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Corangamite Catchment Management Authority and the City of Greater Geelong

A.S. Miner Geotechnical

Case Study for Erosion and Landslides.

Windy Point Great Ocean Road

Report No: 356.3/05/06

Prepared for Troy Clarkson

Department of Primary Industries

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Geelong, VIC 3220

and

Leigh Dennis

Corangamite Catchment Management
Authority

64 Dennis Street

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1. Site Description

1.1 Site I.D.

356.3/05

1.2 Site address

Windy Point, Great Ocean Road,

1.3 Brief site description

1.4 Map datum/ Map projection/ Zone

WGS 1984 Zone 54

1.5 Easting

E759055

1.6 Northing

N5727214

1.7 Municipality

Surfcoast

1.8 CCMA landscape zone

Thompson

1.9 Previous ID

None

1.10 Previous Data Source

N/A

2. Hazard Description

2.1 Soil degradation type

Landslide

2.2 Soil degradation sub-class

Rock slide

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

A large mass of rock was mobilised above the Great Ocean Road as a result of excavations at the toe of the slide. The rock mass is failing along a weaker interbed of weathered siltstone which has the consistency of silty clay

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

Triangular shape of 80 m (D) x 120 m (L) and a depth (D) of sliding mass of the order of 20 m.

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

An approximate area of 4700 m² and volume of the order of 90,000 m³ involving at least 150,000 tonne of sandstone

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

The failure is known to have achieved a maximum daily movement of 2 cms just prior to closure in 1971

2.7 List previous reports or studies relevant to this site

- 1_ANZ Slide '87 Field workshop on Landslides Victorian Section August 4-5 1987
- 2_A Muir and A Williams (1972) The stabilization of a large moving rock slide with Cable Anchors
- 3_J.L.Neilson (1970) Landslip Problem at 89.1 Mile Location on Ocean Road at Windy Point, near Lorne. Unpublished report 1970/12 Vict. Mines Dept.

2.8 Custodian of previous reports and studies

- 1 held by Dahlhaus Environmental Geology
- 2 and 3 held by A.S. Miner Geotechnical

3. The Event Has Already Occurred

3.1 Date of first occurrence

The rockslide commenced in late 1968

3.2 Date of most recent re-activation or acceleration

Further slides occurred after 1968 which were pushed into the sea. Unknown but the site is currently monitored by Vic Roads

3.3 Actual or postulated trigger event including magnitude and duration

The rockslide commenced after the excavation of relatively minor quantities of rock were removed at the toe of the slope during road construction works. (No single significant rainfall event is considered to be the sole initiator for this slide)

3.4 Frequency of Trigger Event if known

Not as relevant here as the failure was due to human intervention although elevated pore pressures will be responsible for periodic reactivations

3.5 What damage or impact occurred?

The Great Ocean Road was closed in July 1971 for 6 months. This would have disrupted traffic along the coast causing impact to tourism and business.

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

There would have been a significant risk of injury and loss of life given the tourist usage of the road

3.7 How important was it?

Very significant

3.8 What asset classes were impacted?

Infrastructure

3.9 What asset sub classes were impacted?

Major Road

3.10 What are the asset values?

Major road relative asset value=4

3.11 How severely were assets impacted?

The asset was severely impacted due to ongoing rock slides and the ultimate closure of the road.

3.12 Estimated cost of impact (including qualitative and quantitative costs for loss of asset, investigations, remedial works, cultural, business and environment)

Need to consult Vic Roads further for costing but significant funds would have been spent in the early 1970s to stabilise the road. A significant investigation and design phase are known to have occurred and the road was closed for nearly 6 months. The remediation involved dangerous drilling and works and more detailed estimates of costs are probably contained in the annual CRB reports from that time.

4. Remediation Has Already Been Undertaken

4.1 What remediation option was used?

A rock cable anchoring system

4.2 How was the site initially assessed?

Assessment was by Vic Roads (or the equivalent at the Time) as well as input from the Victorian Mines department including assessments by John Neilson, senior geologist

4.3 How was the remediation designed and by Who?

Design was completed by A Williams and A Muir from Vic Roads

4.4 Did it require specialist equipment or subcontractors?

Yes- significant construction issues were encountered as some of the cable anchors had to be installed 70 metres above the road.

4.5 How effective has the remediation been?

Extremely effective to date

4.6 How was the effectiveness judged?

The road has remained opened since 1971 and there have not been any large rock slides at this site since this time to our knowledge.

4.7 Would other treatments worked here?

It is unlikely other treatments would have worked given the constraints on the amount of free area at the toe and the need to reinstate a measure of stabilising force to the sliding mass.

4.8 Was it early intervention or reactive?

Both reactive to small movements and proactive in preventing much greater movement

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

Unknown Consult Vic Road

4.10 How was the remediation funded?

Unknown Consult Vic Road

5. Ongoing Review and Monitoring Requirements

5.1 What is the likely ongoing monitoring and review strategy?

A real time monitoring system has been recently installed by VicRoad which comprises a number of extensometers positioned across joints and defects in the rock mass. The instruments are connected to a data logger and alarm system which then is capable of sending SMS messages and triggering a flashing site locate don site.

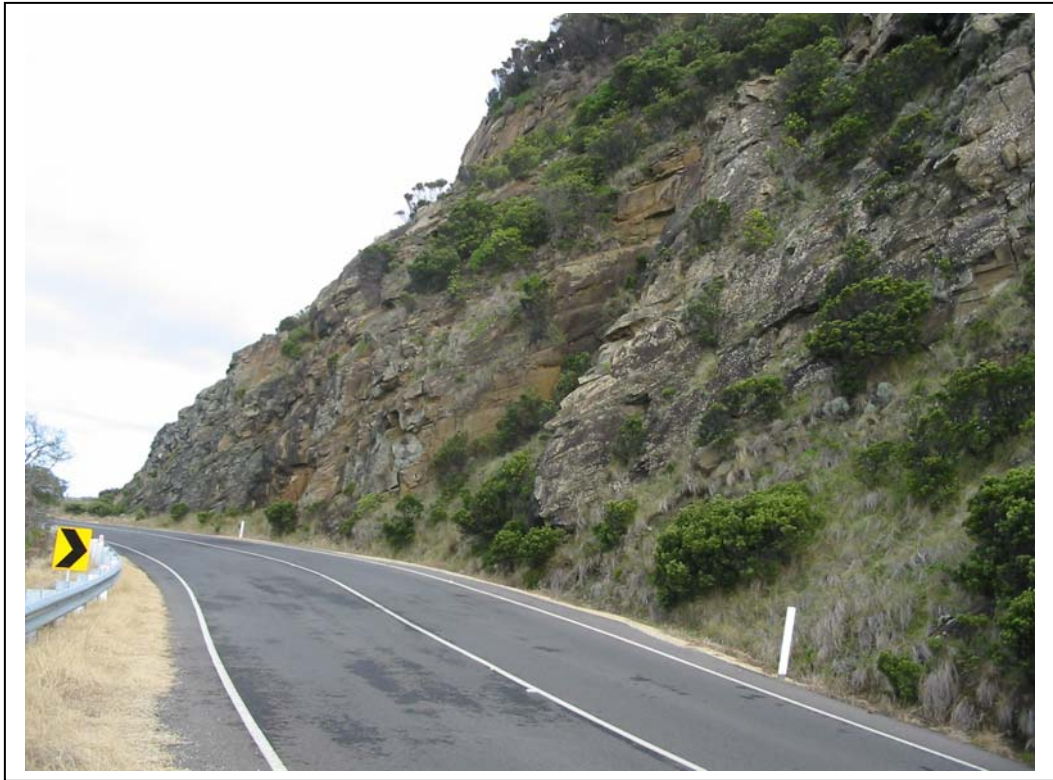
5.2 What is the nature of future monitoring and maintenance?

The system will establish real time monitoring capabilities at the site and will require downloading of data at regular periods.

5.3 What are the likely costs of monitoring and maintenance?

Installation costs for the monitoring station were of the order of \$15,000 to \$20,000. project management costs could be of the order of \$15,000. Ongoing maintenance costs are unknown.

Photos

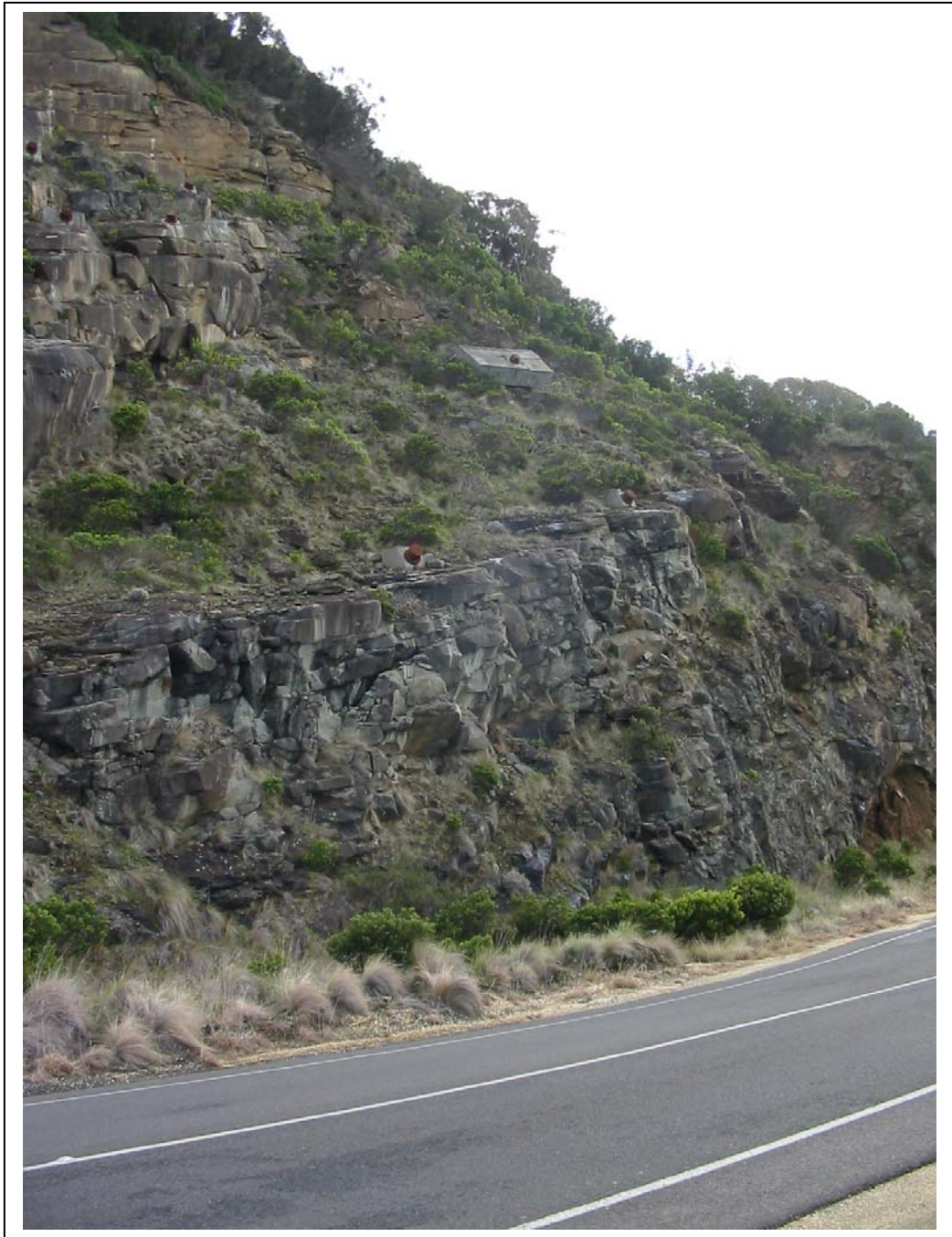


Photos



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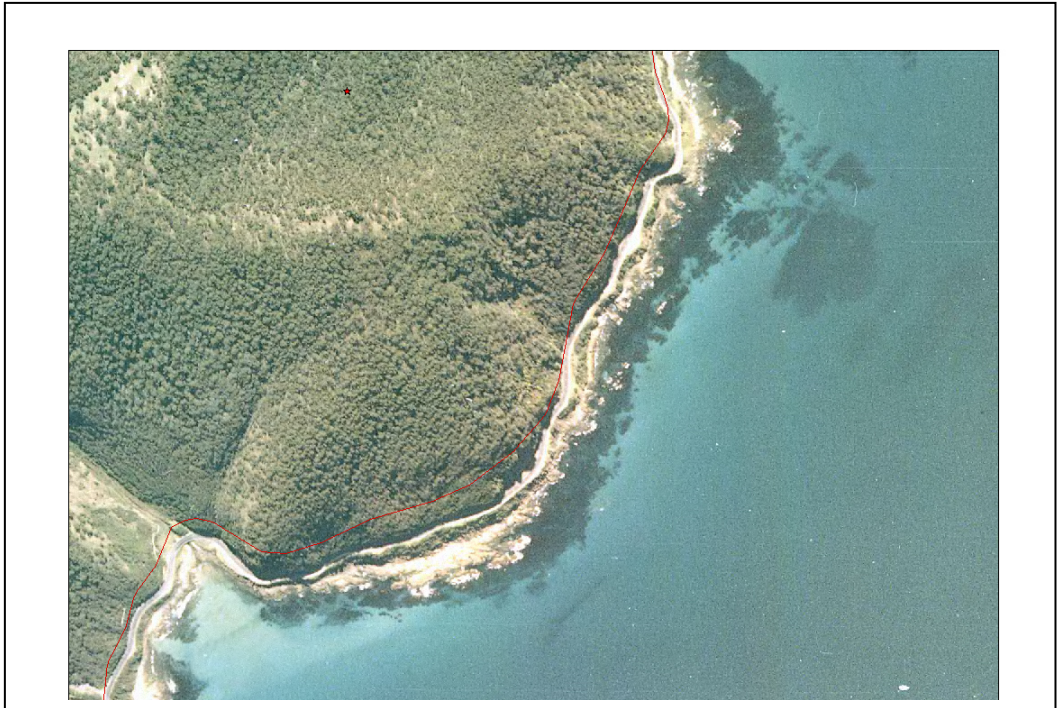




Photos



Photos



Sketches and Drawings

