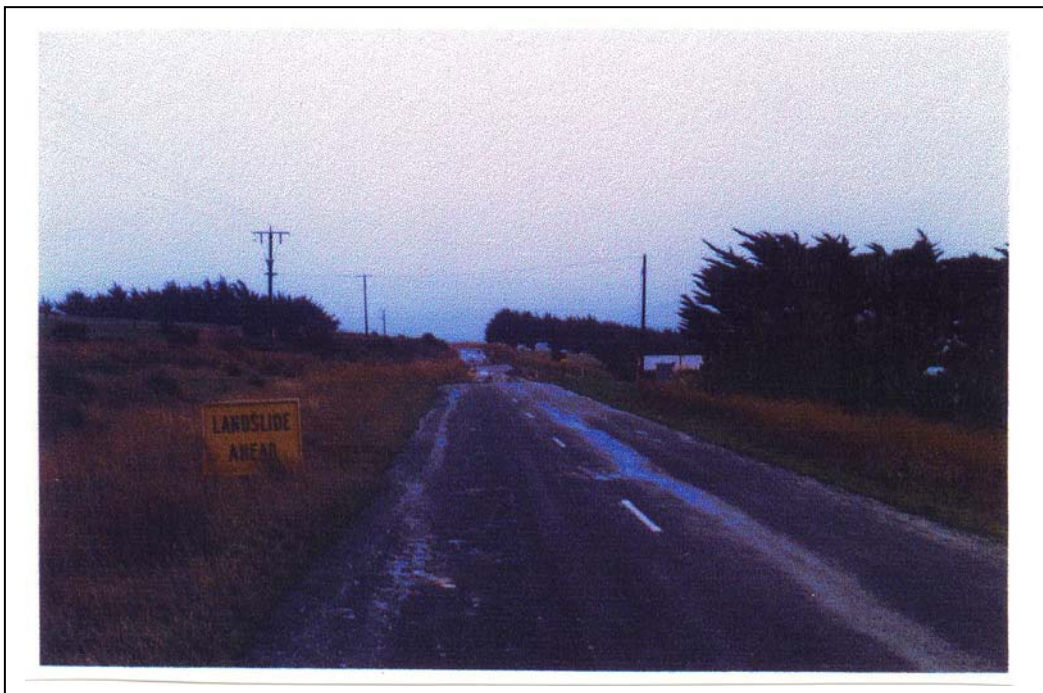
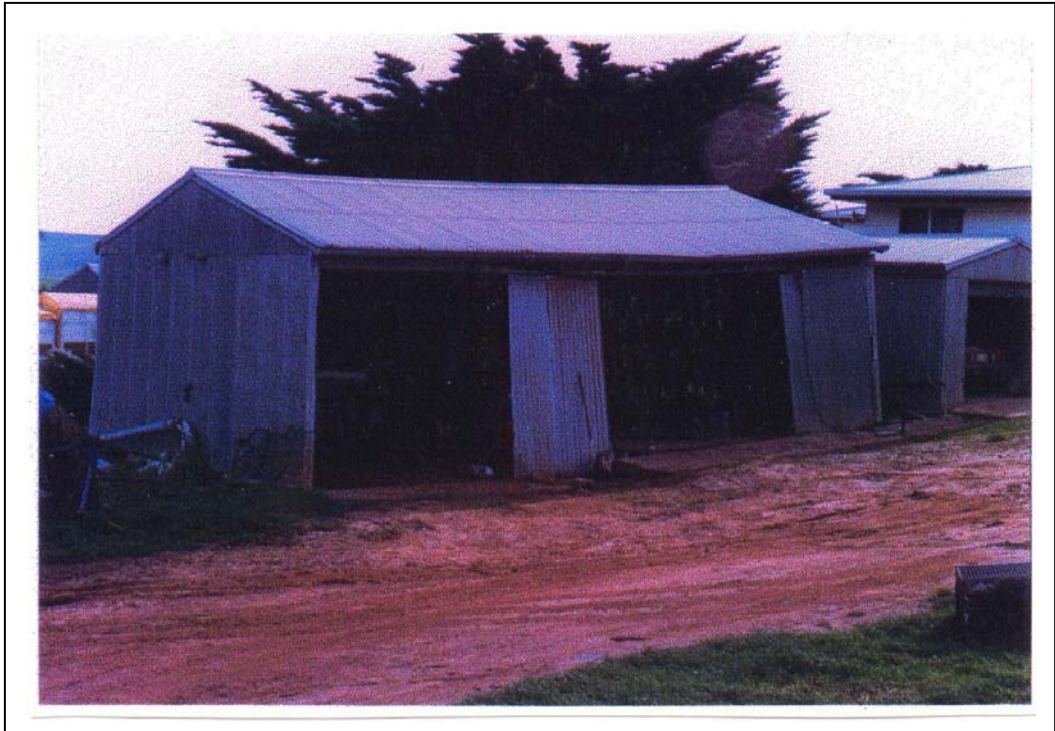
5.2 What is the nature of future monitoring and maintenance?

Ongoing survey and inclinometer monitoring

5.3 What are the likely costs of monitoring and maintenance?

Based on previous costs ongoing monitoring may be of the order of \$25,000

Photos



Photos



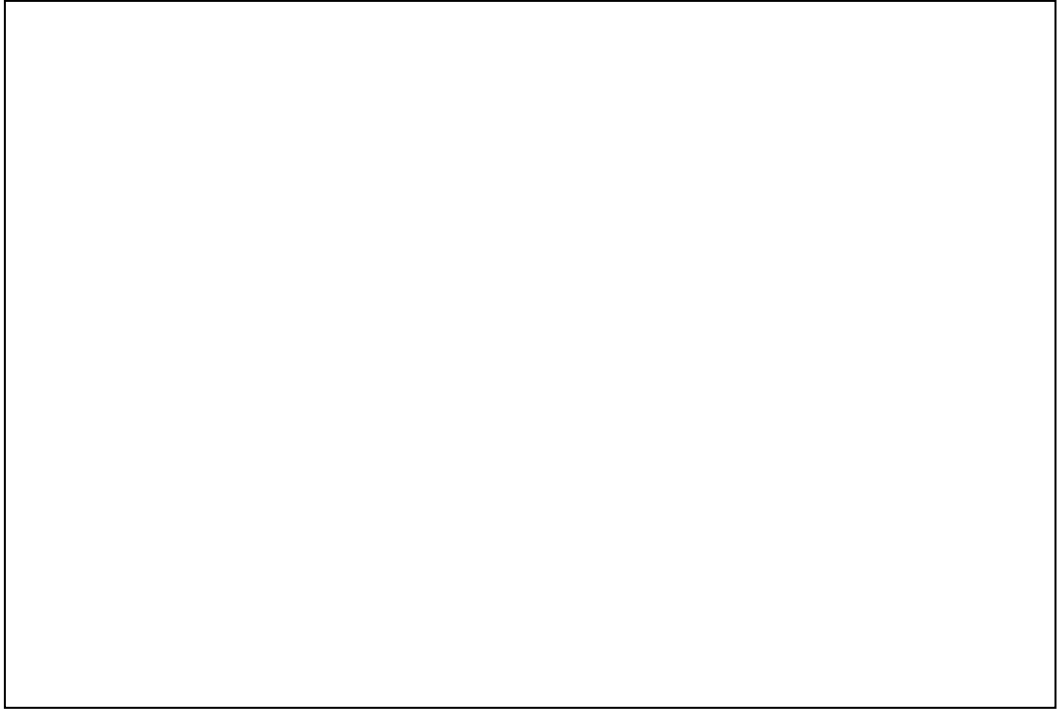
Photos



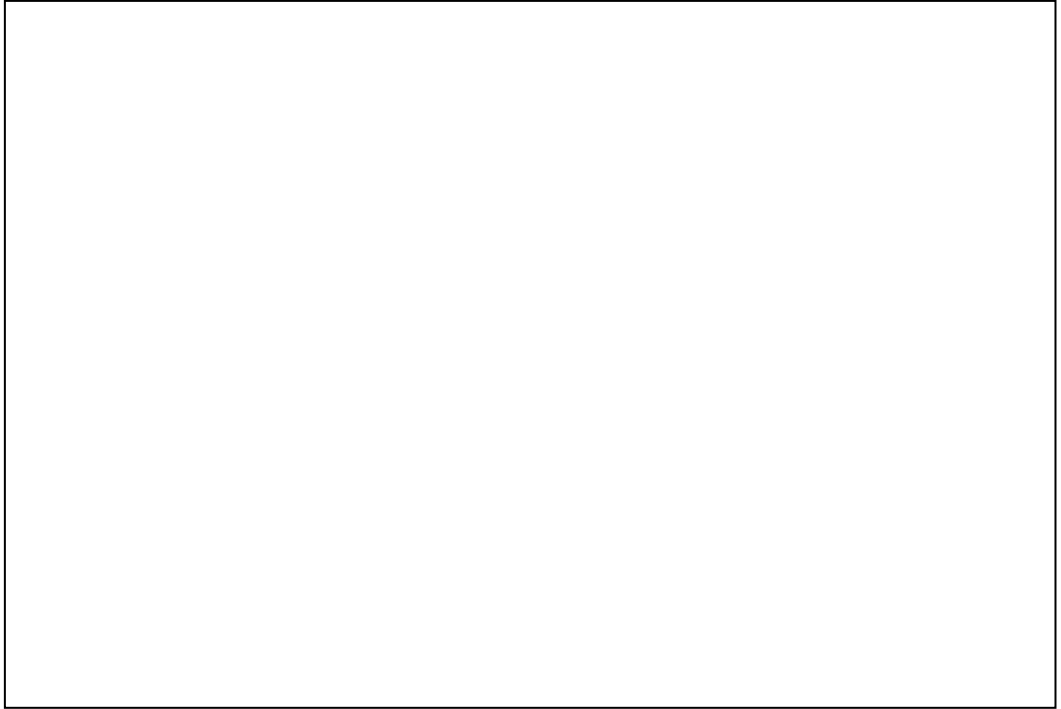
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Photos



Photos



Sketches and Drawings

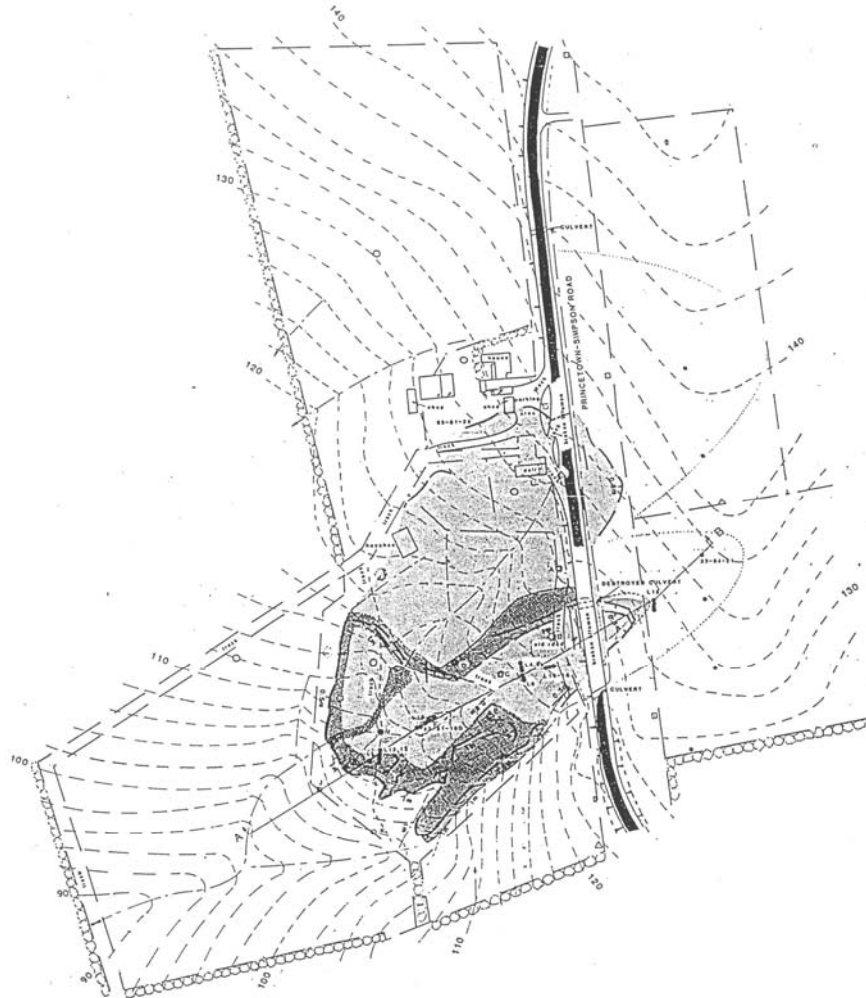


FIGURE 19 - Survey plan of Bouwman's Landslide carried out in 1982 (Cooney, 1983)

GEOLOGICAL SURVEY OF VICTORIA

LANDSLIDE MAP

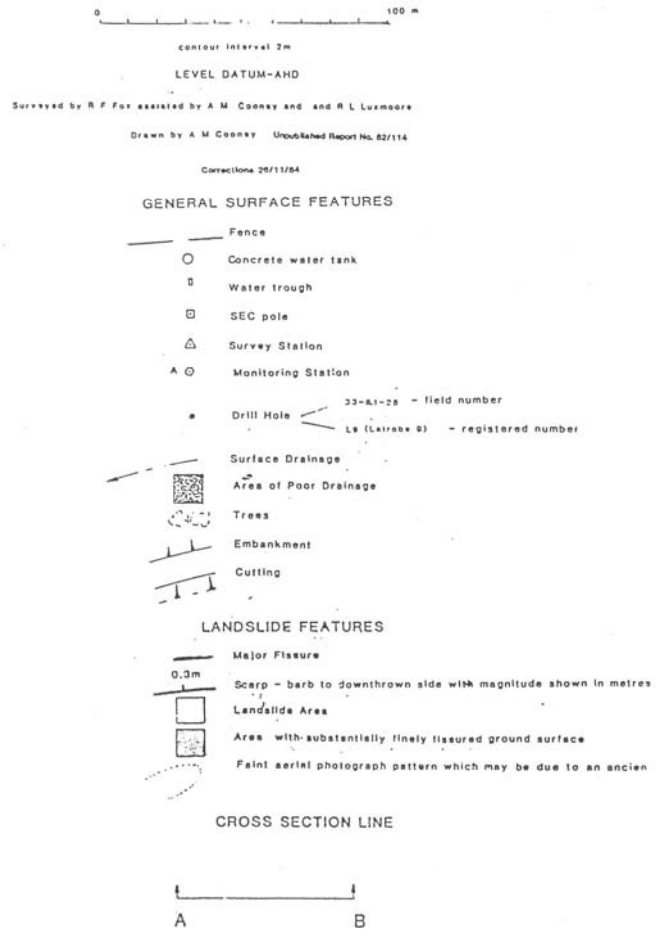


FIGURE 20 Legend for 1982 Survey Plan (Cooney, 1983)

CROSS SECTION

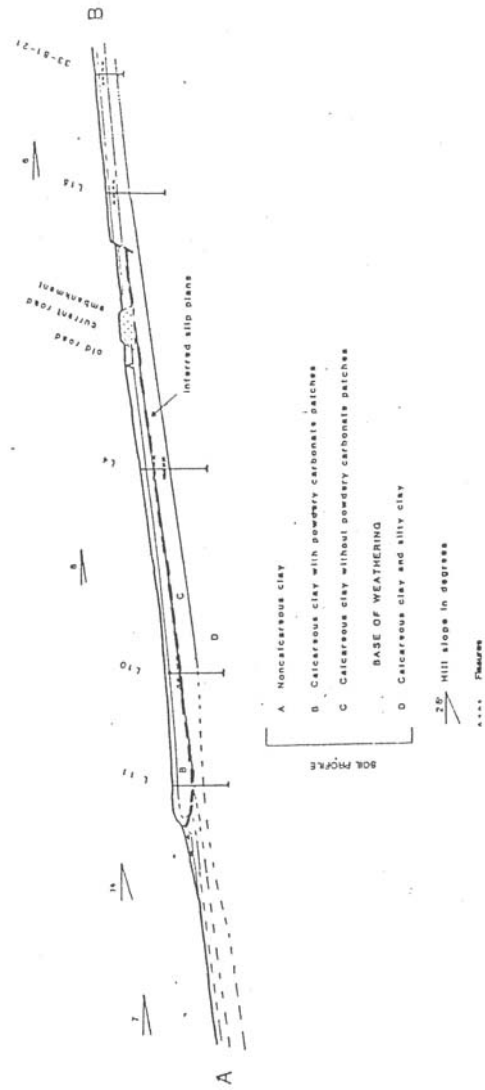


FIGURE 64 Cross section produced by Cooney in 1983

