Slope Stabilisation at Mulligans Bluff and Cangai Bluff, Gwydir Highway.

Review of Environmental Factors

January 2006













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Contents

1 Introduction and Methodology 1
1.1 Name of Proposed Activity 1
1.2 Local Government Area 1
1.3 RTA Region 1
1.4 Introduction 1
1.5 Background 2
1.6 Methodology 2
2 Description of Proposal Site and Study Area 4
2.1 General 4
2.2 Topography 5
2.3 Soils and Geology 5
2.4 Drainage and Flooding 6
2.5 Biodiversity 6
2.6 Noise 8
2.7 Visual Amenity 8
2.8 Climate and Air Quality 9
2.9 Traffic Data 9
3 Proposal Description 10
3.1 Work Methodology 10
3.1.1 Plant and Equipment to be used 10
3.1.2 Construction Process 11
3.1.3 Access 11
3.1.4 Stockpile and Compound Sites 11
3.1.5 Source of Material 12
3.1.6 Additional Truck Movements 12
3.1.7 Workforce and Working Hours 12
3.2 Commencement of Works 12
3.3 Period of Construction 12
3.4 Proposal Cost and Source of Funding 12
4 Statutory Position 13
4.1 Local Environmental Plan 13
4.2 Regional Environmental Plans 13
4.3 State Environmental Planning Policies (SEPPs) 13
4.3.1 SEPP 4 - Development without Consent and Miscellaneous Complying Development 13
4.3.2 SEPP 44 – Koala Habitat Protection 14
4.4 Confirmation of Part 4 or Part 5 Position 14
5 Strategic Stage 15
5.1 Strategic Planning 15
5.2 Need for the Proposal 15
6 Concept Stage 16
6.1 Proposal Objectives 16

6.2 Options Considered 16
7 Assessment Stage 20
7.1 Background and Database Searches 20
7.1.1 Australian Heritage Database 20
7.1.2 NSW Heritage Office State Heritage Register/Inventory 20
7.1.3 RTA Heritage and Conservation Register (s170) 20
7.1.4 LEP Heritage Listings 20
7.1.5 DEC Aboriginal Heritage Information Management System (AHIMS) 20
7.1.6 DEC Wildlife Atlas Flora and Fauna Records 21
7.1.7 The Commonwealth Department of the Environment and Heritage (EPBC Act) Databases 21
7.1.8 National Native Title Claims Search 22
7.1.9 NSW Department of Primary Industries Noxious weeds list 22
7.1.10 DEC Contaminated land information 22
7.1.11 Department of Natural Resources (DNR) Salinity Information Data 22
7.2 Consultation 22
8 Potential Environmental Impacts 23
8.1 General 23
8.2 Geology, Soils and Landform 23
8.3 Water Quality and Hydrology 24
8.4 Flora and Fauna 24
8.5 Socio-economic Considerations 27
8.6 Indigenous Heritage 27
8.7 Non-Indigenous Heritage 28
8.8 Visual Amenity and Landscape 28
8.9 Waste Minimisation and Management 28
8.10 Summary of Beneficial Effects 29
8.11 Summary of Adverse Effects 29
9 Implementation Stage 30
9.1 Safeguards Process 30
9.2 Licences and Approvals 32
10 Consideration of Environmental Factors 34
10.1 Clause 228(2) Factors (NSW Legislation) 34
10.2 EPBC Act 1999 Factors (Commonwealth Legislation) 36
11 Certification 37
12 References 38

APPENDICES

Appendix A Photographs of the Proposal Site

Appendix B Concept Design

Appendix C Correspondence and Results of Database Searches

Appendix D Ecological Assessment and Eight Part Test

Appendix E Geotechnical Reports for Mulligans and Cangai Bluff

Appendix F Heritage Assessment

DEFINITIONS

***Proposal Site* = Area of direct impact, related to the construction footprint.**

***Study Area* = Area of potential impact including the Proposal site and the surrounding receiving environment.**

1 Introduction and Methodology

1.1 Name of Proposed Activity

Slope Stabilisation at Mulligans Bluff and Cangai Bluff, Gwydir Highway

1.2 Local Government Area

Clarence Valley (formerly Pristine Waters)

1.3 RTA Region

Northern Region

1.4 Introduction

The NSW Roads and Traffic Authority (RTA) propose to carry out slope stabilisation measures at Mulligans Bluff and Cangai Bluff on the Gwydir Highway, west of Jackadgery.

This Proforma 1 Review of Environmental Factors (REF) has been prepared by RTA Environmental Technology on behalf of RTA Northern Region.

For the purposes of these works, the RTA is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment* (EP&A) *Act 1979*.

The purpose of the REF is to describe the Proposal, to document the likely impacts of the Proposal on the environment, and to detail protective measures to be implemented.

The description of the proposed works and the associated environmental impacts have been undertaken in the context of Clause 228 of the *Environment Planning and Assessment Regulation 2000*, the *Threatened Species Conservation* (TSC) *Act 1995*, the *Fisheries Management* (FM) *Act 1994*, and the (Commonwealth) *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999*. In doing so, the REF helps fulfil the requirements of Section 111 of the EP&A Act, that the RTA examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

This REF has been prepared in accordance with the RTA's Proforma 1 REF as presented in the RTA's *Environmental Impact Assessment Policy, Guidelines and Procedures, Version 4* (RTA, April 2001).

The findings of the REF would be considered when assessing:

- whether the Proposal is likely to have a significant impact on the environment and therefore the necessity for an Environmental Impact Statement (EIS) under Section 112 of the EP&A Act;
- the significance of any impact on threatened species as defined by the TSC Act, in Section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS); and
- the potential for the Proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Commonwealth Environment Minister in accordance with the EPBC Act.

1.5 Background

Mulligans and Cangai Bluff as part of the Gwydir Highway have a history of extensive rock falls generally coinciding with heavy rainfall events, which have resulted in closure of the Gwydir Highway on numerous occasions. The Assessed Risk Level (ARL) of both highway sections is currently rated ARL 1 to 2. ARL 1 is the highest level of risk (out of 5 levels) and generally regarded as tolerable in the short to medium term. The purpose of the proposed slope stabilisation measures is to reduce the ARL of both sites to three or above in order to reduce the risk to road users and property.

1.6 Methodology

The method in which this document has been prepared is as follows:

1. A discussion was held with the Project Manager to consider the Proposal.

2. RTA Environmental Technology representatives undertook a site visit on 22 April 2004 to provide an overview of the Proposal and discuss any issues relevant to the completion of the REF.

3. Consultation was undertaken with the following agencies and RTA personnel:
   - Clarence Valley Council;
   - Department of Natural Resources (DNR); and
   - RTA Aboriginal Programs Consultant, Northern Region.

4. A search was conducted on the following databases to identify any potential issues:
   - Australian Heritage Database;
   - NSW Heritage Office State Heritage Register and State Heritage Inventory;
   - RTA Heritage and Conservation Register (s.170);
   - Local Council Heritage Lists (LEP);
   - National Native Title Claims Search;
   - DEC Aboriginal Heritage Information Management System (AHIMS);
   - DEC Wildlife Atlas threatened flora and fauna records;
   - DPI FishFiles Database and NSW Fisheries Threatened Species List;
   - DEH Protected Matters (EPBC Act) Database;
   - DEC Contaminated Land Records;
   - National Pollutant Inventory; and
   - DPI Noxious Weeds List.

5. As part of the environmental assessment undertaken for this REF, a series of specialist studies were undertaken to identify Proposal constraints and to provide environmental impact mitigative measures. Details and findings from the relevant investigations are further discussed in this REF and a copy of each specialist study is included as an appendix to this REF. Specialist investigations leading up to and during the REF development phase include:
   - A Flora Survey and Fauna Habitat Assessment

- A Heritage Assessment
- Geotechnical Investigation

6. A literature review and review of documentation was undertaken to determine issues relating to:
   - Landform, geology and soils;
   - Local Environment Plan (zoning and heritage);
   - Regional Environmental Plans; and
   - State Environmental Planning Policies.

2 Description of Proposal Site and Study Area

2.1 General

The Gwydir Highway is a two-lane single carriageway State Road (SH12) providing a connection between the New England Tablelands and the coastal area of northern New South Wales. The road links the townships of Grafton and Glen Innes, meandering through steep terrain. The existing road was constructed over 40 years ago.

For the purpose of this REF, Mulligans Bluff is referred to as Proposal site A and Cangai Bluff as Proposal site B. The two Proposal sites are located on the Gwydir Highway approximately 55km (Proposal site A) and 61km (Proposal site B) northwest of Grafton and west of Jackadgery. At the Proposal sites the road lies between mountain ranges in the west and Mann River in the east. The study area is defined as the Proposal site and a buffer area of 50m.

Common Features of Proposal sites A and B

Typical faults at both bluffs include:

- Unstable earth and undercut slopes at the top of the cut;
- Loose earth and rocks on the face of the bluff;
- Tree roots penetrating bedding planes and loosening rocks;
- Large unstable rock masses due to bedding planes day lighting in the cutting; and
- Erosion of the fill slopes by the Mann River.

The existing road provides a 6m seal with variable width shoulders. The shoulder and table drain width reduces to less than 1m in some sections. The cut batters are generally at about 60° compared with the safe angle of slope of about 30° to 35°. The existing fill on the Mann River side is generally end dumped material at the slope of 1V to 1.3H. Both bluffs have barrier line markings and guardrail.

Proposal site A – Mulligans Bluff

The relevant highway section at Mulligans Bluff has a length of approximately 600m and provides for a 6.7m formation with a 1.2m table drain.

The original construction drawings show three sections with rock retaining walls between 50m and 80m long. The excess cut from the construction appears to have been dumped over the edge of the formation, as has any previous rock fall material. This has resulted in the formation being widened by 3m to 4m over the original design drawings.

The existing slope of the fill is 45° to 50° and the slope of the cutting is 75°. Following recent rainfall a drainage path down the bluff dislodged loose material and filled the table drain. This causes water to be diverted across the road scouring out end-dumped fill material back to the original stone retaining wall, which is now on the edge of the current seal. The guardrail and shoulder is positioned on the end-dumped material along the side of the formation.

Above the bluff face the catchment extends for approximately 300m from the road and runoff water from the catchment runs over the batter face dislodging loose material and lubricating the bedding planes potentially resulting in slips. With drainage flows down the batter, material is dislodged which then blocks the table drain at the toe of the batter. The original drawings only showed five culverts across the road at Mulligans Bluff (Proposal site A), but a preliminary assessment indicates at least 12 drainage paths down the bluff.

Proposal site B – Cangai Bluff

At Cangai Bluff the relevant highway section has a length of approximately 600m. Several locations have rock retaining walls up to 30m long. The excess cut from the construction appears to have been end-dumped over the edge of the formation, as has any rock fall material. The existing slope of the fill is 45° to 50° and the slope of the cutting is 75°.

Cangai Bluff has a number of potential sources of rock falls and the extent and location of each fault varies throughout each section of the bluff.

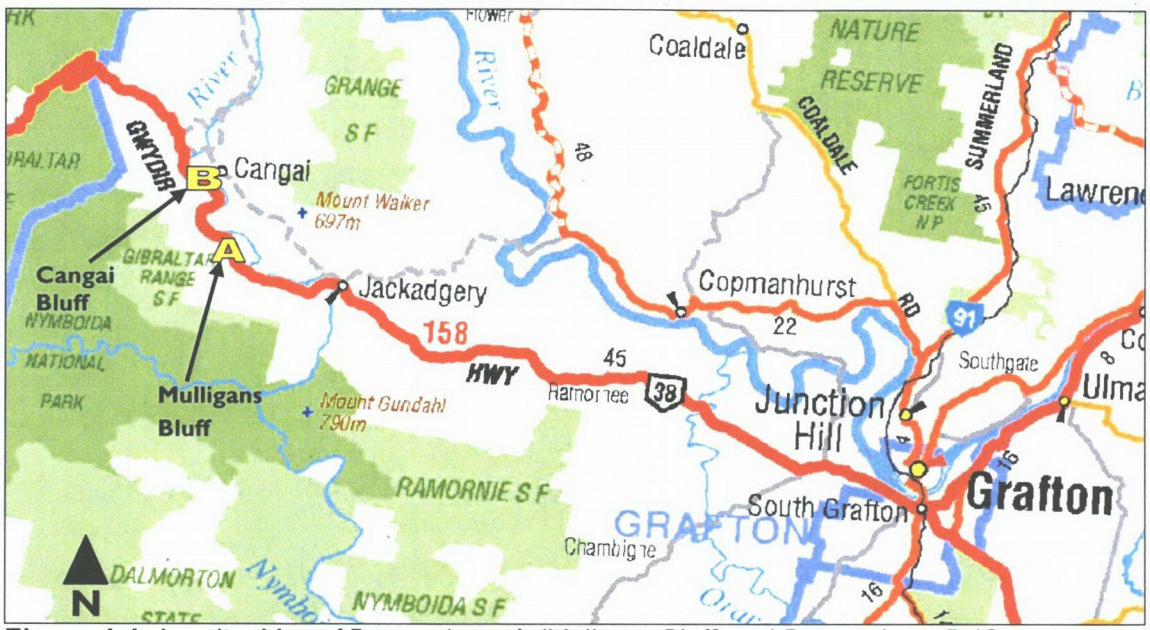

Figure 1.1: Locality Map of Proposal site A (Mulligans Bluff) and Proposal site B (Cangai Bluff). (Figure not to scale, Map extract courtesy of Penguin)

2.2 Topography

The area surrounding the Proposal sites forms a transition from the river flats of the Mann River to the east and the high mountains of the Gibraltar Range to the west. Deep valleys and giant granite boulders overlook the scenic creeks and cascades, swamps, heaths and woodlands. Dramatic steep-sided valleys, broad ridges and escarpments are covered with natural vegetation. Within the region altitude ranges from less than 200m above sea level (ASL) in the River valleys to 1490m ASL along the Great Dividing Range in the west

2.3 Soils and Geology

The sites occur on the eastern margin of the New England Fold Belt. A review of the Grafton 1:250 000 geological map series shows the Proposal sites to be underlain by the Gundahl Complex of early Carboniferous age. This comprises of high strength metamorphic and bedded sediments dating from the late Permian (approximately 250 million years ago) and includes broad groupings of rock such as andesite, rhyodacites, adamellite and granites (Fox 1983, Barnes *et al.* 1995). Minor quartz infills occur at joints and at fault contacts. Isolated areas of sandstone occur in poorly defined interbedding. Materials range from slightly weathered to moderately weathered with some isolated heavily weathered zones at the bluff boundaries.

Soils within the vicinity of the Proposal sites are generally colluvium on alluvium with a metamorphic substrate. Soil types include Red Chromosols, Red Kurosols and Red Podzolic Soils. Erosion hazard is moderate to high with no salting evident.

2.4 Drainage and Flooding

Drainage in the vicinity of the Proposal site is dominated by the Mann River to the east of the Proposal sites. The Mann River flows from south to north into the Clarence River approximately 15km to the north east. Within the Proposal sites substantial drainage channels exist on the natural slopes as well as roadside table drains directing surface waters to the Mann River.

2.5 Biodiversity

Sandpiper Environmental was engaged to undertake an ecological assessment of the Proposal sites. The assessment was undertaken on 25 May 2005 and identified four native vegetation communities and one modified community (Refer to Figure 3.1A and 3.1B in Appendix D). Table 2.5 below details the vegetation communities at the Proposal sites.

Table 2.5: Vegetation communities at the Proposal sites

Vegetation Community	Vegetation Description	Location
Grey Box/ Tallowood Very Tall Open Forest	Occurring in dryer sections of the road reserve at the northern end of Cangai Bluff. Dominant species include Grey Box (*Eucalyptus moluccana)* and Tallowood (*E. microcorys*). Other tree species present include Grey Ironbark (*E. siderophloia*), White Mahogany (*E. acmenoides*), Pink Bloodwood (*Corymbia intermedia*) and Narrow-Leaved Red Gum (*E. seeana*). The understorey stratum consists mainly of eucalypt saplings and Cherry Ballart (*Exocarpus cuppressiformis*). With the groundcover stratum dominated by Three awn Grass (*Aristida* sp.) and Kangaroo Grass (*Themeda australis*).	Cangai Bluff
Tallowood/ White Mahogany Tall to Very Tall Open Forest	This community occurs on the sheltered mid and lower slopes of the road reserve at the southern end of Cangai Bluff and northern end of Mulligan's Bluff. Dominant species include Tallowood (*E. microcorys*) and White Mahogany (*E. acmenoides*). Other species present include Grey Ironbark (*E. siderophloia*), Pink Bloodwood (*Corymbia intermedia*) and Brush Box (*Lophostemon confertus*). A mixture of Brush Box, Tallowood and Forest Oak (*Allocasuarina torulosa*) form the understorey with juvenile eucalypt species. The groundcover stratum is dominated by Threeawn Grass (*Aristida* sp.) and Kangaroo Grass (*Themeda australis*) and Red Natal Grass (*Rhynchelytrum repens*).	Cangai Bluff and Mulligans Bluff
Narrow Leafed Red Gum/ White Mahogany Very Tall Open Forest	This vegetation community occurs on the exposed upper slope of Mulligans Bluff at the southern end of the area accessible to machinery. Dominant species include Narrow-Leaved Red	Mulligans Bluff

Vegetation Community	Vegetation Description	Location
	Gum (*E. seeana*) and White Mahogany (*E. acmenoides*). Other species present include Grey Ironbark (*E. siderophloia*) and Pink Bloodwood (*Corymbia intermedia*). The understorey stratum consists mainly of juvenile eucalypt species and grass trees (*Xanthorrhoea sp.*) with the groundcover dominated by Three awn Grass (*Aristida* sp.) and Kangaroo Grass (*Themeda australis*).	
Weeping Lily Pilly/ Weeping Bottlebrush Low Closed Forest	This community forms the riparian vegetation along the southern bank of the Mann River, which is situated adjacent to the proposed works at the Mulligan's Bluff site. Dominant species included Weeping Lilly Pilly (*Waterhousia floribunda*) and Weeping Bottlebrush (*Callistemon viminalis*). Other species present include River Oak (*Casuarina cunninghamiana*) and Black Bean (*Castanospermum australe*). The understorey consists primarily of Lantana (*Lantana camara*), Weeping Lilly Pilly and Weeping Bottlebrush with scattered Sandpaper Fig (*Ficus coronata*), Green Bolly Gum (*Neolitsea australiensis*) and Senna (*Senna septemtrionalis*). Groundcover is dominated by Water Couch (*Paspalum distichum*).	Mulligans Bluff
Castor Oil Plant/ Wild Tobacco Tree Very Tall Open Shrubland	This modified vegetation community occurs within the northern road reserve at the Mulligan's Bluff site. The area has been previously cleared of native vegetation. Dominant vegetation includes Castor Oil Plant (*Ricinus communis*) and Wild Tobacco Tree (*Solanum mauritianum*). Groundcover is dominated by Red Natal Grass, Lantana (*Lantana camara*) and Stinking Roger (*Tagetes minuta*). Other common groundcover species present include Purple Top (*Verbena bonariensis*), Paspalum (*Paspalum dilatatum*), Billygoat Weed and Cobbler's Pegs (*Bidens pilosa*).	Mulligans Bluff

A moderate to severe level of disturbance has been recorded in the open forest sites, with all sites being burnt in the past 2-3 years and experiencing either severe (totally cleared) or moderate (partial clearing) logging in the past 20 to 30 years (Sandpiper 2004).

Tree hollows were common in the open forests at both Cangai and Mulligans Bluff sites. No hollows were recorded in the disturbed land and only a small number of hollows were identified during the traverse of the riparian habitat. 15 Hollow Bearing Trees (HBT) were recorded at the Cangai Bluff Proposal site, of which nine were stags (i.e. dead trees). Four of the 15 HBT at Cangai were located on the opposite side of the fence line and would not be impacted by the works. Six HBT were recorded at Mulligans Bluff Proposal site, of which

one was a stag (Sandpiper 2004). A total of 47 HBT were identified within the study area by Sandpiper during the site inspection.

The threatened plant species, Soft Grevillea (*Grevillea mollis*), has been recorded in the nearby Gibraltar Range National Park. However, this species was not identified on site, and the study area does not contain the typical overstorey species that accompany this species such as New England Blackbutt (*Eucalyptus campanulata*), Thick-Leaved Mahogany (*E. carnea*) and Tindale's Stringybark (*E. tindaliae*) (NPWS 2002). No Threatened flora species were identified as potentially occurring within the Proposal site.

Noxious weeds identified at the site include Lantana (*Lantana camara*) and Johnson grass (*Sorghum halepense*) both W2 listed species. Both of the species were recorded in three of the vegetation communities, Tallowood/ White Mahogany Tall to Very Tall Open Forest, Weeping Lily Pilly/ Weeping Bottlebrush Low Closed Forest and Castor Oil Plant/ Wild Tobacco Tree Very Tall Open Shrubland. The category W2 means the identified weeds 'must be fully and continually suppressed and destroyed'.

Seven threatened fauna species have been recorded as potentially occurring within the locality of the Proposal sites. The Potentially occurring species are listed in Table 2.5.1 below.

Table 2.5.1: Potentially occurring threatened fauna species.

Common Name	Scientific Name	Listed on TSC Act	Listed on EPBC Act
Emu	*Dromaius novaehollandiae*	Yes	No
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	Yes	No
Powerful Owl	*Ninox strenua*	Yes	No
Masked Owl	*Tyto novaehollandiae*	Yes	No
Spotted-tailed Quoll	*Dasyurus maculatus*	Yes	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	Yes	No
Rufous Bettong	*Aepyprymnus rufescens*	Yes	No

Sandpiper identifies the Emu (*Dromaius novaehollandiae*) as the only species unlikely to utilise habitat in the study area as the emu prefers open plains and would be unlikely to utilise hilly terrain or dense shrublands, such as those occuring in the study area.

Other potentially occurring fauna species would include common insectivorous bat species that forage along the Mann River and common bird and foraging species.

For further detail on the assessment refer to Chapter 8.4, Flora and Fauna, of this REF or the full report located in Appendix D.

2.6 Noise

The study area occurs in a rural surrounding, and as such the ambient noise levels are low. During the site inspection, it was observed that the study area was quiet with the only source of noise being motor vehicles using the Gwydir Highway.

2.7 Visual Amenity

The visual amenity of the study areas is considered to be of high value given the proximity of the sites to nature reserve, natural vegetation and waterways. Areas adjacent to the Proposal site, outside the road reserve, consist largely of native vegetation.

2.8 Climate and Air Quality

According to the nearest Bureau of Meteorology (2003) Monitoring Station in Grafton, mean daily temperatures during summer range from 30.8°C to 17.8°C, while winter temperatures range from 10.8°C to 5.9°C. The average annual rainfall is 981mm with the highest rainfall occurring between December and March.

The study area is located in a remote rural setting, thus the air quality is considered to be high. The highest level of emissions identified by the National Pollution Inventory on 30 April 2004 within the study area are total nitrogen and total phosphorus, which are likely to be sourced from livestock farming. Due to low traffic volumes (refer to Chapter 2.9 below) experienced on the Gwydir Highway, emissions from vehicles are not considered to be a major contributor to the air quality conditions of the study area.

2.9 Traffic Data

Annual Average Daily Traffic (AADT) count on the Gwydir Highway at Orara River Bridge, approximately 40km east of Proposal site A (Mulligans Bluff), was 808 vehicles in 2001 (Station No. 04.277). The count is considered to be representative of the traffic volume at both Proposal sites. The traffic volume has increased from 730 vehicles in 1978 in a linear growth rate of less than 1%.

3 Proposal Description

The Proposal would be constructed under trafficked conditions.

Table 3.1 provides the actual road width of Gwydir Highway at Mulligans and Cangai Bluff, the Road Design Guide (RDG) width and the proposed width.

Table 3.1: Road widths of the Gwydir Highway

	Actual width	RDG width	Proposed width
Traffic lanes	3.0m	3.0 – 3.5m	3.5m
Shoulders	Variable	1.0 – 2.0 m	2.0m
Shoulders adjacent to barrier lines		3.0m	2.0m
Fill verge	Variable	1.0m	1.0m
Cut verge (Mulligans)	Variable	2.0m	3.4m including rock fall fence
Cut verge (Cangai)	Variable	1.5m	1.5m concrete lined
Batters (Mulligans)		N/A	Fill 1.5H : 1V
Batters (Cangai)		N/A	Cut 1.4H : 1V

It is proposed to widen the traffic lanes to 3.5m with 2m shoulders. Verges of 1m would be provided in location with safety barriers. In cuttings a 1.5m concrete lined table drain would be provided.

At Mulligans Bluff a 4m high rock fall fence with a 3m berm would be constructed on the batter side of the road.

At Cangai Bluff a low mesh fence would be provided for minor rock falls. On the river side of the road, a kerb would be provided to collect surface water and prevent it from running down the batter and scouring the batter.

Due to restricted width availability between the bluffs and the Mann River it is not proposed to widen the shoulders to 3m adjacent to the barrier lines. In some locations retaining walls will be provided to avoid fill batters extending down to the Mann River.

At Mulligans Bluff the existing road reserve extends down to the Mann River and no land acquisition is required.

At Cangai Bluff the existing fence line does not follow the road boundary. The fence will be relocated back onto an old road reserve approx 20m to 30m to the west so that it is clear of the top of the new batter.

3.1 Work Methodology

3.1.1 Plant and Equipment to be used

The Proposal would require the use of:

- Backhoe
- Grader
- Bulldozer
- Drill rig
- Paving machine
- Compressor
- Excavator
- Roller

- Roto mills
- Compactor
- Dump truck
- Line maker
- Cement pump spray
- Cement trucks
- Water cart
- Hand held plant and equipment

3.1.2 Construction Process

The works would be undertaken using the following methodology:

Cangai

- Establishment of erosion and sedimentation controls and other safeguards detailed in the CEMP;
- Preparation of the site, including installation of site compound;
- Removal of vegetation;
- Excavation of approximately 30,000 m^3 of cut between chainage 100 and 300 (to be used as fill for Mulligans Bluff site);
- Slope grooming between chainage 300 and 440;
- Road Pavement rehabilitation and widening between chainage 100 to 440;
- Revegetation and restoration of the Proposal site.

Mulligans Bluff

- Establishment of erosion and sedimentation controls and other safeguards detailed in the CEMP;
- Preparation of the site, including installation of site compound;
- Removal of vegetation and excess rock fall material from chainage 300 to 360;
- Construct side track chainage 320 to 360;
- Construct access track down to the scour area west of the chicane chainage 580;
- Construct retaining wall chainage 580;
- Place fill at chainage 380 and reinstate access track;
- Construct access track to chainage 360;
- Construct fill chainage 60 to 300;
- Complete rock fall fence and pavement widening;
- Revegetation and restoration of the Proposal site.

3.1.3 Access

The majority of access to the Proposal sites would be obtained through the existing roadway with temporary single lane closures undertaken in accordance with the RTA – *Traffic Control at Work Sites Manual 2003.* At the Mulligans Bluff site additional constructed pathways would be required to facilitate personnel and equipment to access the bluff and work areas remote from the roadway at the base of the fill.

3.1.4 Stockpile and Compound Sites

At the time of writing this REF the location for the stockpile and compound sites is unknown. Potentially the sites would be located within the existing road reserve in previously cleared areas between the Cangai and Mulligans Bluffs. Should this area be considered unsuitable it may be required to lease land at the roadside. Consultation with affected landholders and RTA Regional Environmental Officer would be undertaken prior to commencement of works and all activities would be in accordance with the RTA Stockpile Site Management Procedures (RTA 2001).

3.1.5 Source of Material

Materials extracted from Cangai Bluff would be used as fill material at Mulligans Bluff. Should any additional fill material be required it would be sourced from quarry sites within the local area.

3.1.6 Additional Truck Movements

It is anticipated that the Proposal would generate approximately 1500 additional truck movements over the period of construction.

3.1.7 Workforce and Working Hours

The workforce would be determined by the Contractor but is not expected to consist of more than 20 personnel. It is expected that the Proposal would be undertaken during standard working hours of:

- Monday – Friday: 7am – 6pm;
- Saturday: 8am – 1pm; and
- Sunday and Public Holidays: no work.

On occasions where night or weekend work may be required, works would be undertaken in accordance with procedures outlined in the RTA's *Environmental Noise Management Manual 2001, Practice Note vii – Roadworks outside normal working hours.*

3.2 Commencement of Works

It is expected that works would commence in July/August 2006.

3.3 Period of Construction

It is anticipated that works would be completed over a period of approximately 30 to 40 weeks from commencement given ideal working conditions.

3.4 Proposal Cost and Source of Funding

The Proposal would cost approximately $9 million and funding allocation would be sourced from the NSW Assets Corridor Slope and Wall Stability Program (Program 12303).

4 Statutory Position

4.1 Local Environmental Plan

The Proposal is located in Clarence Valley Local Government Area (LGA). Prior to, 1 July 2000 the study area was part of Nymboida Shire (LGA), which was amalgamated with Ulmarra Shire LGA to constitute a new LGA of the name Pristine Waters. The LGAs of Pristine Waters, Copmanhurst, Grafton and Maclean were amalgamated to constitute a new LGA having the name Clarence Valley LGA on 25 February 2004. At the time of writing this REF no Local Environmental Plan (LEP) for Clarence Valley LGA is in place, but development on land previously within the Pristine Waters Local Government Area (LGA) is currently controlled by Clarence Valley Council under the Nymboida Local Environmental Plan (LEP), 1986.

The land of the Proposal sites and study area is zoned *7(d) Scenic Protection*. The objectives of this zone are:

(a) "to preserve valley ridgeline and prominent topography which is of high aesthetic value in parts of the Boyd, Kangaroo, Mann and Nymboida Rivers' valleys, being areas which are relatively undeveloped and, due to their exposure, warrant environmental protection, and

(b) to permit development for tourism and recreational purposes covering a wide range of activities which are compatible with the natural environment and character of the area."

Within zone 7(d), roads are permissible with Council consent and a Statement of Environmental Effects needs to be submitted to Council for approval. However, as the proposed works are for the purpose of a classified road, Clause 11C of SEPP 4 operates to remove these consent requirements. Therefore, the works undertaken within zone 7(d) would be exempt from Council consent. For further information on SEPP 4, refer to Chapter 4.3.1 of this report.

4.2 Regional Environmental Plans

The North Coast Regional Environmental Plan (REP) 1988 applies to the whole of the Northern Coast including the study area. The focus of the REP is to ensure that newly developed LEPs take into account the regional aims and specific objectives of plan preparation. Specific objectives of this plan in relation to transport are outlined in Division 1(52) - Transport:

(a) "to safeguard the role and efficiency of the main road system of the region, particularly by recognising the importance of primary arterial roads, and

(b) to facilitate maintenance and improvement of transport in the region."

The Proposal would be in accordance with the REP.

4.3 State Environmental Planning Policies (SEPPs)

4.3.1 SEPP 4 - Development without Consent and Miscellaneous Complying Development

Clause 11C (2) states

> *"where, in the absence of this clause, development for the purposes of a classified road or toll work, or a proposed classified road or toll work, may be carried out only with development consent being obtained therefore, that development may be carried out without that consent".*

SEPP 4 applies to the Proposal, as the proposed works are for the purposes of a classified road as defined by the *State Roads Act 1986*. Therefore the RTA would not require consent from Clarence Valley Council prior to undertaking the proposed works.

4.3.2 SEPP 44 – Koala Habitat Protection

The Clarence Valley LGA is identified within the Schedules of SEPP 44 (Koala Habitat Protection) as a Local Government Area in which Koalas are known to occur. While the requirements of the SEPP do not technically apply to this Proposal, as it is not subject to Council consent, it is the RTA's practice to consider SEPP 44 criteria in its EIA process. These criteria relate to the percentages of feed tree cover, particularly trees listed under Schedule 2 - Known Feed Trees. The assessment criteria consider the percentage cover of known feed trees, and whether these are greater or less than 15% of the total tree canopy.

An assessment of potential Koala habitat was undertaken as part of the ecology assessment by Sandpiper Environmental, refer to Appendix D. The report identifies potential Koala habitat at Cangai Bluff and at the top of Mulligans Bluff with no potential Koala habitat was recorded below the road at Mulligans Bluff. Koala scat searches were conducted at three locations, two at Cangai Bluff and one at Mulligans Bluff. Trees within the Proposal study area were searched and no koala scats were identified. The report concludes that the proposed works would not have any adverse impacts to Koala habitat.

4.4 Confirmation of Part 4 or Part 5 Position

All relevant statutory planning instruments have been examined for the Proposal. It is confirmed that this Proposal is subject to environmental impact assessment under Part 5 of the *EP&A Act 1979*.

5 Strategic Stage

5.1 Strategic Planning

The Proposal is part of an ongoing commitment by the RTA to address road safety in accordance with the RTA's responsibilities for ensuring a maximum level of service to road users and to maintain appropriate services for adjacent landholders.

5.2 Need for the Proposal

A combination of the effects of erosion, climatic conditions and wear and tear has resulted in the need for maintenance and repairs to be undertaken to Cangai and Mulligans Bluffs to improve road safety and reduce the likelihood of road incidents. The works are required to remove loose material and to install a rock fall fence at the toe of the slope limiting the potential for rocks to fall onto the roadway. Left unattended, the sites would continue to erode creating excess loose material and sediment which may potentially fall onto the road, placing road users at risk.

6 Concept Stage

6.1 Proposal Objectives

Mulligans Bluff and Cangai Bluff have a history of extensive rock falls generally coinciding with heavy rainfall events, which have resulted in closure of Gwydir Highway on numerous occasions. The purpose of the Proposal is to avoid a rock fall seriously injuring a road user and reduce the number of closures.

The primary objectives of the Proposal are:

- To reduce the Assessed Risk Level (ARL) of the slopes to three or above; and
- To improve drainage to prevent water induced rock falls and pavement failures.

In conjunction with the primary objectives, secondary objectives of the Proposal aim to upgrade two sections of the Gwydir Highway at Mulligans and Cangai Bluff and include the following:

- To improve road safety by reducing the severity and the incidence of road crashes;
- To improve transport efficiency by reducing travel times;
- To improve travel conditions by achieving at least a level of service B;
- To provide a project in harmony with the natural and social environment;
- To provide a road network that would promote economic development; and
- To achieve an acceptable return on project investment.

6.2 Options Considered

Proposal site A – Mulligans Bluff

Option 1 – Do Nothing

This option would not meet the Proposal objectives and would subject the roadway to potential future rock falls that may impact on road safety. Over time the ARL of the slopes may increase given future erosion and slope instability. Therefore this option has been considered as unacceptable.

Option 2 – Stabilising of batter

This option proposed stabilising the batter at Mulligans Bluff, however, this was considered unfeasible due to a number of reasons as discussed below.

A preliminary assessment revealed that a reduction in ARL could not be achieved by grooming, rock bolting and scalping the slope to prevent large blocks (200-500mm) and large rock falls from occurring. The rock in the slope is highly jointed and any attempts at rock bolting might provide difficult. The large unstable rocks currently unsupported could not be removed as this would only expose further unstable rocks. It would not be feasible to flatten the batter to a safe angle of slope due to extensive earthworks and disposal of large volumes of fill. Any work on the slope would be hazardous and require abseiling to the site and using hand tools to correct the deficiencies. Access along the top of the batter with machinery would also not be feasible due to loose scree and the steep natural slope.

Any workers on the slope would be in danger of rock falls from above, caused by the abseiling ropes dislodging material. During construction the road would require large temporary rock fall fences to protect the public or the road would require closing

altogether. If large cranes were used to lift equipment up the face, the road would also require closing whilst the crane was on the formation.

Rock fall netting could be considered suitable at limited locations, however, it would not be suitable over the vegetated areas. Another concern would be the location of suitable anchor points for netting and problems associated with large rocks becoming snagged.

Option 3 – Rock fall fence and widen to 11m formation with 1.5H : 1V batter (Preferred Option)

The only other option to contain the ARL 1 and 2 rock fall events would be erecting a rock fall fence at the toe of the bluff. Due to the height and slope of the existing bluff, a 4m high Type 3 fence would be required at a 3m distance from the toe. With a required distance of 3m from the toe, widening of the existing formation would be required.

This option involves the placement of approximately 30,000m^3 of fill along the Mann River side at two locations to provide sufficient width to construct the rock fall fence and the wider formation. The fill could be generated from flattening the batter to a safe slope at Cangai. Access to the River would be provided by removing the existing rock fall at chainage 350. The rock fall fence and pavement would be constructed across this location and the traffic deviated. The increased width then available would be used to construct an access track down to the base of the fill. The fill would be constructed from a rock base up to the existing road level with minimal impact on traffic. The toe of the fill would still be 20 to 30m from the low river flow. The advantage of this option is that the existing dry packed retaining walls constructed along the original road edge in 1940 will not be disturbed, thus over coming any Heritage issues. The fill widening would also enable the base of the fill to be stabilised to prevent scouring due to high river flows. At the present time none of the five existing culverts crossing the road are operational due to rockfalls or being covered by fill. New culverts would be required with outlets to take the flows down to the Mann River. Along the edge of the formation on the River side a kerb would be placed to collect any water flowing across the road so that it can be discharged down the batter at selected locations.

A scour at the outlet of a culvert on the west end of Mulligans Bluff is undermining a dry packed retaining wall and will need to be rectified as part of the work. This is proposed to be achieved by constructing a retaining wall to support the road formation.

Option 4 - Widen to 11m formation with 2H : 1V batter

This is essentially the same as option 3 except that the fill batter is flatter. The flatter batter provides improved stability of the fill embankment, however the existing material has been end dumped and there is no evidence of instability even with a 1.3H : 1v batter. This option was not considered feasible due to the requirements of 46,000m^3 of fill as opposed to only 30,000m^3 for Option 3.

Option 5 - Widen to 9m formation with 2H : 1V batter

This option is also similar to Option 3 except that the cross section has been reduced to two 3.5m traffic lanes and 1m shoulders and the fill slope increased. The volume of fill required is 25,000m^3 which is similar to option 3. This option does not meet the preferred shoulder width of 2-3m.

Option 6 - Widen to 9m formation with 1.5H : 1V batter

This option would be as detailed in option 3 however this minimises the earthworks with 17,000m^3 of fill required. However this proposal only provides 1m shoulders and does not meet the project objectives. Whilst the fill quantities are reduced the costs are not significantly lower than option 3.

Option 7 - Widen to 12m formation using piled retaining wall

This option requires the construction of a piled retaining wall approximately 4m from the existing edge of formation over 210m. The construction of the piling wall requires the construction of an access track 4m below the existing road level to provide access for the piling rig. The temporary access track would result in the removal of the existing road and closure of the road to all traffic during construction. Drilling to establish the depth and quality of the rock could not be undertaken until the access track is constructed which will be a considerable risk to the Principal as the design may need to change significantly depending on the drilling results. Drilling into the rock for the pile walls could also be difficult because of the steeply dipping rock face. This option would still require an access track down to the River to undertake stabilising works along the toe of the fill. This is the most expensive option, has considerable risks associated with the work and would require substantial delays in traffic or road closures. As such this option was not considered feasible.

Option 8 - Widen to 9m formation using L shape precast retaining wall

The additional width is provided by excavating 3m below road level to place a 3m x 3m L shaped precast retaining wall on the existing fill. This would require closing half the road to traffic and removal of the Heritage retaining walls. The batter protection at the toe of the batter would still be required. This has a lower cost than the piling option but is more expensive than the filling option. Due to traffic, heritage and cost impacts this option was not considered feasible.

Proposal site B - Cangai Bluff

Option 1 – Do Nothing

This option would not meet the Proposal objectives and would subject the roadway to potential future rock falls that may impact on road safety. Over time the ARL of the slopes may increase given future erosion and slope instability. Therefore this option has been considered as unacceptable.

Option 2 - Stabilising of batter

This option proposed stabilising the batter at Mulligans Bluff, however, this option was considered unfeasible due to a number of reasons as discussed below.

The geotechnical investigation indicates that the existing slope may be stabilised by rock grooming, scalping and rock bolting. The slope treatment is only feasible if the existing formation is retained. However this does not address the substandard widths and pavement deficiencies. Widening on the river side is feasible at several locations as a 3m to 4m berm exist behind the guardrail. The alignment is also fixed at the eastern end by Bucks Creek.

Widening at Cangai Bluff to provide a safe angle of slope of 35° and also an 11m formation with 4m benches would generate approximately 70,000m^3 of fill. Mulligans only requires approximately 30,000m^3. To reduce the cut to 30,000m^3 the batter would only be flattened between chainage 100 to 300.

The options below have been based on widening and flattening the batters to a safe angle and slope grooming.

Option1 - 11m Formation (Preferred Option)

This involves excavation of approximately 30,000m^3 of cut between chainage 100 and 300, slope grooming would be undertaken between chainage 300 and 440 in the highest section of the cut. From chainage 300 to 440 the road would be widened on the River side where a

3m to 4m berm exists. This option satisfies the fill requirements at Mulligans Bluff with no excess fill material being generated.

Option 2 - 9m Formation

This option generates 30,000m^3 of cut. The existing horizontal alignment on this section has a signed curve of 85km/hr. Due to a wide fill berm behind the guard rail the curve should be able to be improved to 100km/hr without widening of the fill. This option only provides 1m shoulders and does not meet the project objectives.

7 Assessment Stage

7.1 Background and Database Searches

The following results were obtained regarding the Proposal from database searches. (Refer to Appendix C for copies).

Note: The Proposal is located in Clarence Valley Council LGA. This LGA was proclaimed on 25 February 2004 as an amalgamation of the areas of Copmanhurst, Grafton City, Maclean and Pristine Waters. At the time of writing this REF, the new Clarence Valley Council LGA was not included in some of the searched databases. Where Clarence Valley Council was not listed searches were carried out for Pristine Waters Shire Council LGA, which the Proposal was located in before the amalgamation.

7.1.1 Australian Heritage Database

A search of Australian Heritage Database for the Pristine Waters LGA was carried out on 10 August 2005 revealing 48 items listed on the Register within the LGA. The closest listed item to the Proposal site, the Gibraltar Range National Park, is located approximately 5km southwest of Mulligans Bluff and is not expected to be affected by the Proposal. None of the other listed sites are expected to be affected by the Proposal.

7.1.2 NSW Heritage Office State Heritage Register/Inventory

A search on the State Heritage Register/Inventory for the Pristine Waters LGA was undertaken on 17 August 2005. Results of the search indicate 10 items listed on the register and 182 items are listed on the Inventory within Clarence Valley LGA. The closest item listed on the NSW Heritage Register to the Proposal site is 'High Conservation Value Old Growth Forest'. This listing refers to several old growth forests in the upper north east NSW. The closet area listed in the description is Gibraltar Range National Park located approximately 4km west of the Proposal sites. As the Proposal does not require clearing of mature native vegetation, and given the proximity of the listing to the proposed works it is not expected to affect this item. Of the items listed on the Inventory none are located within 5km to the Proposal site and therefore it is not anticipated that the works would have any impact to these listings.

7.1.3 RTA Heritage and Conservation Register (s170)

A search of the RTA s170 Register for the Northern Region was carried out on 16 August 2005. 28 items are listed for the Northern Region. None of these items are located within or in close vicinity to the study area.

7.1.4 LEP Heritage Listings

A search of Nymboida LEP was undertaken on 30 April 2004. Schedule 1 lists nine items of Environmental Heritage in the LGA, none of which is located close to the Proposal sites and therefore not expected to be affected by the Proposal.

7.1.5 DEC Aboriginal Heritage Information Management System (AHIMS)

A search of the DEC Aboriginal Heritage Information Management System (AHIMS) for the Proposal sites and a 5km buffer zone was carried out on 3 May 2005. Results of this search indicated that there is one site located within the buffer zone, which is located approximately 2km east north east of Proposal site B. Due to the distance the site is not expected to be affected by the Proposal.

7.1.6 DEC Wildlife Atlas Flora and Fauna Records

A search of the DEC Wildlife Atlas for threatened flora and fauna was undertaken on 25 August 2005 for listings of threatened flora and fauna within a 5km radius of the Proposal sites. A total of 13 threatened fauna have been previously recorded within the search area with no listings for threatened flora species.

The closest fauna species listed to the Proposal sites is the Rufous Bettong (*Aepyprymnus rufescens*) which is located approximately 320m south of the Cangai Bluff site. The closest listing to the Mulligans Bluff site is approximately 2km to the north.

7.1.7 The Commonwealth Department of the Environment and Heritage (EPBC Act) Databases

A search of the EPBC Act Online Database was undertaken on 16 April 2004 for records listed as matters of National Environmental Significance (NES) potentially occurring within 5km of both Proposal sites. The search results are detailed in table 7.1.7 below.

Table 7.1.7: EPBC search results

EPBC Act Protected Matters	Within search area of Cangai Bluff	Within search area of Mulligans Bluff
World Heritage Properties	Central Eastern Rainforest Reserves	Central Eastern Rainforest Reserves
National Heritage Places	None present	None present
Wetlands of International Importance	Little Llangothlin Nature Reserve	Little Llangothlin Nature Reserve
Commonwealth Marine Areas	None present	None present
Threatened Ecological Communities	None present	None present
Threatened Species	22 species potentially occurring	23 species potentially occurring
Migratory Species	9 species potentially occurring	9 species potentially occurring
Marine Species	13 species potentially occurring	13 species potentially occurring
Places on the Register of National Estate (RNE)	None present	None present
Listed Commonwealth Lands	None present	None present
State and Territory Reserves	Gibraltar Range National Park	Gibraltar Range National Park
Regional Forest Agreements (RFA)	Upper North East NSW RFA	Upper North East NSW RFA

It is unlikely that the works would impact on any of the items listed in Table 7.1.7, however the potential impacts of the works upon EPBC Act NES matters are further discussed in Chapter 8.4, Flora and Fauna.

7.1.8 National Native Title Claims Search

A search of the National Native Title Tribunal was conducted on 25 August 2005. No Native Title Claims are recorded within 10km of the Proposal sites.

7.1.9 NSW Department of Primary Industries Noxious weeds list

A search of the Noxious Weeds List was undertaken on 10 August 2005 for noxious weeds occurring in the Clarence Valley LGA. Fifty species of weeds were identified that have the potential to occur within the study area.

7.1.10 DEC Contaminated land information

A search of the DEC Contaminated Land Register was undertaken on 10 August 2005 for sites within Clarence Valley LGA. No records were found in the database.

7.1.11 Department of Natural Resources (DNR) Salinity Information Data

A search of the DNR salinity information data revealed that no known occurrence of salinity has been mapped in the vicinity of the Proposal sites. The closest occurrence of salinity has been recorded over 50km north east of the Proposal sites.

7.2 Consultation

Relevant State government agencies and stakeholders were contacted and provided with the opportunity to comment on the Proposal. Table 5.2.1 lists the government agencies and stakeholders that were invited to comment on the Proposal for this REF. Responses received are summarised in column 1, while column 2 identifies the Chapter in the REF where addressed. Copies of all correspondences are provided Appendix C.

Table 5.2.1: Summary of issues raised during consultation.

Summarised Issue	Chapter in REF where addressed
Clarence Valley Council	
Access to the toe of the existing road batter at Mulligans Bluff is extremely difficult and will require the construction of a substantial access track along the batter for several hundred meters.	Chapter 3.1.3
A considerable quantity of uncompacted loose fill is lying on the existing batter beow the road at Mulligans Bluff, presumably from land slips in the past.	Chapter 2.1
DNR	
A detailed erosion and sedimentation plan should be prepared to address all potential impacts.	Chapter 8.1
A licence under the Native Vegetation Conservation Act would be required for all clearing/lopping works carried out within 20m of the River bank which is state Protected Land but outside the road reserve.	Chapter 9.2
For all excavation works carried out outside the road reserve but within 40m of the high bank of the river a permit under the Rivers and Foreshores Improvement Act would be required. Works involving either fill or excavation within the bed of a river would also require a permit. Where excavation works fall within the road reserve a permit is not required by RTA or the contractor.	Chapter 9.2

8 Potential Environmental Impacts

This Chapter of the REF identifies potential environmental impacts associated with proposed works and provides appropriate safeguards to mitigate these identified potential impacts. Measures to mitigate or prevent impacts would be implemented prior to construction, during construction and post-construction.

8.1 General

A Contractor's Environmental Management Plan (CEMP) would be developed in accordance with the specifications set out in the RTA's *Environmental Protection (Management Plan)' – QA Specifications G35, Soil and Water Management (Erosion and Sediment Control Plan) QA Specification G39, and Clearing and Grubbing QA Specification G40.* The above specifications would incorporate additional site specific requirements, outlined below, which are not covered by the standard clauses in G35 G39 and G40. The specifications and the CEMP would be reviewed by the RTA Environmental Adviser Northern Region, prior to the commencement of any site works.

8.2 Geology, Soils and Landform

Potential Impacts

A geotechnical report undertaken by RTA (refer to Appendix E) identified the need to remove all loose material from both sites, remove selected trees from the slope while maintaining gully vegetation and to install two rock bolts at Cangai Bluff. A rock fall fence at the base of the bluff's was also recommended.

The construction work associated with the Proposal has the potential to impact on the soils at the site through vegetation removal, disturbance of soils, transportation of fill materials, and installation of rock fall fences. The installation of the rock fall fencing has the potential to disturb soils. Removal and deposition of fill material at the Proposal sites would temporarily increase the potential material for sedimentation and transportation along the creek line until compaction and fencing is installed.

The flora species Water Couch *(Paspalum distichum)* has been identified as occurring within the Weeping Lily Pilly/Weeping Bottlebrush Low Closed Forest community in the vicinity of the Mulligans Bluff. Water Couch is a low level indicator of salinity, although it also occurs in waterlogged areas (Semple 2005). The Weeping Lily Pilly/Weeping Bottlebrush Low Closed Forest community occurs adjacent to the Mann River in a well watered area. No other salinity indicator species occur in the locality and no evidence of salinity is present at the Proposal site. Given that DNR salinity data has no recordings of salinity in the immediate locality, and the proposed works would not directly impact on the Weeping Lily Pilly/ Weeping Bottlebrush Low Closed Forest community it is considered that the occurrence of salinity would be negligible and unlikely to affect the Proposal.

These potential impacts would be mitigated by the safeguards listed below in conjunction with the preparation and implementation of the Erosion and Sediment Control Plan (ESCP).

Site Specific Safeguards

- Site rehabilitation of disturbed areas would be undertaken progressively as stages are completed.
- All material in excess of fill requirements at Mulligans Bluff would be transported to an appropriately licensed landfill site.

8.3 Water Quality and Hydrology

Potential Impacts

The Proposal would involve the removal and deposition of fill material and works in the vicinity of a river. Some removal of vegetation would occur on slopes and to facilitate access. Refuelling may occur onsite however there would be minimal fuel/chemical storage. As a result, the works would have the potential to impact on the water quality of the Proposal site through runoff, spills and erosion and sedimentation. These impacts may lead to adverse effects to the aquatic habitat and water quality however the following safeguards would be in place to reduce the likelihood of any potential impacts.

Site Specific Safeguards

- All staff would be inducted in the incident emergency procedures and made aware of the location of the emergency spill kit.
- Should a spill occur during construction, the incident emergency spill plan would be implemented, and the Regional Environmental Adviser, Northern Region contacted.
- All fuels, chemicals, and liquids would be stored at least 20m away from any waterways or drainage lines and would be stored within a bunded area in the compound site.
- All machinery used on-site and in particular machinery used near the Mann River would be appropriately serviced and in good working order to minimise the leakage of lubricants and fuels.
- Heavy machinery would not be permitted to traverse the Mann River at any time during the construction period.
- The refuelling of plant and maintenance of machinery would be undertaken within the compound site where possible.
- Where machinery cannot be moved for refuelling and maintenance temporary bunding would be installed.
- Disturbed land would be stabilised, potentially by planting of locally occurring native species, to avoid ongoing erosion and minimise the risk of sediment deposition in the Mann River.
- Where possible works would be undertaken during the dry season with works being programmed, giving consideration to weather forecasts. The BoM would be contacted for weather forecasts prior to each weeks work.
- Sufficient time would be allowed to vacate and clean up the Proposal sites prior to the commencement of heavy rainfalls or anticipated rise in water level affecting.
- Standard best practise erosion and sedimentation controls would be implemented and adhered to throughout and following the construction phase of the project.

8.4 Flora and Fauna

Potential Impacts

Potential impacts to the flora and fauna at the Proposal sites would arise from clearing of native vegetation from the study and has the potential to displace native fauna species that currently reside or utilise those habitat resources. The displacement of individuals may result in additional pressure on local fauna populations as a result of the sudden reduction in available foraging, roosting and/or nesting resources and potential displaced individuals.

The study area includes good habitat for arboreal mammals and nocturnal birds, with marginal habitat for small ground mammals and reptile with sparse leaf litter and moderate groundcover. Potential koala habitat occurs above each of the cuttings however no scats or

evidence of koalas were identified at the time of the site inspection. In addition to those species identified on the Atlas of NSW Wildlife as potentially occurring in the study area (Refer to Table 2.5.1) a further nine species were included by Sandpiper on the basis of the field survey and background searches. Table 8.4.1 below lists all species with the potential to occur within the study area.

Table 8.4.1: Species with the potential to occur within the study area.

Common Name	Scientific Name	Listing	Status
Emu (Eastern population)	*Dromaius novaehollandiae*	TSC Act	Endangered Population
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	TSC Act	Vulnerable
Powerful Owl	*Ninox strenua*	TSC Act	Vulnerable
Masked Owl	*Tyto novaehollandiae*	TSC Act	Vulnerable
Spotted-tailed Quoll	*Dasyurus maculatus*	TSC Act, EPBC Act	Vulnerable – TSC, Endangered EPBC
Brush-tailed Phascogale	*Phascogale tapoatafa*	TSC Act	Vulnerable
Rufous Bettong	*Aepyprymnus rufescens*	TSC Act	Vulnerable
Squirrel Glider	*Petaurus norfolcensis*	TSC Act	Vulnerable
Greater Broad-nosed Bat	*Scoteanax reuppelli*	TSC Act	Vulnerable
Large-footed Myotis	*Myotis adversus*	TSC Act	Vulnerable
Eastern Freetail Bat	*Mormopterus norfolcensis*	TSC Act	Vulnerable
Hoary Bat	*Chalinalobis nigrogriseus*	TSC Act	Vulnerable
Grey-headed Flying Fox	*Pteropus poliocephalus*	TSC Act, EPBC Act	Vulnerable – TSC, Vulnerable EPBC
White-crowned Snake	*Cacophis harriettae*	TSC Act	Vulnerable
Eastern Cod	*Maccullochella ikei*	TSC Act, EPBC Act	Endangered TSC, Endangered EPBC
Silver Perch	*Bidyanus bidyanus*	TSC Act	Vulnerable

Use of the study area by the above listed species is considered variable with different scales of disturbed habitat. The only species considered unlikely to utilize the habitat in the study are is the emu, which prefers open plains and is unlikely to utilize the hill terrain of the study area.

The Proposal has the potential to remove habitat, create edge effects and cause pollution. However, the Proposal would not increase the extent of habitat fragmentation and isolation as works would be along existing habitat edges. The Proposal would result in vegetation removal (2.7ha) that would be confined to the existing road reserve and would not result in variability in use of the different habitats and the location of these habitats in the landscape are unlikely to result in significantly reduced rates of breeding success or noticeable declines in local fauna populations (Sandpiper 2004). It is unlikely that any fauna rely solely on habitat

within the sites or that this habitat constitutes an important part of an individual's home range.

Sandpiper (2004) notes that the steepness of the existing batter slope is likely to reduce movement of all but the most mobile species (eg. birds and bats), however, no nest or roosting sites were identified within the Proposal sites at the time of inspection. These species would not perceive the slight increase (2m) in road width as a barrier, nor would arboreal or ground fauna should they choose to scale the batter. The value of the subject sites as fauna crossing points is questionable given the variable habitat. Potential crossing opportunities occur at the northern end of Cangai Bluff where a small area of open forest occurs on the eastern side of the road. The increase in gap created in this location would be limited as it occurs at the end of the proposed works. Finally, the Proposal would not result in an increase in vehicle traffic or a substantial increase in vehicle speed, two factors that contribute to road strike (Sandpiper 2004).

The Proposal would remove up to 17 HBT's of the 47 HBT's identified within the study area of both sites, some of which may be used by fauna, including insectivorous bats that forage along the Mann River. However, similar hollows occur in adjacent habitats and the proposal would not result in the total removal of the hollow resource of the study area. Detrimental impacts would occur if any of the hollows are occupied during the removal of the HBT's. Therefore hollows would be inspected for presence of fauna prior to removal.

The Proposal has the potential to cause pollution to the aquatic habitat of the Mann River which provides habitat for two species of fish listed on the NSW *Fisheries Management Act 1994.* In most cases machinery would be at least 30m from the river however access may require machinery to encroach on the riparian zone. The risk of sedimentation and pollution to the river system would be considered low given the rock gravel substratum adjacent to the river which would reduce the potential of pollution and sedimentation entering the river. Additionally, erosion and sedimentation controls would be installed and maintained at each site and machinery would minimise any activity within 30m of the Mann River. In the event that sediment does enter the Mann River system it would be anticipated that the predicted extent of sediment transfer, (based on the size of the river and high flow rate and the existing background levels of pollution), would mobilise the sediment and it would be unlikely to have a detrimental effect (Sandpiper, 2004)

An eight part test on threatened flora and fauna under Section 5A of the EP&A Act was conducted by Sandpiper (refer to Appendix D). This concludes that the Proposal would not have a significant affect on threatened species, endangered populations or endangered ecological communities. This conclusion has considered the small area of habitat affected, the degraded nature of this habitat, the ability to retain some hollow bearing trees, the ability to mitigate impacts on aquatic habitat, the absence of impacts such as barrier effects, road strike and habitat fragmentation.

Therefore, as no threatened flora or fauna species would be impacted by the works and the works would only include minor vegetation clearing within the road reserve, it not anticipated that the proposed works would have any adverse impacts to biodiversity at the locality. The following safeguards would be implemented to ameliorate any potential impacts of the Proposal.

Site Specific Safeguards

- The riparian habitat adjacent to the Mann River would not be disturbed.
- Clearing works would be undertaken during the dry season (June-Sep) and prior to the onset of spring storms.
- Vegetation to be removed would be clearly marked. Should additional vegetation removal be required the proposed variation to the original scope would be referred to Regional Environmental Advisor.

- Hollow bearing trees would be retained wherever possible and the extent of habitat removal above each bluff would be minimised.
- Machinery would be manoeuvred around trees when accessing the Proposal site and would minimise activities within 30m of the Mann River, where possible.
- Trees on the edge of potential cleared zones would be maintained where possible.
- The number of Forest Oaks and the extent of potential habitat to be removed would be minimised.
- The large White Mahogany and Tallowood at the southern end of Cangai Bluff would be retained for habitat value. The tree would be clearly marked as being retained.
- Appropriate measures would be introduced to minimise the spread of weeds between and within sites. An extensive weed infestation occurs below the road at Mulligans Bluff and careful planning would be required to minimise spread of weed in this area.

8.5 Socio-economic Considerations

Potential Impacts

There is potential for the local community and travelling public to be temporarily inconvenienced as a result of the proposed works. During the construction period there is the potential to delay through-traffic with a reduced speed limit zone and additional heavy vehicles on the road. Temporary single lane closures may be required to safely undertake proposed activities, however these would be undertaken in accordance with RTA – *Traffic Control at Work Sites Manual 2003.* These impacts would be considered minor, and it is not anticipated that any adverse comments would be receive regarding the Proposal.

Site Specific Safeguards

- Consultation would be undertaken with potentially affected residences prior to the commencement of works and would be undertaken in accordance with the RTA's *Community Involvement Practice Notes and Resource Manual, 1988.*

8.6 Indigenous Heritage

Potential Impacts

Background searches including AHIMS and DEC database searches were undertaken to identify any potential occurrence of items of indigenous heritage within the study area of the Proposal. One site, was listed on the AHIMS database within the search area, however given the recording is listed 2km north east of the Proposal site it is unlikely that the works would have any impact on this item.

Consultation with Local Aboriginal Land Council (LALC) and RTA Aboriginal Programs Coordinator (APC) did not result in any objection being raised in regard to the Proposal. Given the scope of the works and the disturbance of the site in past activities, such as the construction of the Gwydir Highway, it is not anticipated that any additional indigenous items would be uncovered. The following safeguards would be implemented to minimise any potential impacts to indigenous heritage.

Site Specific Safeguards

- All personnel working on site would receive training in their responsibilities under the *National Parks and Wildlife Act 1974.*
- Should any indigenous artefacts or items be uncovered or located during the works, all work would cease in the vicinity of the find, and the RTA's Environmental Adviser, Northern Region, would be contacted

8.7 Non-Indigenous Heritage

Potential Impacts

Dry stone walls were identified along the side of the Gwydir Highway within the study area of both Proposal sites. A Heritage Assessment was undertaken by RTA Operations in 2004 to determine the heritage values associated with the dry stone walls. A copy of the report is available in Appendix F.

This report identifies construction of the stone walls is likely to have been undertaken with the expansion of the NSW road network between 1939 and 1955 and are likely to have been completed after 1955. The stone wall demonstrates a relatively low degree of technical achievement and is not widely know within the local area. The stone walls represent common examples of engineering within the region and are assessed as having no heritage significance. The proposed alterations as a part of the Proposal would not require a Statement of Heritage Impact report.

No other items or places of non-indigenous heritage were identified within the vicinity of the Proposal sites and therefore it is not anticipated that the Proposal would have any adverse affects on heritage within the locality.

Site Specific Safeguards

- In the event that any non-indigenous artefacts or items are located during the works, all work would cease in the vicinity of the find, and the RTA's Environmental Adviser, Northern Region would be contacted.

8.8 Visual Amenity and Landscape

Potential Impacts

During the construction period, the area surrounding the Cangai and Mulligans Bluff sites would be reduced to a construction site affecting the visual appearance to road users. Additionally vegetation removal would occur on the slopes and rock fall fences would be constructed at the toe of the bluffs. These changes would result in a minor negative impact on the visual amenity of the locality however, given the scale of the works and the improvement in safety requirements it is not anticipated that any adverse comments would be received in regard to the visual amenity. Additionally the works would be confined to the road reserve and would not impact on the natural bushland surrounding the Proposal sites. The following safeguards would be implemented to ameliorate any potential impacts as a result of the proposed works.

Site Specific Safeguards

- Cleared areas would be revegetated as soon as possible on completion of works.
- The construction site would be kept tidy and rubbish free.
- No clearing of vegetation would occur outside the road reserve.
- In the event that any additional works to those described in this REF are necessary, consideration would be given to local and community values throughout the planning stage.

8.9 Waste Minimisation and Management

Potential Impacts

The principles of waste management are to minimise the amount of waste generated, recycle waste wherever possible and dispose of the remainder in a responsible manner in accordance with appropriate RTA policy. The RTA adopts the Resource Management

Hierarchy principles embodied in the *Waste Avoidance & Resource Recovery Act 2001* (WARR Act).

The works have the potential to generate various types of waste that can be reused or recycled in accordance with the principles of the WARR Act, and some wastes that would require disposal.

Potential sources of waste generated through construction would include the following:

- Cleared vegetation;
- Excess soil material;
- Excess construction and fencing materials; and
- Removed rocks and boulders.

Site Specific Safeguards

- There would be no burning of waste.
- All noxious weeds and exotic plant species removed would be bagged and disposed of at a licensed landfill facility.
- All construction materials, surplus soils and wastes generated from the Proposal would be separated, stockpiled and stored at the compound site prior to reuse, recycling or disposal as a last resort.
- All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.

8.10 Summary of Beneficial Effects

- Improved safety for road users;
- Reduced Assessed Risk Level (ARL);
- Improved road pavement; and
- Reduced number of road closures.

8.11 Summary of Adverse Effects

- Short term delays for road users during construction period;
- Potential for increase sedimentation during construction period; and
- Minor reduction in visual amenity at the Proposal sites.

9 Implementation Stage

9.1 Safeguards Process

A Contractor's Environmental Management Plan (CEMP) would be developed in accordance with the specifications set out in the RTA's *Environmental Protection (Management Plan) – QA Specifications G35.* The CEMP would incorporate additional site specific requirements, outlined below, which are not covered by G35. The CEMP would be reviewed and certified by the RTA Environmental Adviser, Northern Region, prior to the commencement of any site works.

Table 9.1: Site Specific Environmental Safeguards

Impact	Environmental Safeguards
Landform, Geology & Soils	
	• Site rehabilitation of disturbed areas would be undertaken progressively as stages are completed.
	• All material in excess of fill requirements at Mulligans Bluff would be transported to an appropriately licensed landfill site.
Water Quality & Hydrology	
	• All staff would be inducted in the incident emergency procedures and made aware of the location of the emergency spill kit.
	• Should a spill occur during construction, the incident emergency spill plan would be implemented, and the Regional Environmental Adviser, Northern Region contacted.
	• All fuels, chemicals, and liquids would be stored at least 20m away from any waterways or drainage lines and would be stored within a bunded area in the compound site.
	• All machinery used on-site and in particular machinery used near the Mann River would be appropriately serviced and in good working order to minimise the leakage of lubricants and fuels.
	• Heavy machinery would not be permitted to traverse the Mann River at any time during the construction period.
	• The refuelling of plant and maintenance of machinery would be undertaken within the compound site where possible.
	• Where machinery cannot be moved for refuelling and maintenance temporary bunding would be installed.
	• Disturbed land would be stabilised, potentially by planting of locally occurring native species, to avoid ongoing erosion and minimise the risk of sediment deposition in the Mann River.
	• Works would be programmed giving consideration to weather forecasts. The BoM would be contacted for weather forecasts prior to each weeks work.
	• Sufficient time would be allowed to vacate and clean up the Proposal sites prior to the commencement of heavy rainfalls or

Impact	Environmental Safeguards
	anticipated rise in water level affecting.
	• Standard best practise erosion and sedimentation controls would be implemented and adhered to throughout and following the construction phase of the project.
Flora and Fauna	
	• The riparian habitat adjacent to the Mann River would not be disturbed.
	• Clearing works would be undertaken during the dry season (June-Sep) and prior to the onset of spring storms.
	• Vegetation to be removed would be clearly marked. Should additional vegetation removal be required the proposed variation to the original scope would be referred to Regional Environmental Advisor.
	• Hollow bearing trees would be retained wherever possible and the extent of habitat removal above each bluff would be minimised.
	• Machinery would be manoeuvred around trees when accessing the Proposal site and would minimise activities within 30m of the Mann River, where possible.
	• Trees on the edge of potential cleared zones would be maintained where possible.
	• The number of Forest Oaks and the extent of potential habitat to be removed would be minimised.
	• The large White Mahogany and Tallowood at the southern end of Cangai Bluff would be retained for habitat value. The tree would be clearly marked as being retained.
	• Appropriate measures would be introduced to minimise the spread of weeds between and within sites. An extensive weed infestation occurs below the road at Mulligans Bluff and careful planning would be required to minimise spread of weed in this area.
Socio-Economic Considerations	
	• Consultation would be undertaken with potentially affected residences prior to the commencement of works and would be undertaken in accordance with the RTA's *Community Involvement Practice Notes and Resource Manual, 1988.*
Indigenous Heritage	
	• All personnel working on site would receive training in their responsibilities under the *National Parks and Wildlife Act 1974.*
	• Should any indigenous artefacts or items be uncovered or located during the works, all work would cease in the vicinity of the find, and the RTA's Environmental Adviser, Northern Region, would be contacted

Impact	Environmental Safeguards
Non-Indigenous Heritage	
	• In the event that any non-indigenous artefacts or items are located during the works, all work would cease in the vicinity of the find, and the RTA's Environmental Adviser, Northern Region would be contacted.
Visual Amenity / Landscape	
	• Cleared areas would be revegetated as soon as possible on completion of works. • The construction site would be kept tidy and rubbish free. • No clearing of vegetation would occur outside the road reserve. • In the event that any additional works to those described in this REF are necessary, consideration would be given to local and community values throughout the planning stage.
Waste Management & Minimisation	
	• There would be no burning of waste. • All noxious weeds and exotic plant species removed would be bagged and disposed of at a licensed landfill facility. • All construction materials, surplus soils and wastes generated from the Proposal would be separated, stockpiled and stored at the compound site prior to reuse, recycling or disposal as a last resort. • All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.

9.2 Licences and Approvals

Water Act, 1912

Should water for bridge and road works and associated ancillary works need to be drawn from any waterways and used, a licence under Section 10, or a permit under Section 18F of the Water Act, 1912 may be required from Department of Natural Resources (DNR, formerly DIPNR).

In addition, the RTA's Environmental Adviser, Sydney Region, would be advised of the location and methodology in which water would be drawn.

Any diversion of water for the purposes of the Proposal or any ancillary works would also be licensed under Part 2 of the Water Act 1912. Any works that are not subject to a licence under Part 2 or a permit of the Water Act 1912 that comprise a "controlled work" under Part 8 of the Act would require an approval under Part 8 of the Act.

It should however be noted that at any time after the completion of writing this REF the above sections of the Water Act 1912 will be superseded by the Water Management Act

2000 in the event that a water sharing plan applies to the affected water source. In those circumstances, regard would be given to any new or additional requirements resulting from the applicability of the Water Management Act 2000 (and any other legislation) to any water source that may be affected by the Proposal.

Protection of the Environment Operations Act, 1997

Should the Proposal involve the pollution of water such as any physical change to the existing water quality and Environmental Protection Licence would be sought from the DEC under the POEO Act, 1997.

In addition the RTA are obliged to notify the DEC when a "pollution incident" occurs that causes or threatens "material harm" to the environment.

NSW Fisheries Management Act, 1994

A permit is required from the NSW Fisheries to temporarily or permanently block fish passage under section 219 of the Act. Such blockages may include silt fencing across waterways for sediment erosion control and bunding and dewatering works during the construction of crossings (NSW Fisheries, 2003).

The *Fisheries Management Act, 1994* through the *Fish Habitat Protection Plan No. 1*, requires public authorities, including local government and state authorities to notify the Minister for Fisheries of any Proposal to remove or relocate woody debris.

Native Vegetation Conservation Act 1997

The *Native Vegetation Conservation Act 1997* regulates the clearing of native vegetation in New South Wales and the clearing of vegetation on land identified as State protected land.

A licence under the *Native Vegetation Conservation Act* would be required for all clearing/lopping works carried out within 20m of the river bank which is state Protected Land but outside the road reserve.

10 Consideration of Environmental Factors

10.1 Clause 228(2) Factors (NSW Legislation)

The factors which need to be taken into account when considering the environmental impact of an activity are listed in Clause 228(2) of the *Environmental Planning and Assessment Regulation, 2000*. Those factors have been addressed in Table 10.1 below to ensure that the likely impacts of the proposed activities on the natural and built environment are fully considered.

Table 10.1: Compliance with Clause 228(2) of the EP&A Regulation 2000.

Clause 228(2) Factors	Impact
a) Any environmental impact on a community?	
In the short term there would be minor impacts on the community, including minor disruption to traffic, minor visual impacts and an increase in noise levels for the surrounding area during the construction period. These would be minimised with the implementation of the safeguards outlined in Chapter 8.	**Short term (-) ve**
In the long term, there would be a positive impact for the community as the works would increase the safety to road users.	**Long term (+) ve**
b) Any transformation of a locality?	
The locality of the Proposal site would not be transformed to a different use and the works would have no lasting visual impacts.	**Nil**
c) Any environmental impact on the ecosystem of the locality?	
Although some vegetation removal would occur, this would not result in any impact to threatened species or their habitat. Additionally the Proposal site is highly disturbed due to the previous construction of the Gwydir Highway. Therefore the proposed works would not impact on the ecosystems of the locality.	**Nil**
d) Any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality?	
The Proposal would not result in any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality.	**Nil**
e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?	
There would not be any impact on any locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social or other special value for present or future generations as a result of the works.	**Nil**
f) Any impact on habitat of any protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?	
The works would not impact on the habitat of any protected or endangered fauna (within the meaning of the *National Parks and Wildlife Act 1974*).	**Nil**

Clause 228(2) Factors	Impact
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	
The works would not endanger any species of animal, plant or other form of life, whether living on land, in water or in the air.	**Nil**
h) Any long-term effects on the environment?	
The works would not have any long-term effects on the environment.	**Nil**
i) Any degradation of the quality of the environment?	
The works would result in a short-term reduction in the visual environment within the vicinity of the Proposal site. However this would be minimised with the implementation of the safeguards outlined in Chapter 8.	**Short term (-) ve**
j) Any risk to the safety of the environment?	
The works present a potential risk to the safety of the environment during construction through increased erosion and sedimentation potential and fuel/chemical spillages associated with the construction activities. However, these would be minimised with the implementation of the safeguards outlined in Chapter 8.	**Short term (-) ve**
The works would reduce upslope scouring and subsequent sedimentation of a waterway in the long term.	**Long term (+) ve**
k) Any reduction in the range of beneficial uses of the environment?	
The proposed works would not result in any reduction in the range of beneficial uses of the environment.	**Nil**
l) Any pollution of the environment?	
The works have the potential to impact on the local air quality and water quality within and surrounding the study area during construction, however the impacts would be minimised by the implementation of the safeguards listed in Chapter 8.	**Short term (-) ve**
In the long term the works would not result in any pollution to the environment and would reduce sedimentation of the waterway through the slope stabilisation.	**Long term (+) ve**
m) Any environmental problems associated with the disposal of waste?	
All waste generated by the works would be reused and recycled where possible and disposed of in an appropriate manner where recycling is not possible. There would be no environmental problems associated with the disposal of waste.	**Nil**
n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply?	
There would be no increased demand on resources, natural or otherwise, which are, or are likely to become in short supply as a result of the works.	**Nil**
o) Any cumulative environmental effect with other existing or likely future activities?	
There would be no cumulative environmental effects with other activities.	**Nil**

10.2 EPBC Act 1999 Factors (Commonwealth Legislation)

The EPBC Act requires that the following matters of National Environmental Significance (NES) be considered.

Table 10.2: Compliance with Commonwealth EPBC Act requirements.

EPBC Act Factors	Impact
a) Any environmental impact on World Heritage property? There would be no environmental impact on World Heritage property as a result of the Proposal. The closest World Heritage Properties is Central Eastern Rainforest Reserves occurring within the Gibraltar Range to the west of the Proposal site. The proposed works would have no impact on the Gibraltar Range National Park or Central Eastern Rainforest Reserves.	**Nil**
b) Any environmental impact on National Heritage places? There would be no environmental impact on National Heritage places as a result of the Proposal. No National Heritage Places occur within 100km of the site.	**Nil**
c) Any environmental impact on wetlands of international importance? There would be no environmental impact on wetlands of international importance as a result of the Proposal. The closest wetland of international importance is Little Llangothlin Nature Reserve occurring over 10km of the Proposal site.	**Nil**
d) Any environmental impact on Commonwealth listed threatened species or ecological communities? Although 23 threatened species were recorded as potentially occurring, the minor nature of the works and the proposed safeguards ensure that there would be no environmental impact on Commonwealth listed threatened species or ecological communities as a result of the Proposal.	**Nil**
e) Any environmental impact on Commonwealth listed migratory species? Although nine migratory species were recorded as potentially occurring, the minor nature of the works and the proposed safeguards ensure that there would be no environmental impact on Commonwealth listed migratory species as a result of the Proposal.	**Nil**
f) Does any part of the Proposal involve nuclear action? The Proposal does not involve nuclear action.	**Nil**
g) Any environmental impact on a Commonwealth Marine area? There would be no environmental impact on a Commonwealth Marine area as a result of the Proposal.	**Nil**
In addition: Any impact on Commonwealth Land? There would be no impact on Commonwealth Land as a result of the Proposal.	**Nil**

11 Certification

This Review of Environmental Factors provides a true and fair review of the Proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Proposal.

Bradley Cole

Environmental Officer

Date: 02/02/06

I have examined this Review of Environmental Factors and the certification by Bradley Cole and accept the Review of Environmental Factors on behalf of the RTA.

Peter Millar

Project Manager

Date: 6/2/06

12 References

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Appendix A

Photographs of the Proposal site



Photo 1: Mulligans Bluff – view to the south from the northern limit of works.



Photo 2: Mulligans Bluff – view to the south.



Photo 3: Mulligans Bluff – western slope. View to the north. Minor stabilisation works would be required.



Photo 4: Mulligans Bluff – southern limit of work. View to the south.



Photo 5: Mulligans Bluff – proposed stock pile site at northern limit of works. View to the south.



Photo 6: Cangai Bluff – southern limit of works. View to the north.



Photo 7: Cangai Bluff – western slope. View to the northwest.

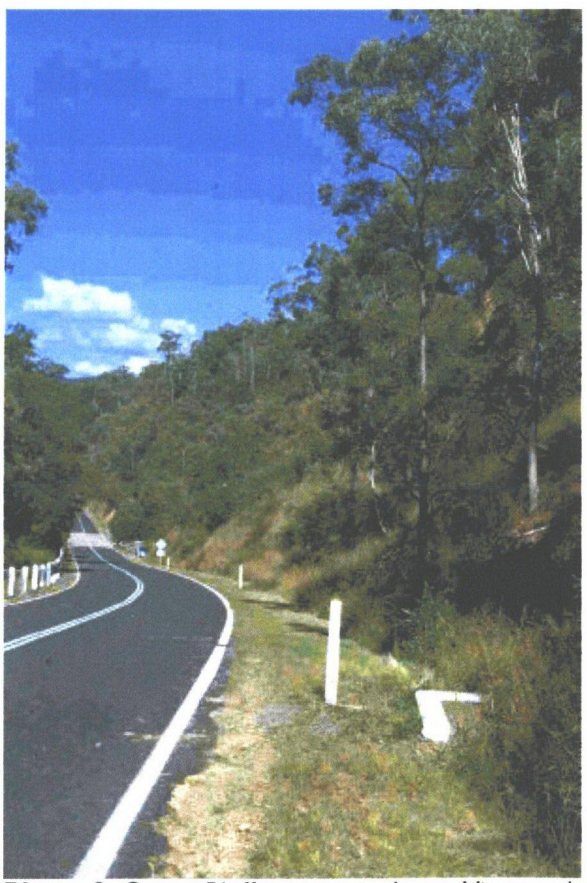


Photo 8: Cangai Bluff – western slope. View to the south.



Photo 9: Cangai Bluff – northern limit of work. View to the south.



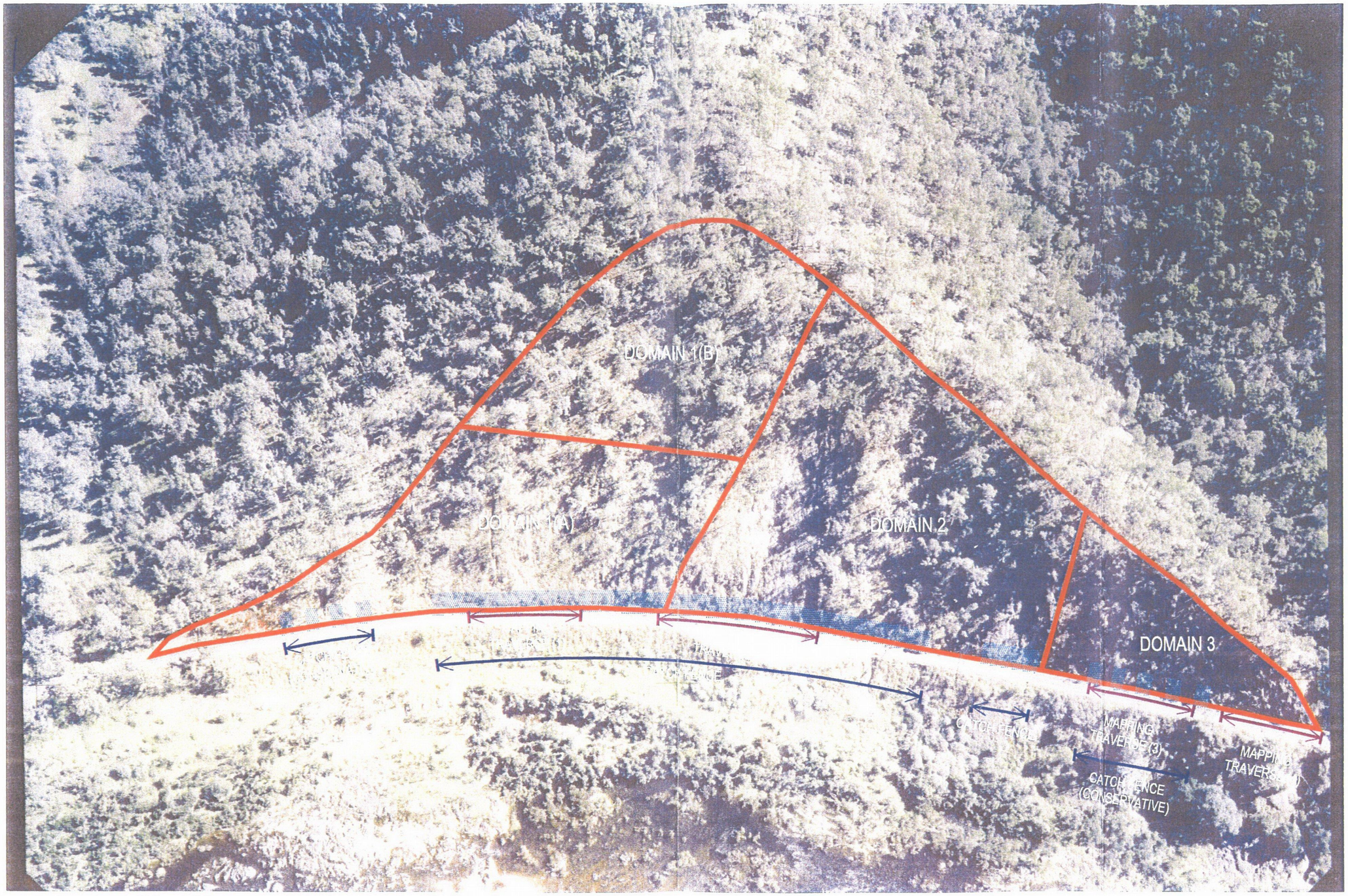
Photo 10: Cangai Bluff – proposed stockpile site at northern limit of works. View to the south.



Photo 11: Cangai Bluff – top of the batter. View to the southeast.

Appendix B

Concept Design



NOTE:

1. TRAVERSE LOCATIONS ARE APPROXIMATE, SUBJECT TO RTA SURVEY
2. ROCKFALL CATCH FENCE LOCATIONS ARE APPROXIMATE

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
MULLIGANS BLUFF - DOMAINS AND MAPPING LOCATIONS

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Job No:	21/12334
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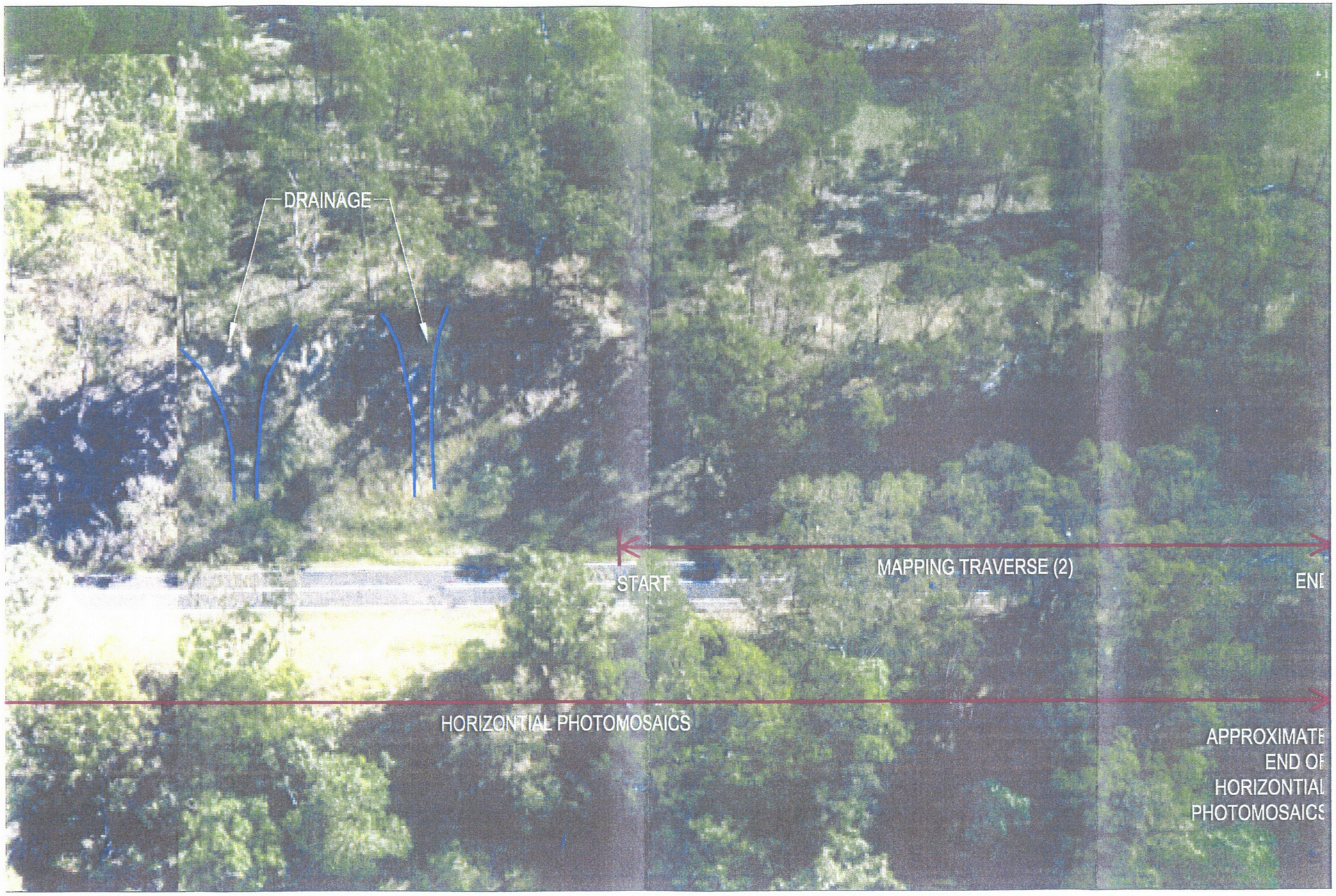

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF - MAPPING FEATURES (PART 3)

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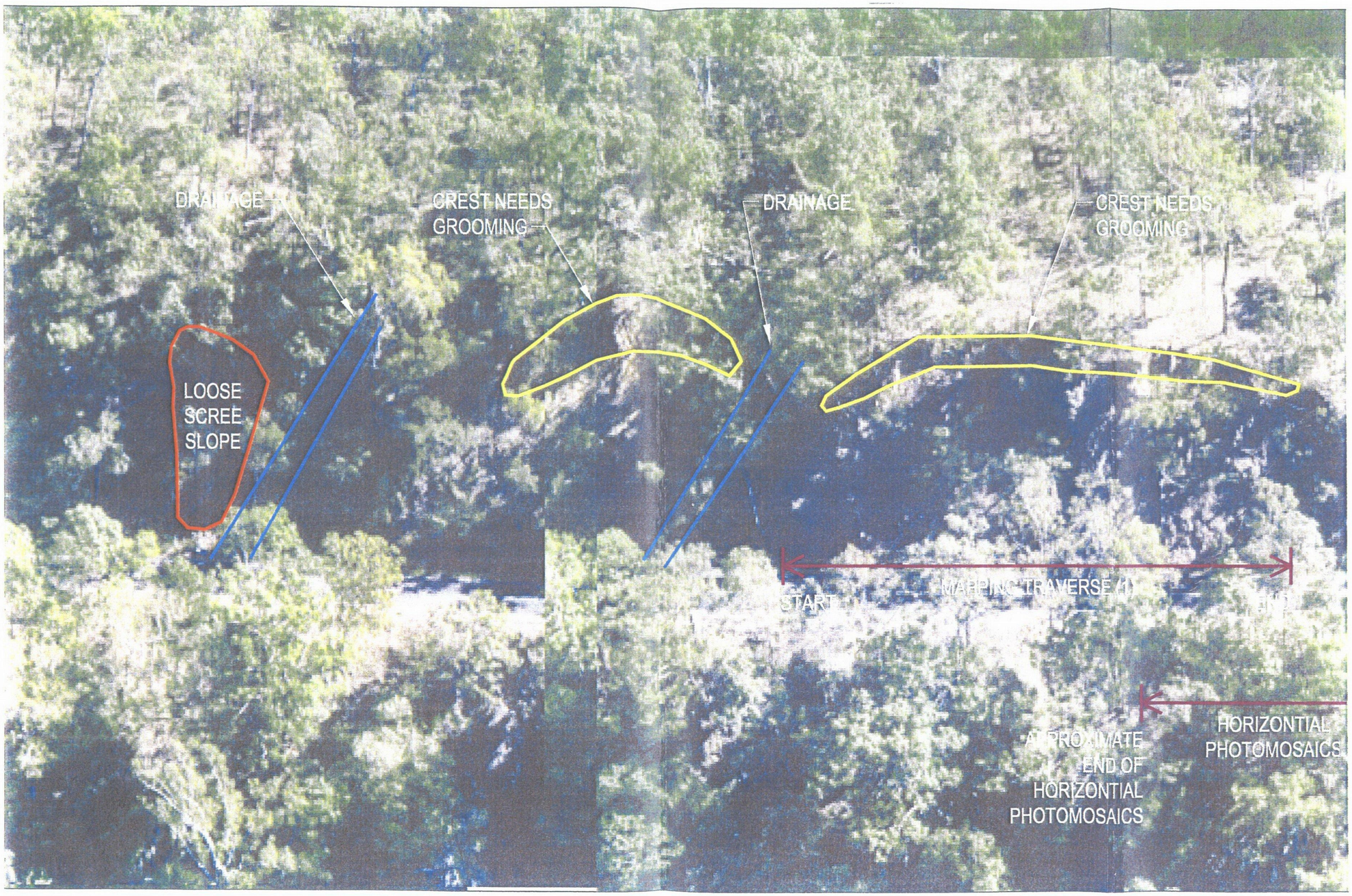

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF - MAPPING FEATURES (PART 2)

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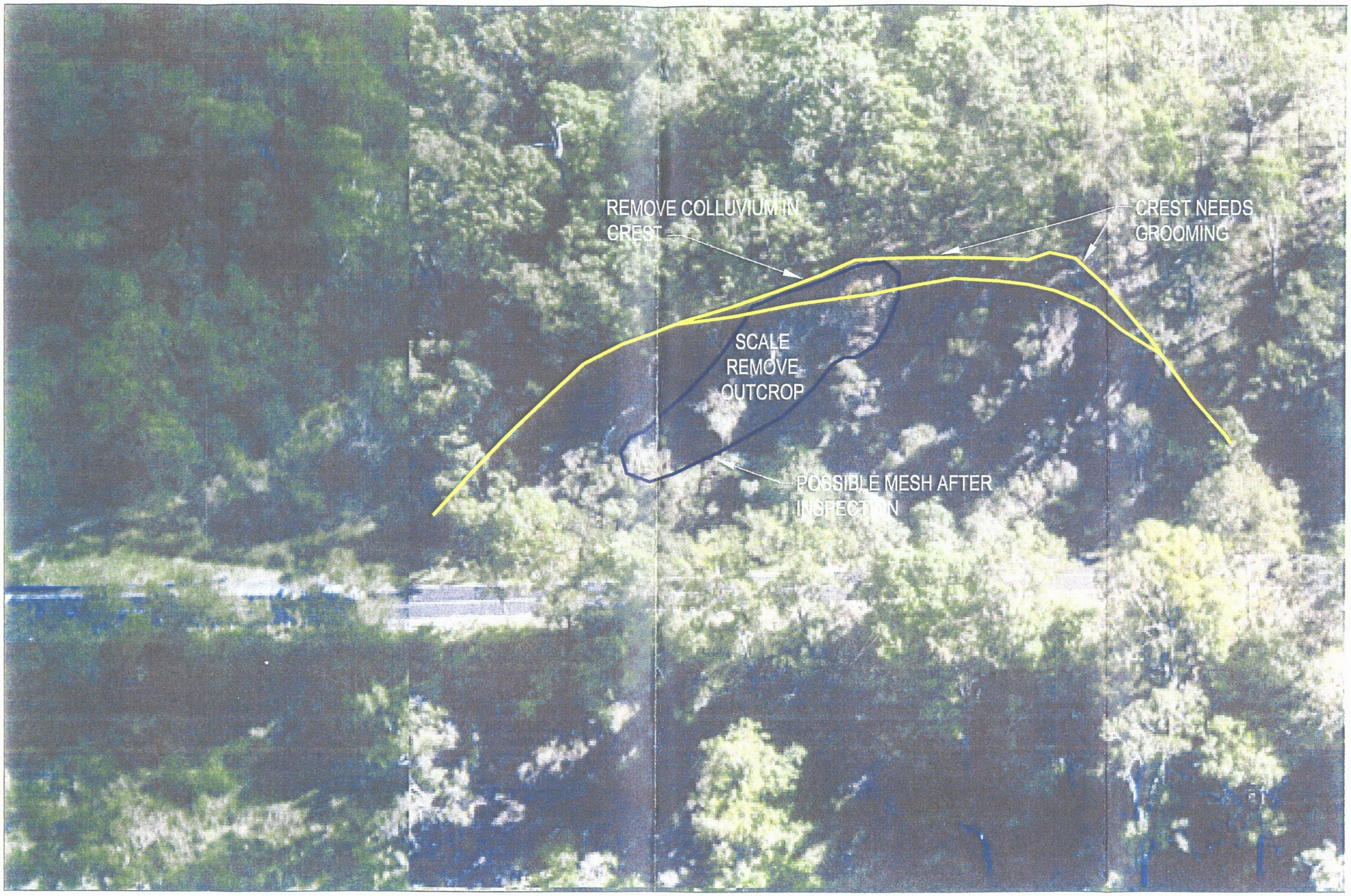

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF - MAPPING FEATURES (PART 1)

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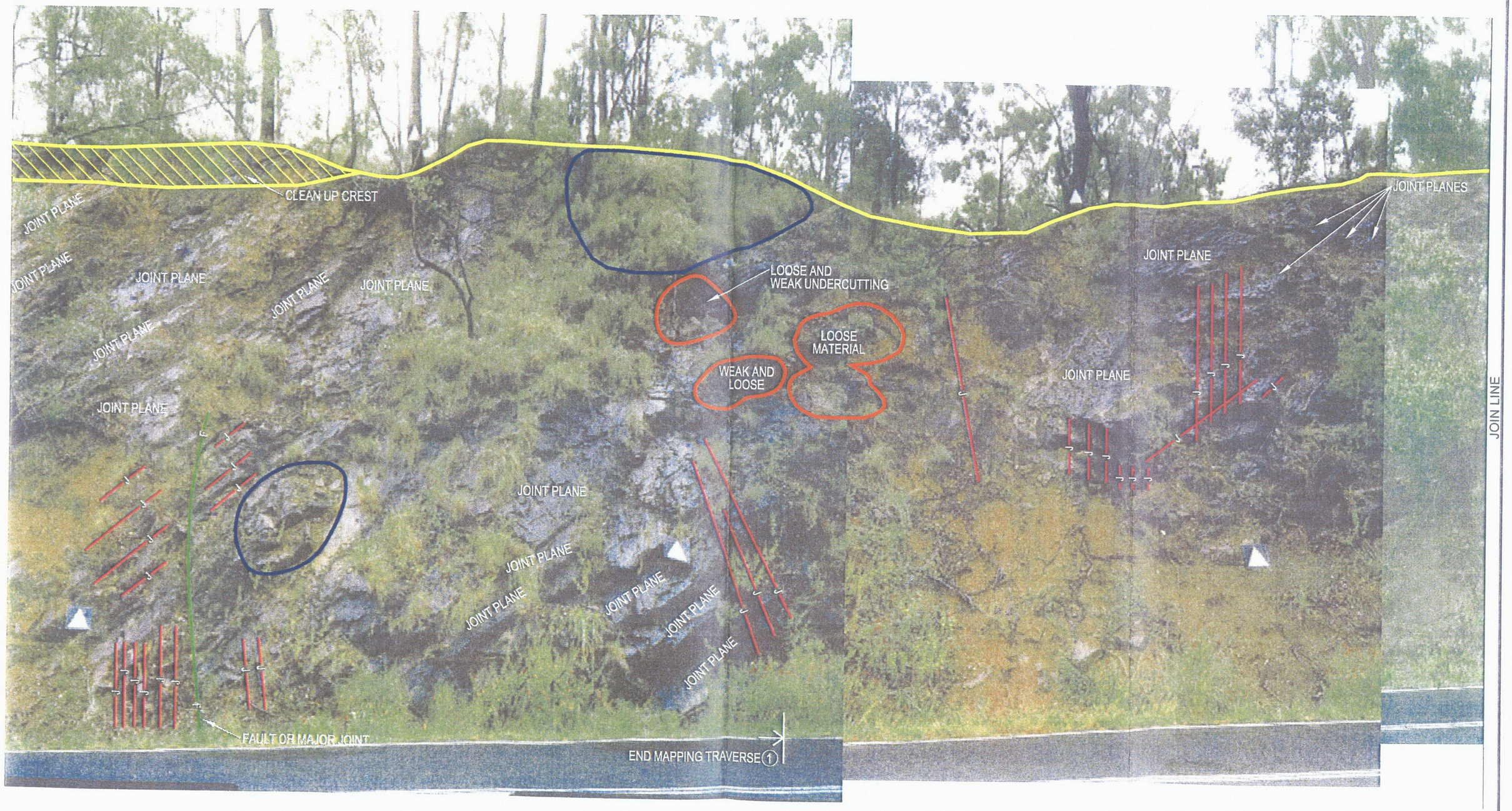

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF

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CANGAI BLUFF

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Scale:	AS SHOWN

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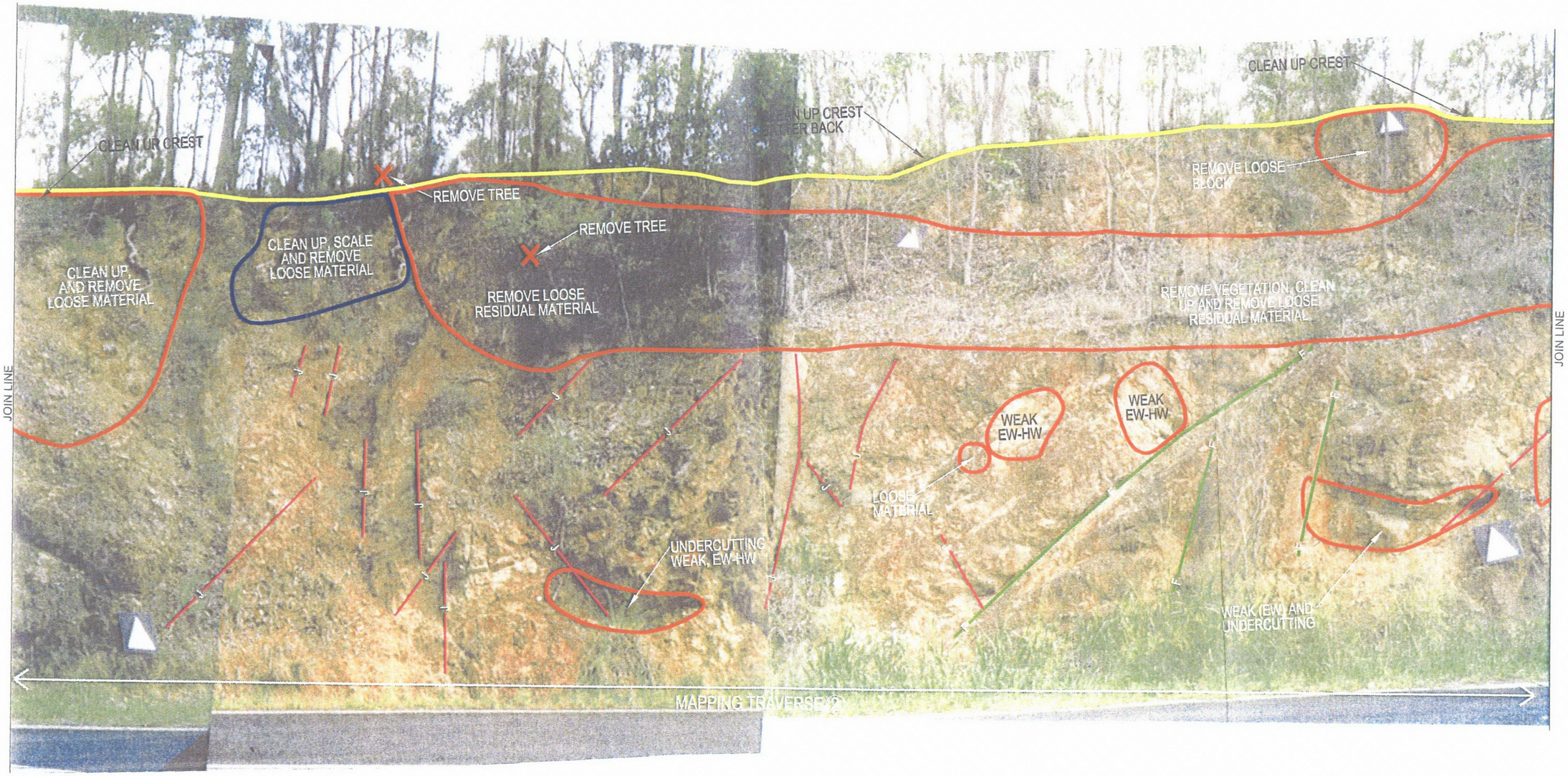

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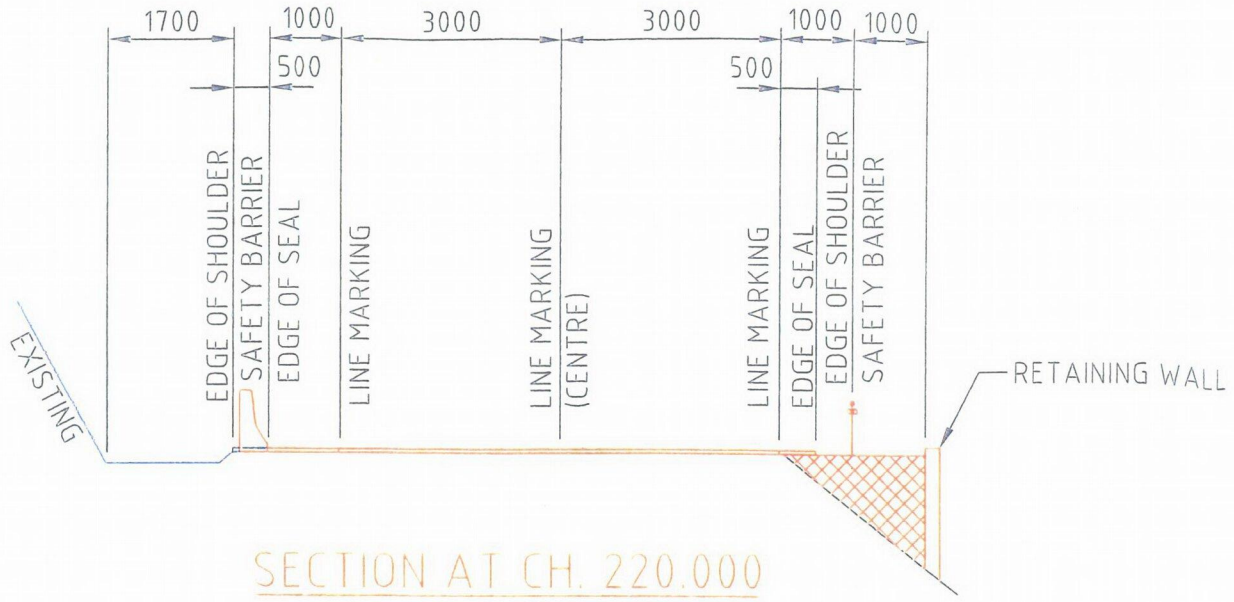
MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF

Designed:	GAP
Drawn:	JH
Checked:	Date: 18/11/03
File name:	2112334_F3-4-5.DWG

Figure No:	4
Job No:	21/12334
Scale:	AS SHOWN



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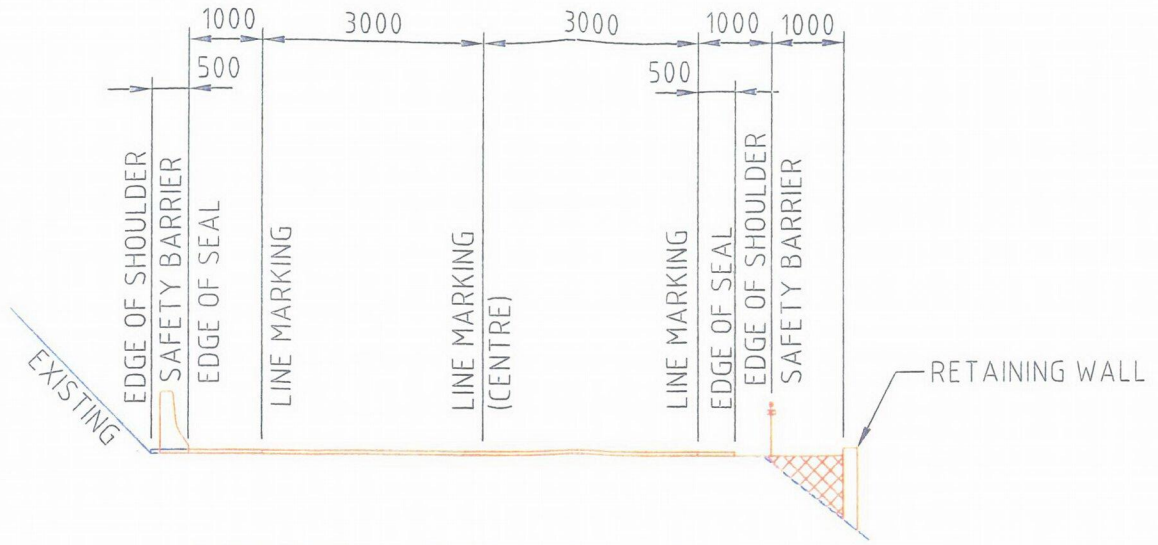

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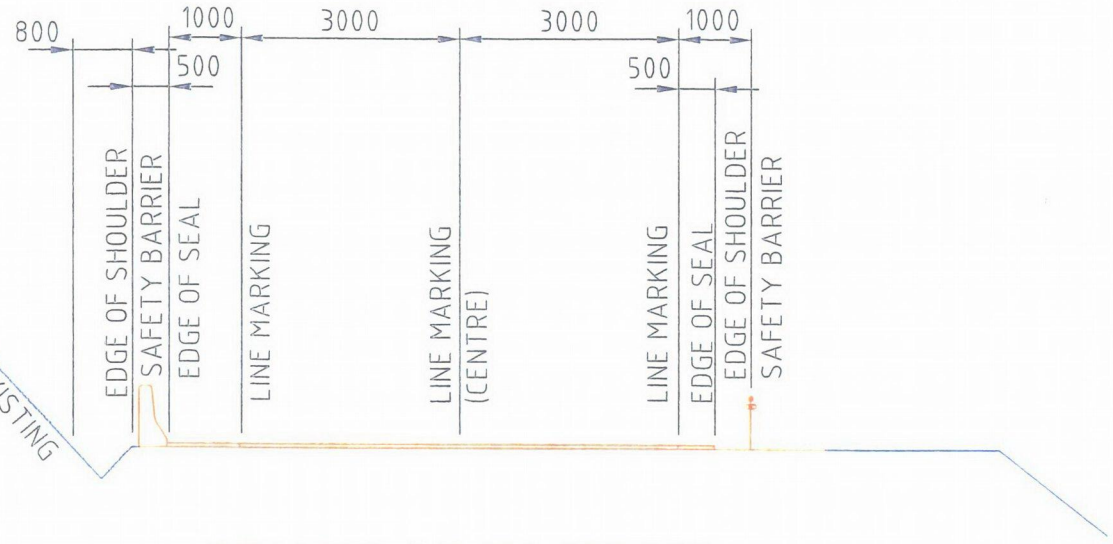

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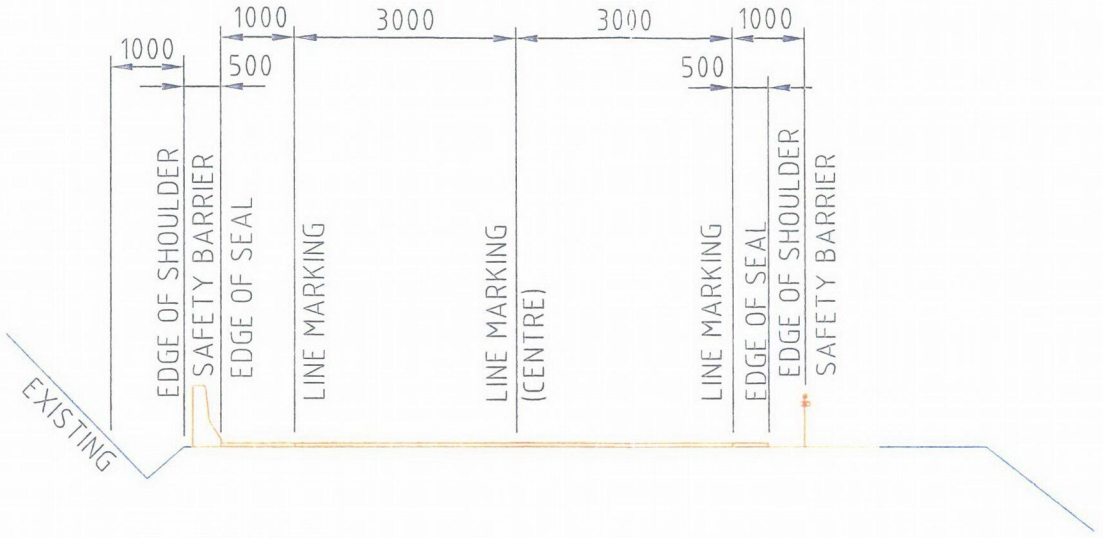

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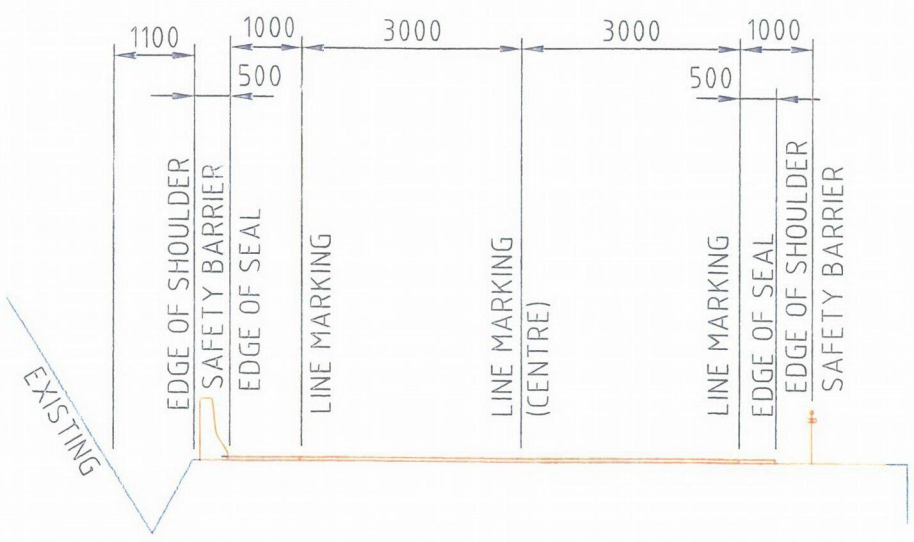

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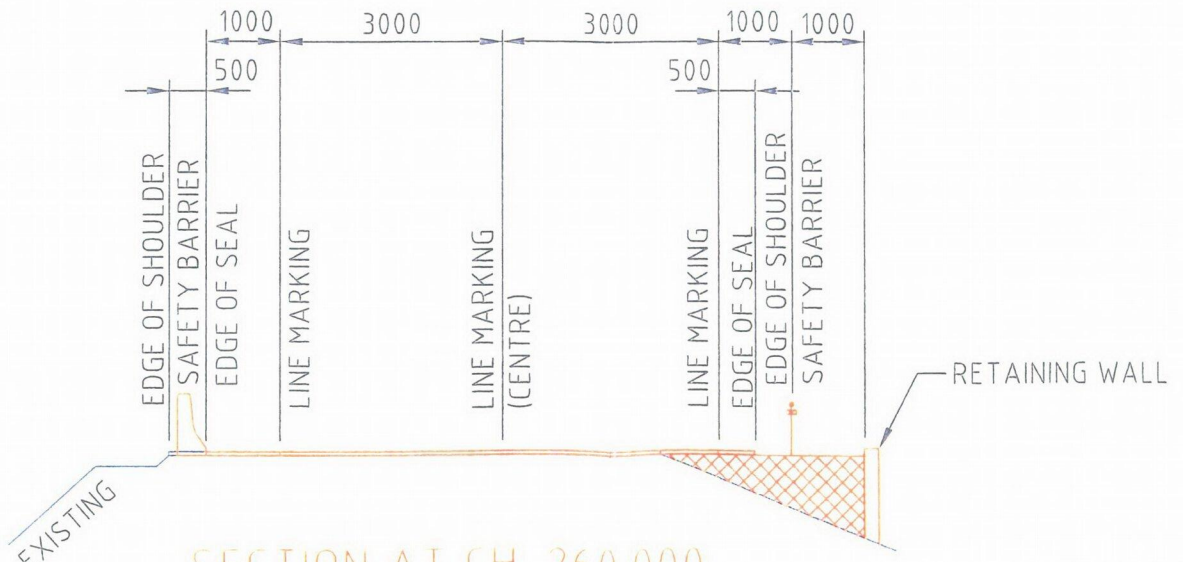
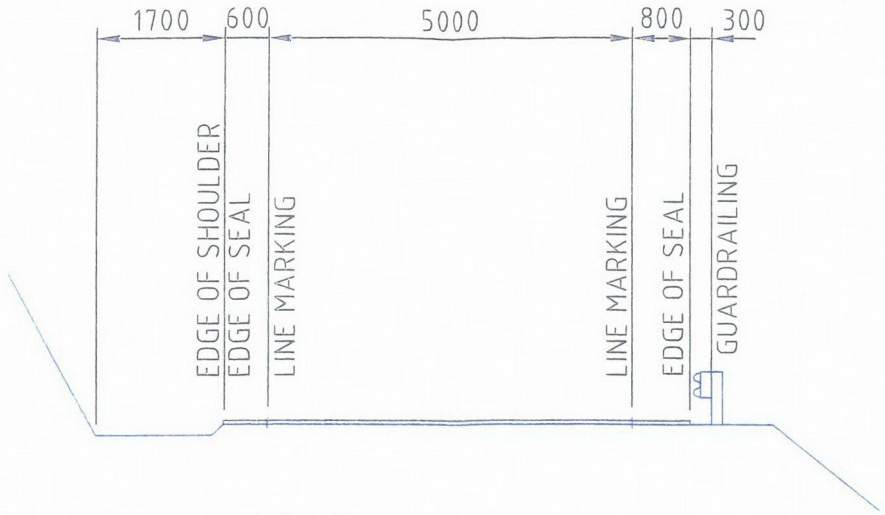


SECTION AT CH. 260.000

22 11493

MULLIGANS BLUFF
MODIFIED SECTIONS

SKETCH 20



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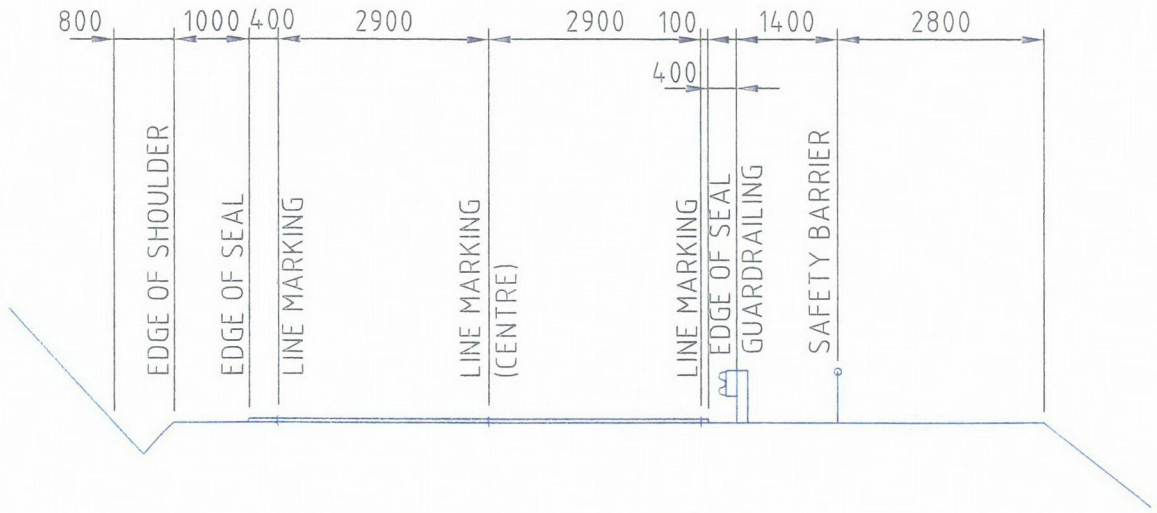

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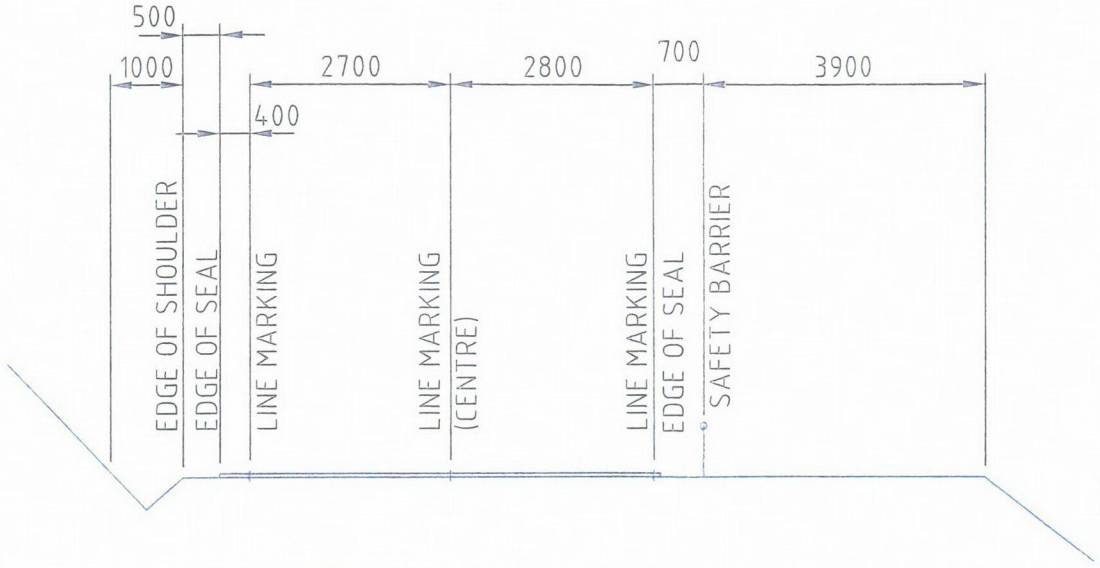

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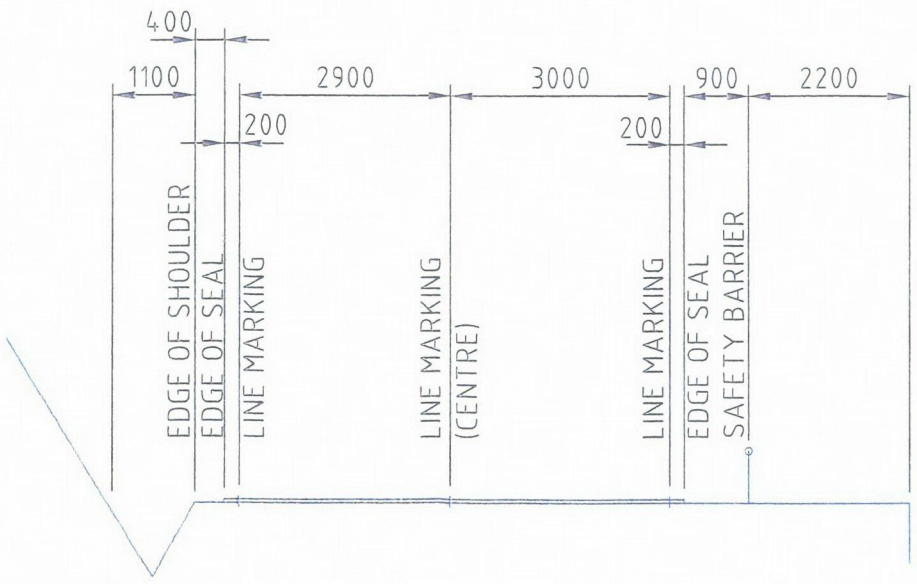

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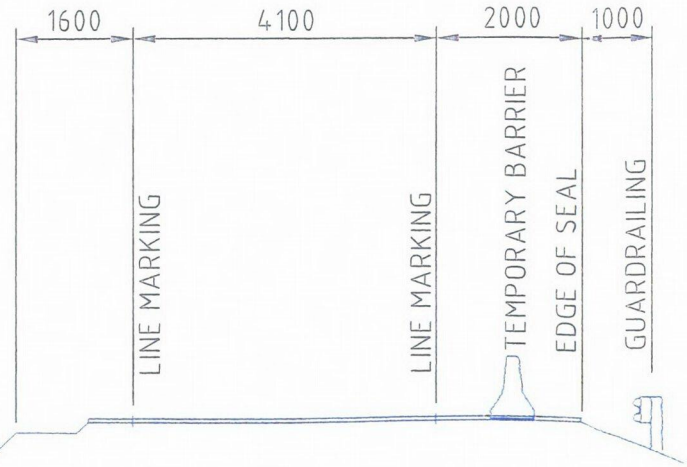

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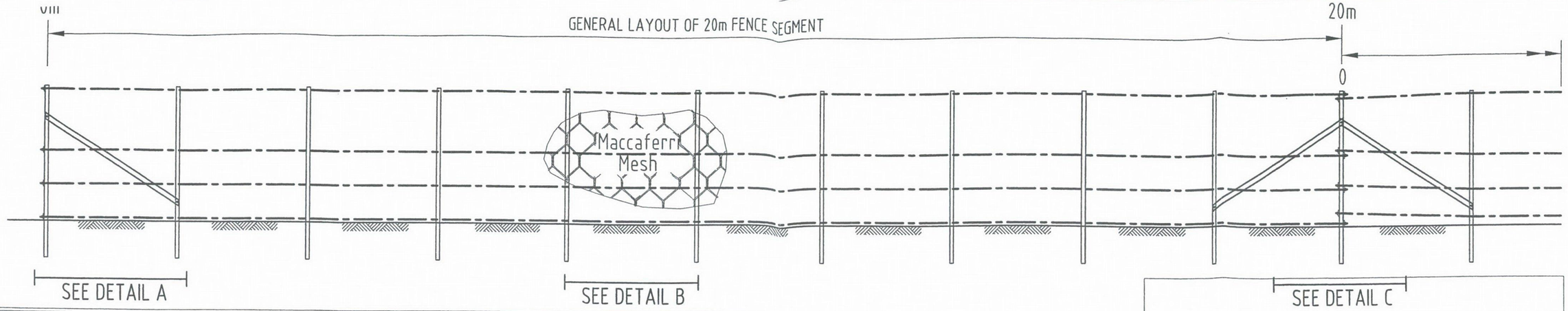
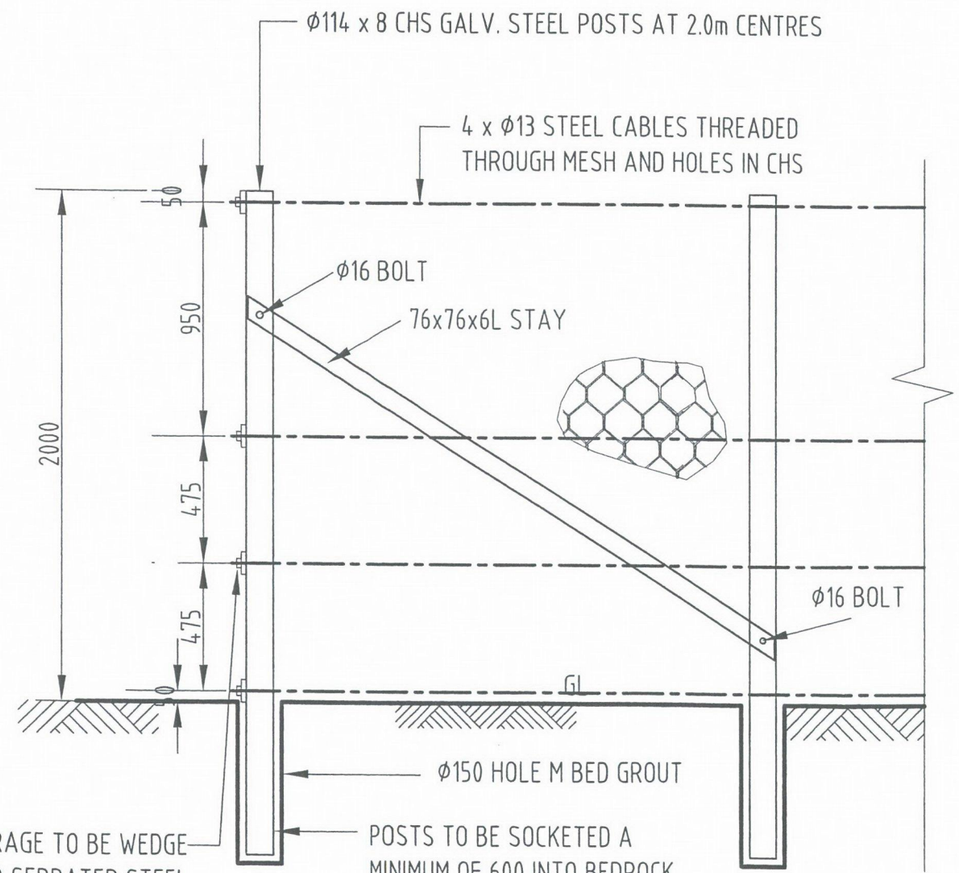
22 11493

MULLIGANS BLUFF SECTIONS

SKETCH 19

GENERAL LAYOUT OF 20m FENCE SEGMENT





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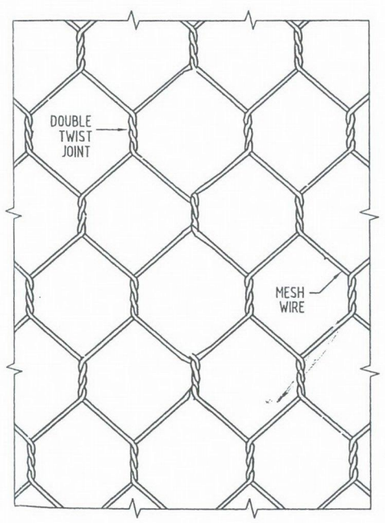
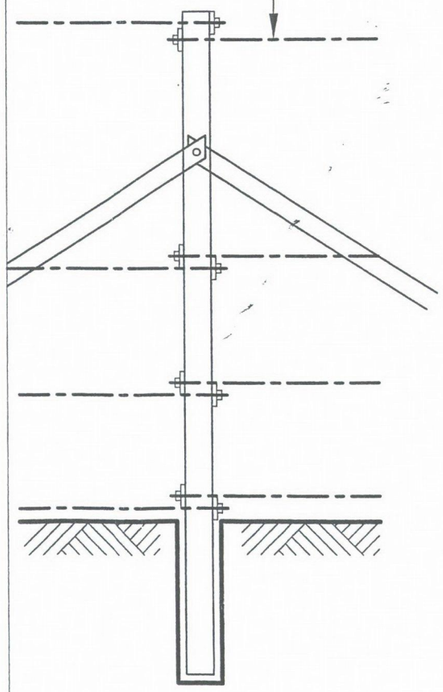


ROCKFALL PROTECTION NETTING MESH DETAILS
N.T.S.

NOTE:
MESH TO BE PLACED ON "ROCK FACE" SIDE OF POSTS

DETAIL B



DETAIL C

FIGURE

CATCH FENCE DETAILS

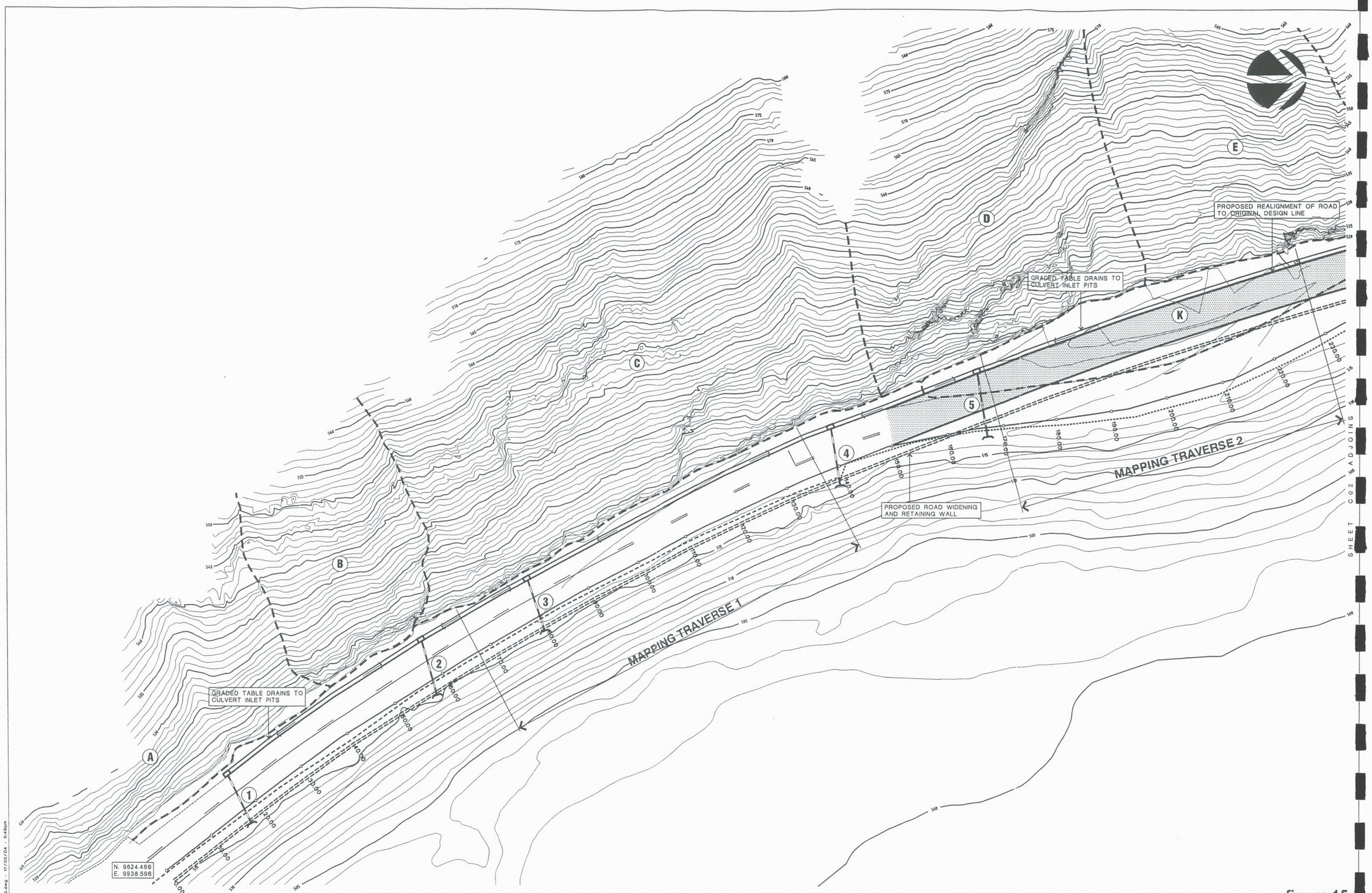


figure 15.

No	Revision	Note: * indicates signatures on original issue of drawing or last revision of drawing	Drawn	Checked	Approved	Date
A	Preliminary Issue		W.H.P.			

0 3 6 9 12 15m
SCALE IN METRES (1:300 BEFORE REDUCTION)

RTA

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Scale 1 : 300	DO NOT SCALE	Client	RTA
Drawn PAYNTER	Designed WC OD	Project	GWYDIR HIGHWAY SLOPE STABILISATION
Drafting Check	Design Check	Title	MULLIGANS BLUFF CATCHMENT AREAS AND DRAINAGE PLAN
Approved		Original Size	A1
Date		Drawing No:	22-11493-C01
This Drawing must not be used for Construction unless signed as Approved		Rev:	A

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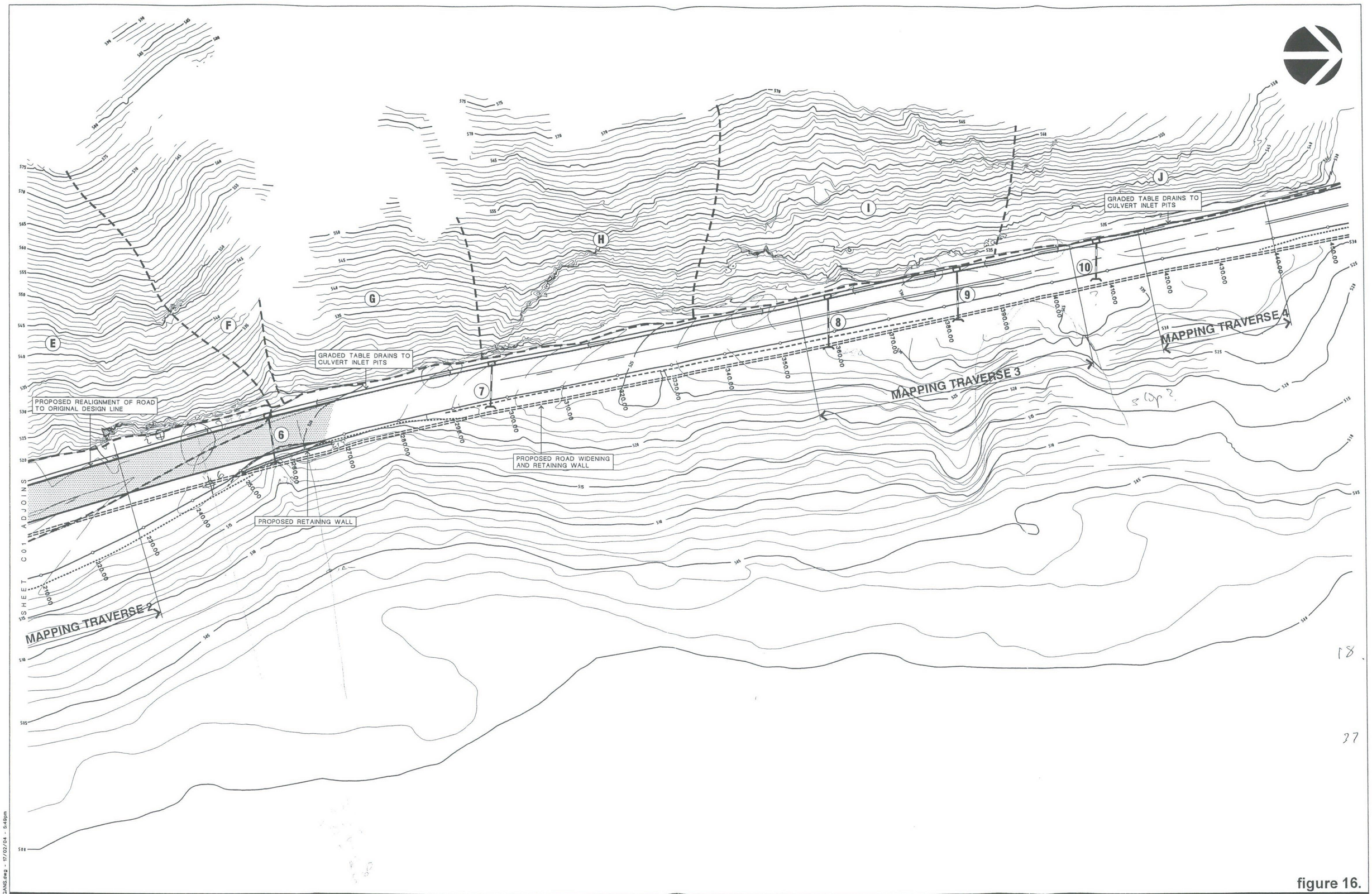

figure 16.

No	Revision	Drawn	Checked	Approved	Date
A	Preliminary Issue	W.H.P.			

Note: * indicates signatures on original issue of drawing or last revision of drawing

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SCALE IN METRES (1:300 BEFORE REDUCTION)

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Scale 1 : 300	DO NOT SCALE
Drawn PAYNTER	Designed WOCD
Drafting Check	Design Check
Approved	
Date	

This Drawing must not be used for Construction unless signed as Approved

Client RTA
Project GWYDIR HIGHWAY SLOPE STABILISATION
Title MULLIGANS BLUFF CATCHMENT AREAS AND DRAINAGE PLAN

Original Size A1
Drawing No: 22-11493-C02
Rev: A

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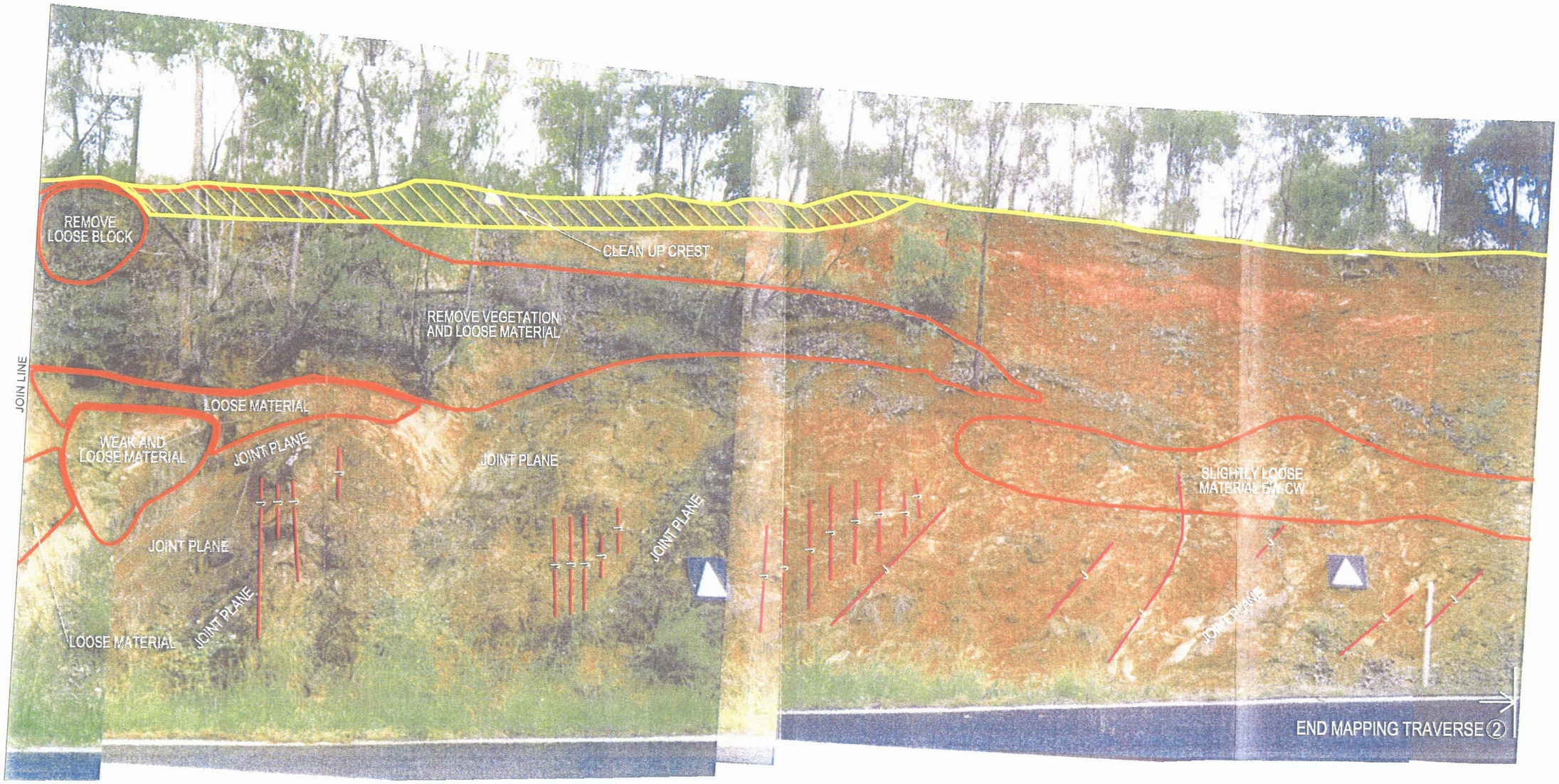

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
CANGAI BLUFF

Designed:	GAP
Drawn:	JH
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File name:	2112334_F3-4-5.DWG

Figure No:	5
Job No:	21/12334
Scale:	AS SHOWN

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MULLIGANS BLUFF

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File name:	2112334_F6-7-8.DWG

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Job No:	21/12334
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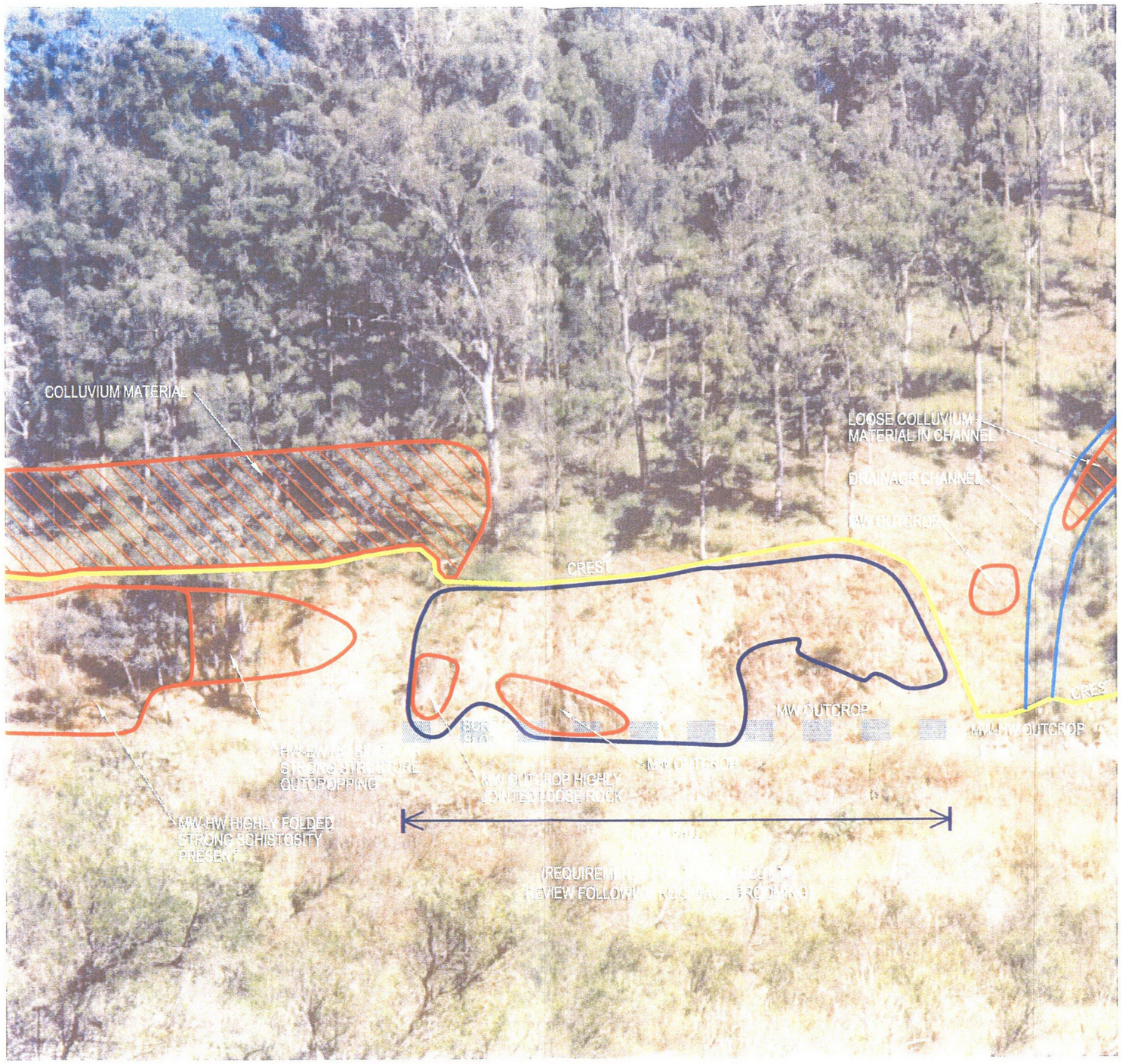

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MULLIGANS BLUFF

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Checked:	Date: 18/11/03
File name:	2112334_F6-7-8.DWG

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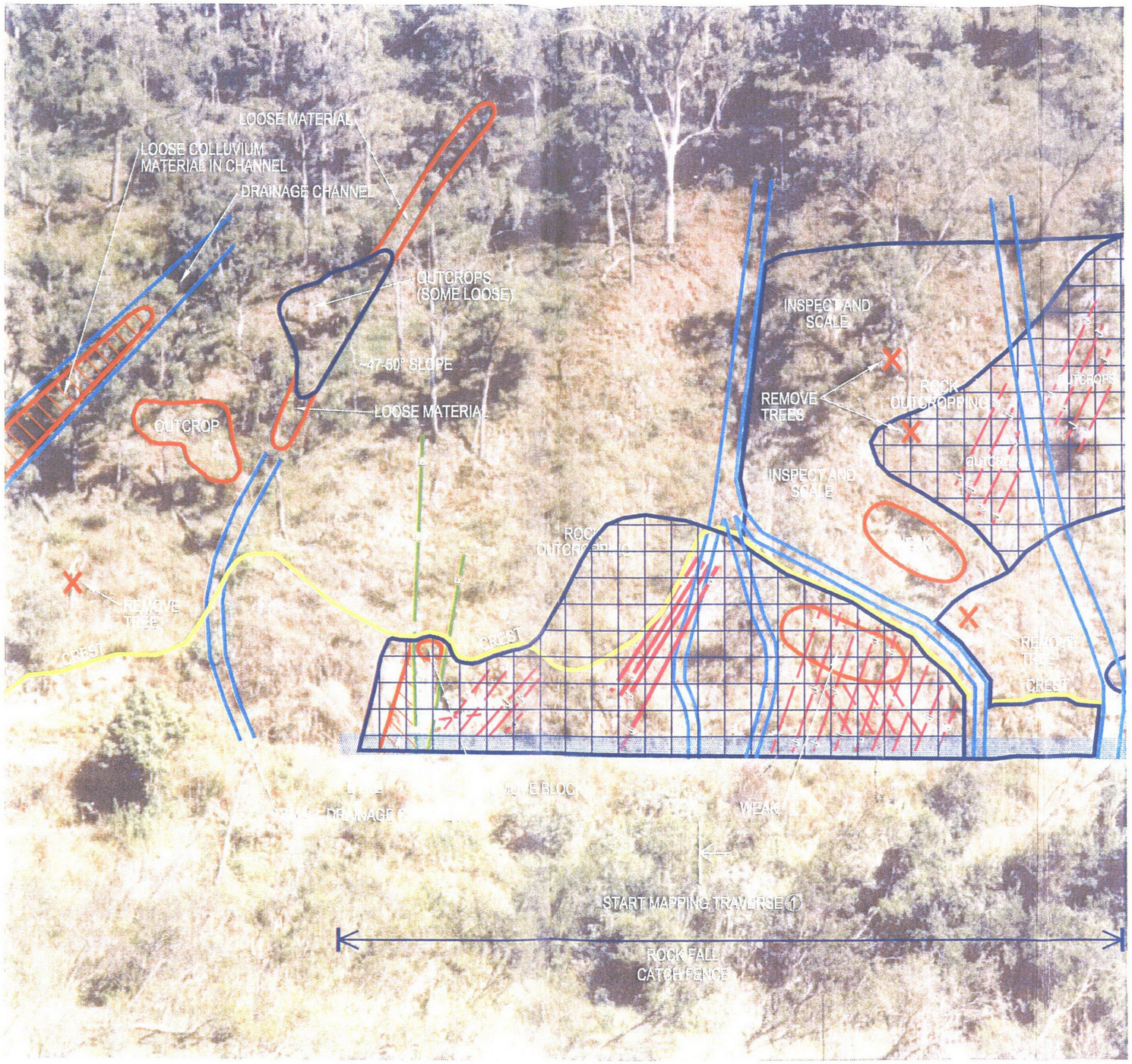

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MULLIGANS BLUFF

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Checked:	Date: 18/11/03
File name:	2112334_F6-7-8.DWG

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Job No:	21/12334
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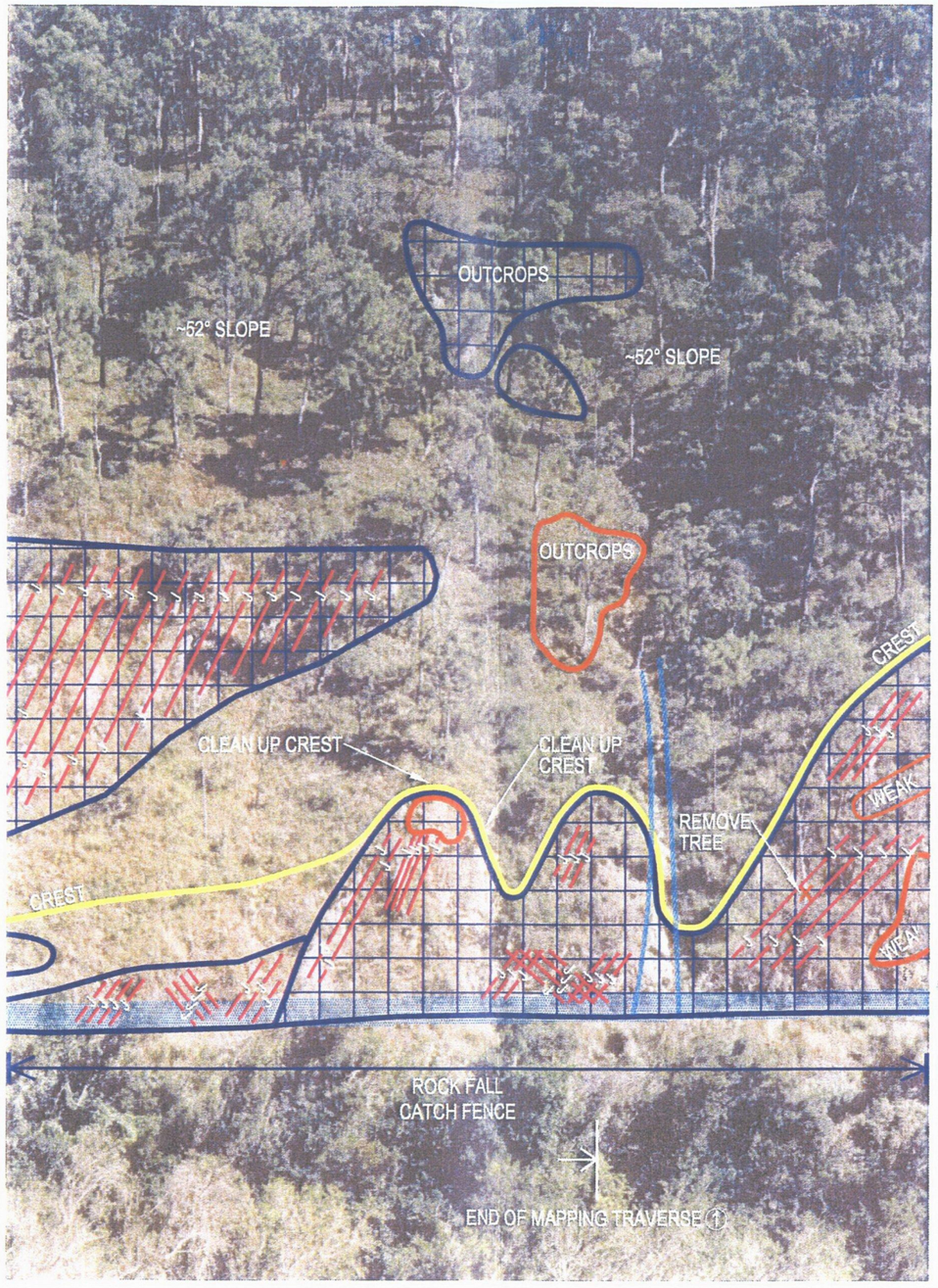

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
MULLIGANS BLUFF

Designed:	GAP
Drawn:	JH
Checked:	Date: 18/11/03
File name:	2112334_F9-10-11.DWG

Figure No:	9
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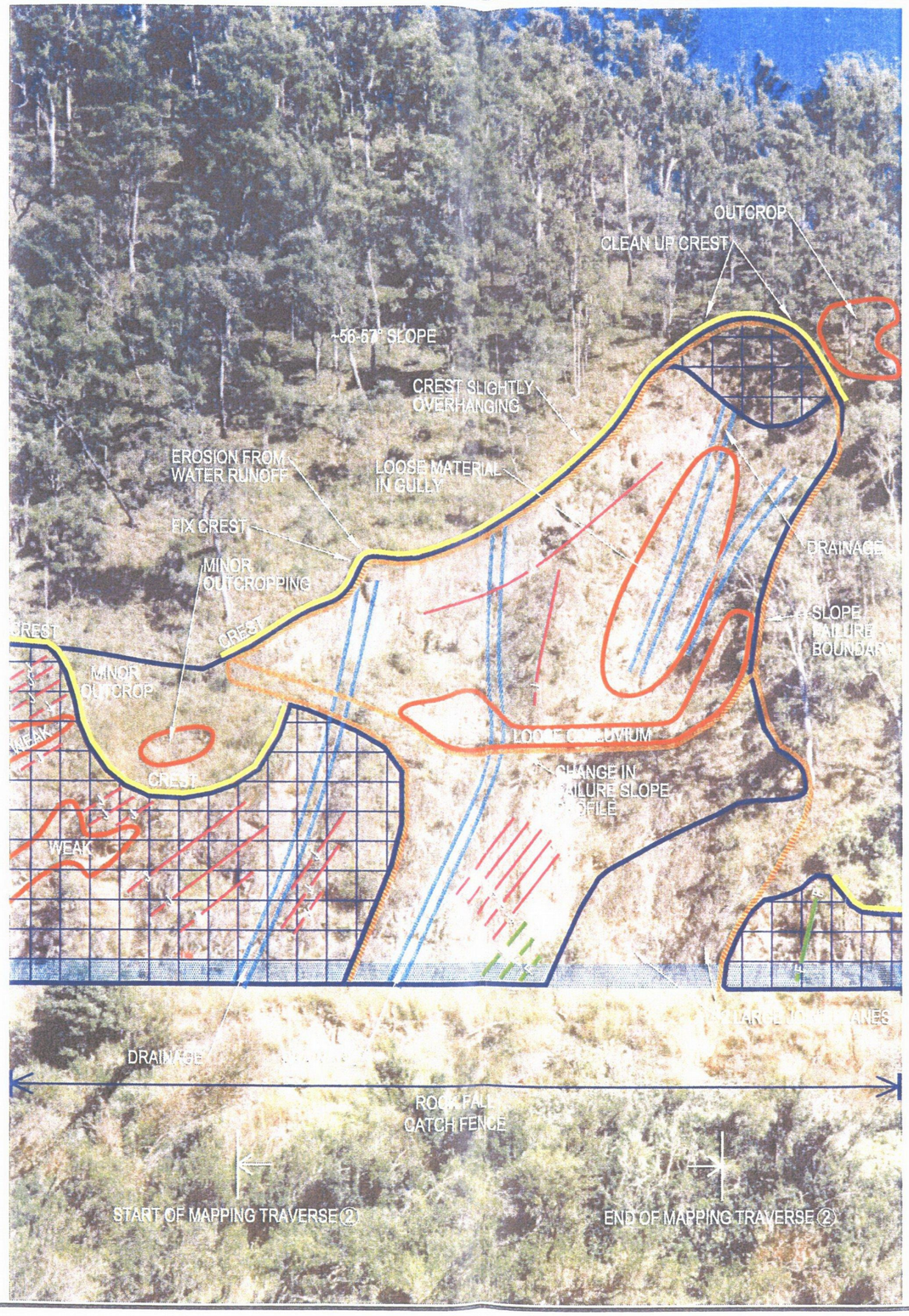

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MULLIGANS BLUFF

Designed:	GAP
Drawn:	JH
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File name:	2112334_F9-10-11.DWG

Figure No:	10
Job No:	21/12334
Scale:	AS SHOWN

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MULLIGANS BLUFF

Designed:	GAP
Drawn:	JH
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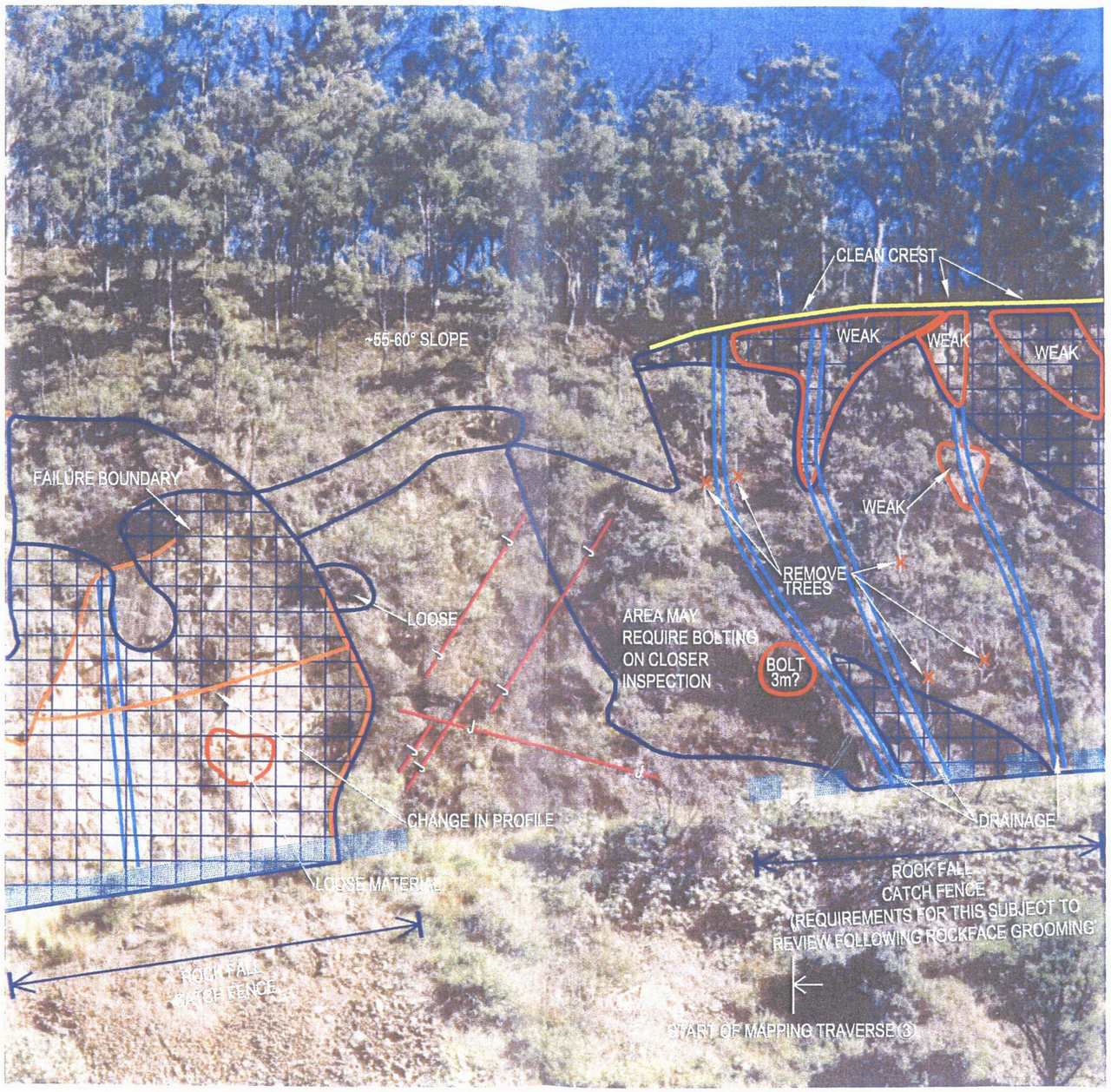

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MULLIGANS AND CANGAI BLUFFS - GWYDIR HIGHWAY
MULLIGANS BLUFF

Designed:	GAP
Drawn:	JH
Checked:	Date: 18/11/03
File name:	2112334_F12-13.DWG

Figure No:	12
Job No:	21/12334
Scale:	AS SHOWN



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MULLIGANS BLUFF

Designed:	GAP
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File name:	2112334_F12-13.DWG

Figure No:	13
Job No:	21/12334
Scale:	AS SHOWN

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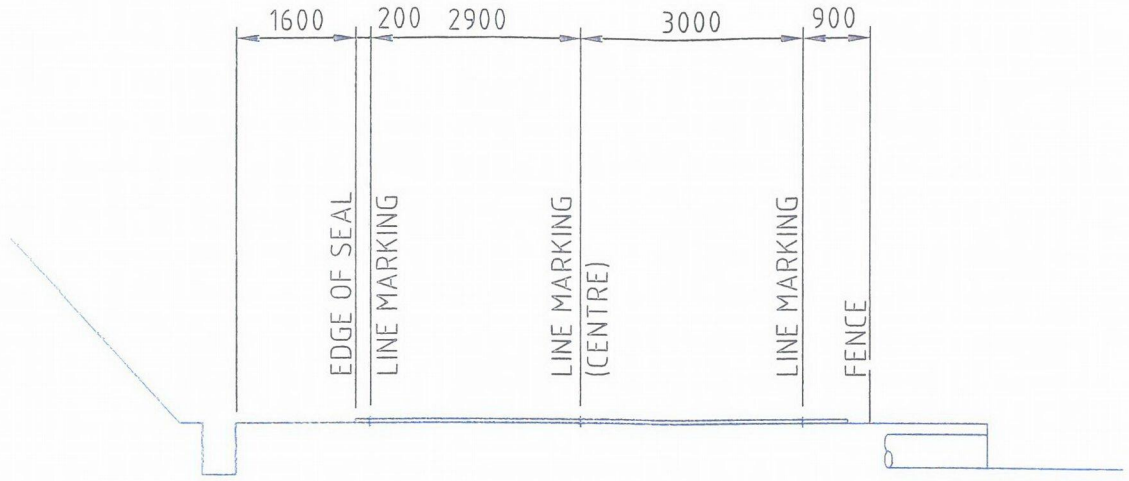

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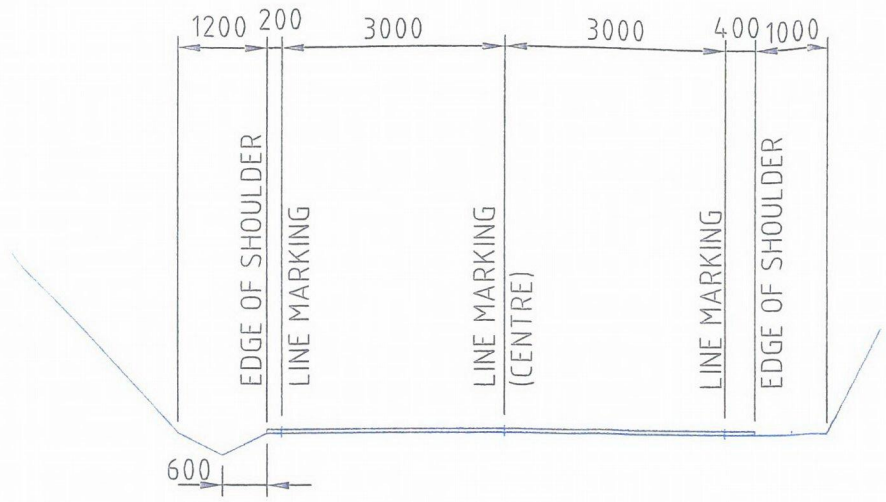

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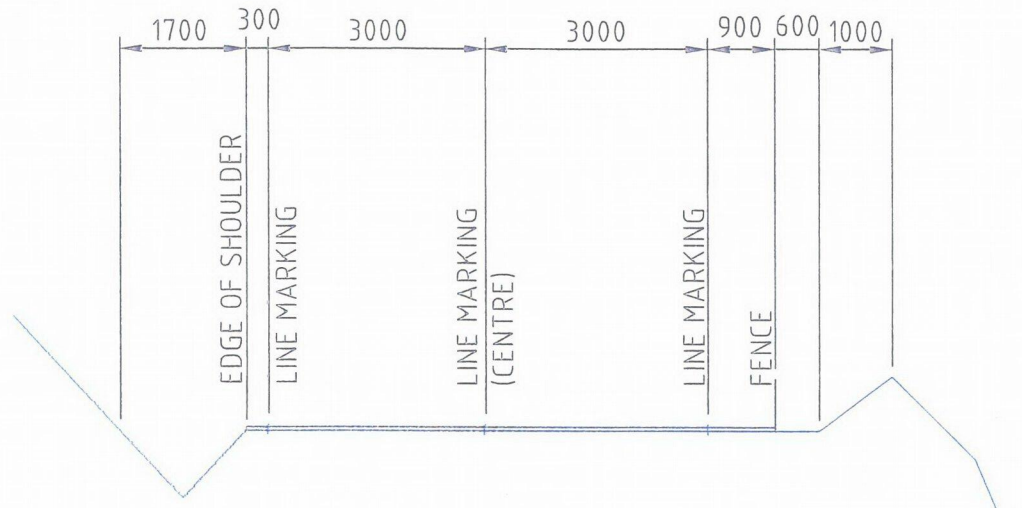

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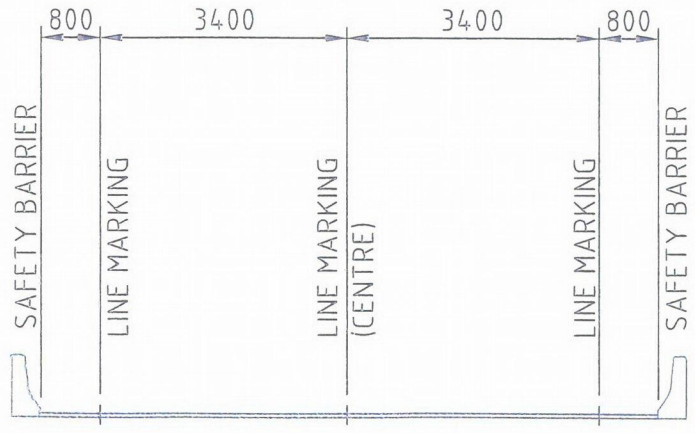

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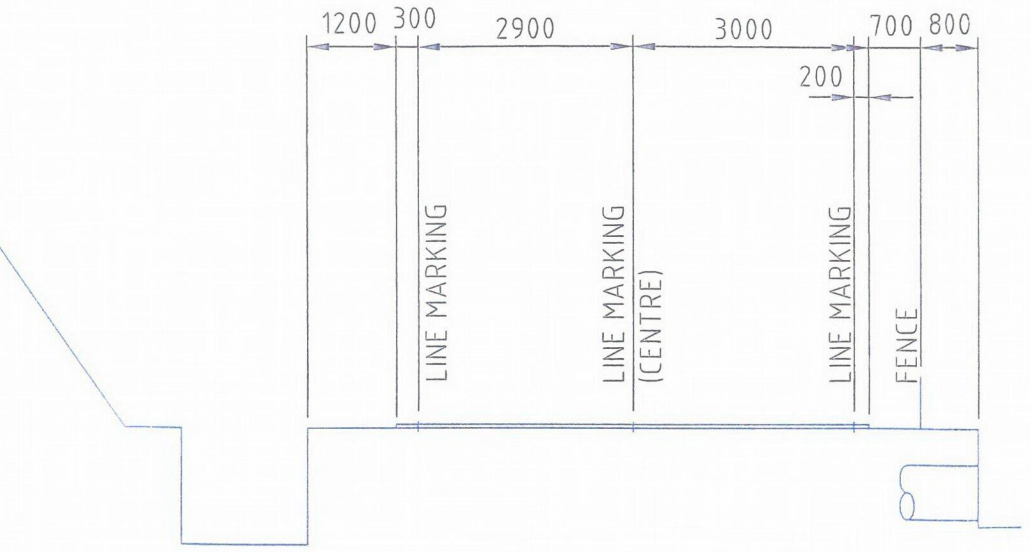

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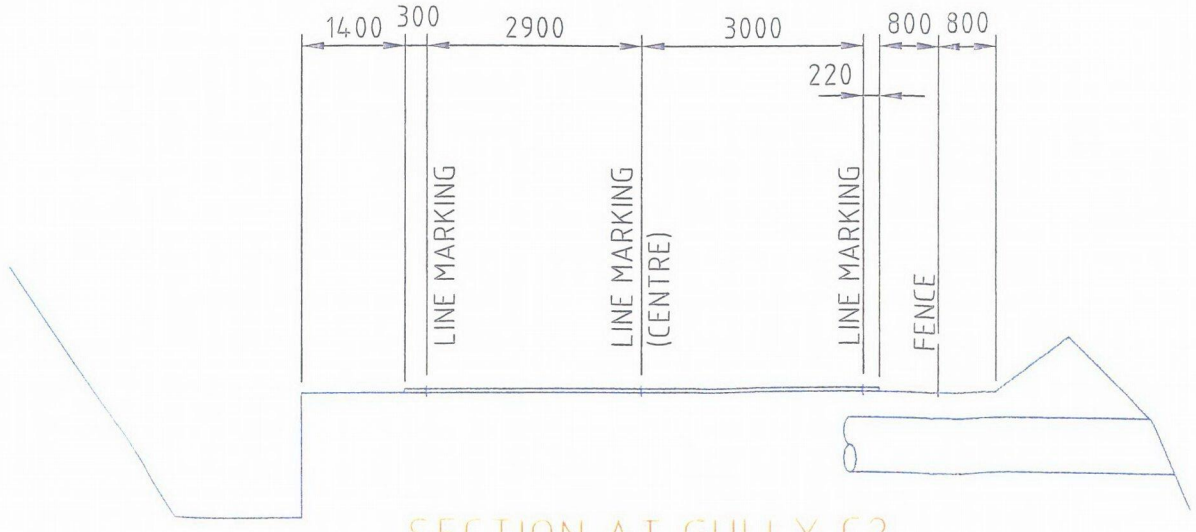
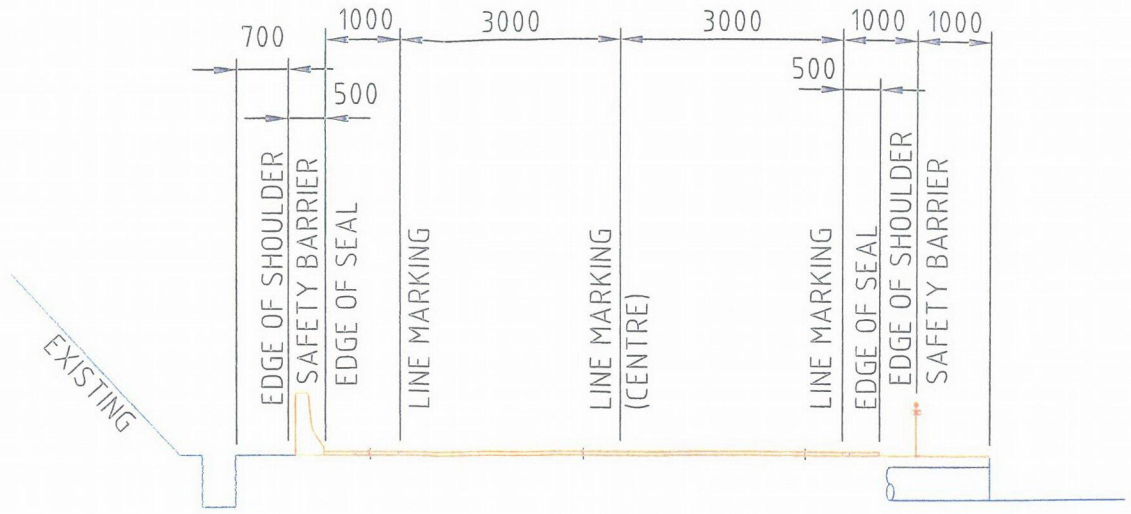


SECTION AT GULLY C2

22 11493

CANGAI BLUFF
SECTIONS
SKETCH 23



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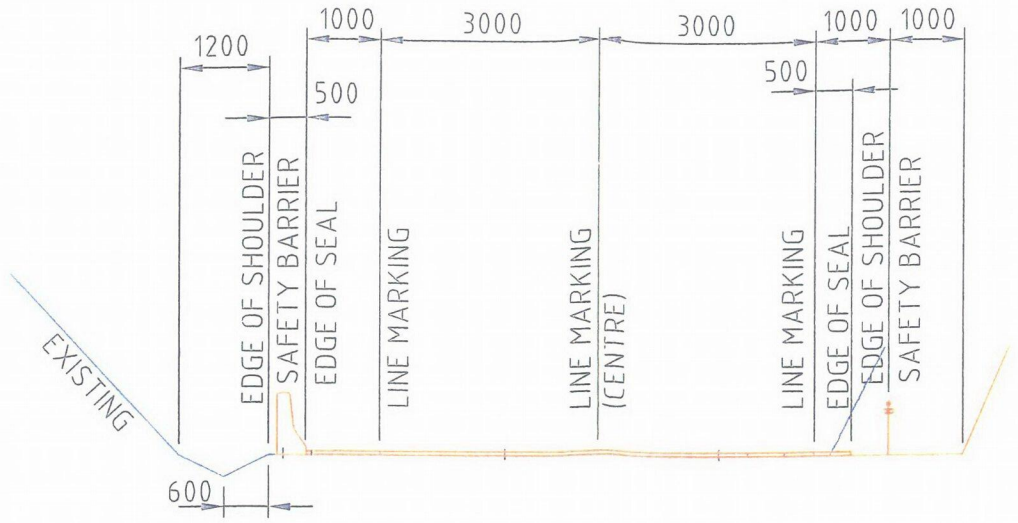

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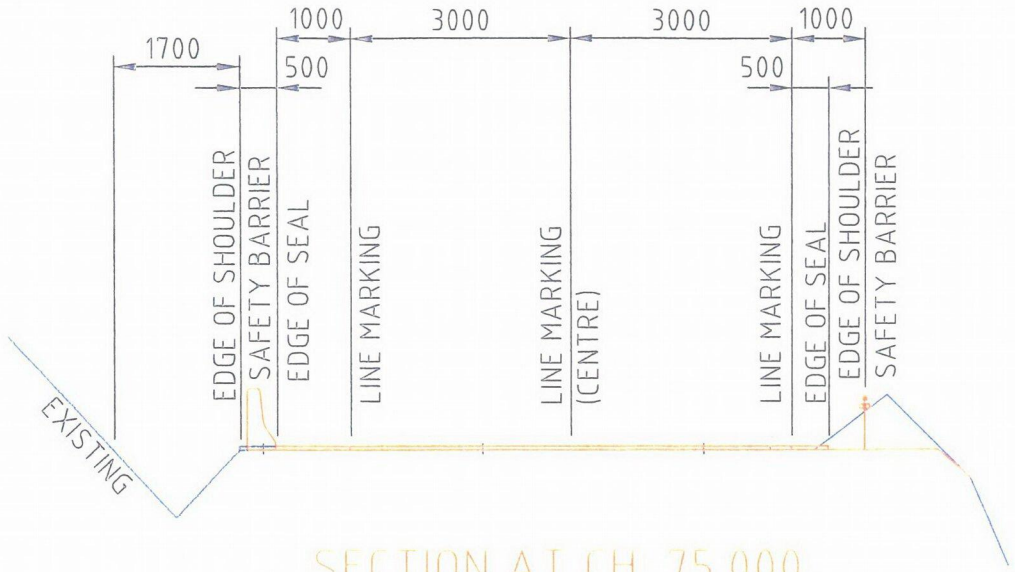

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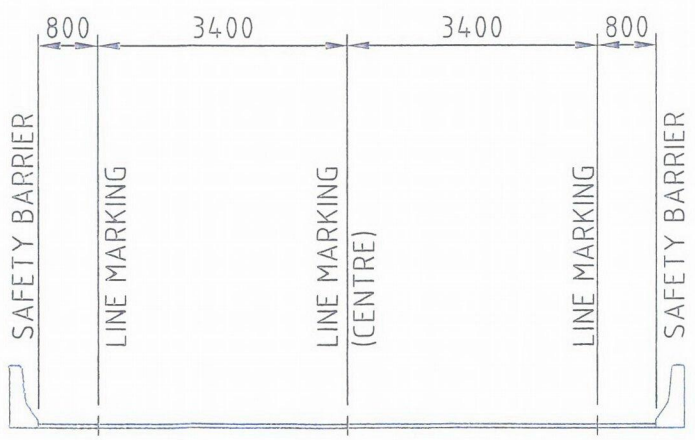

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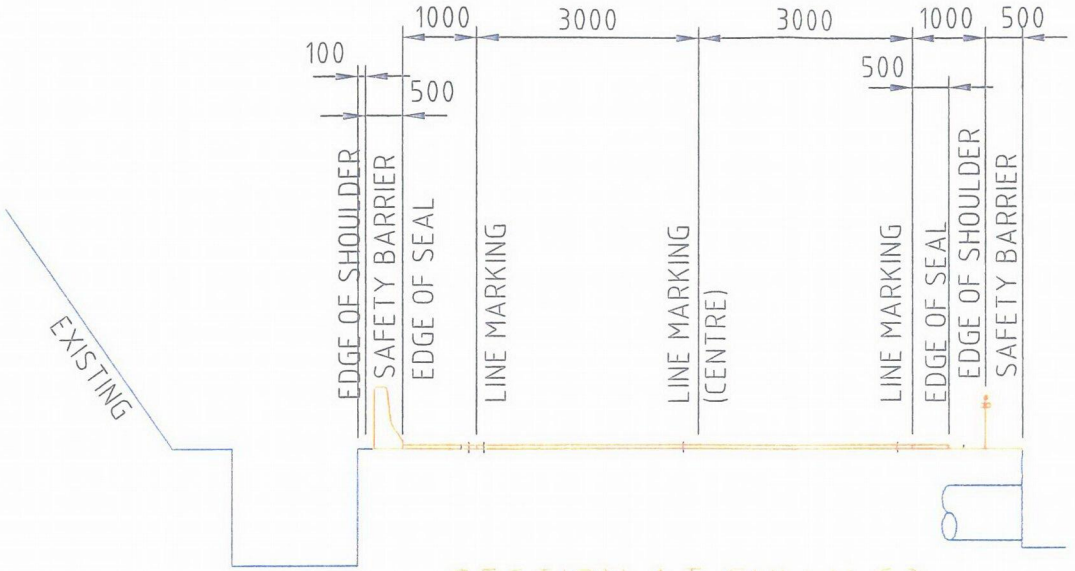

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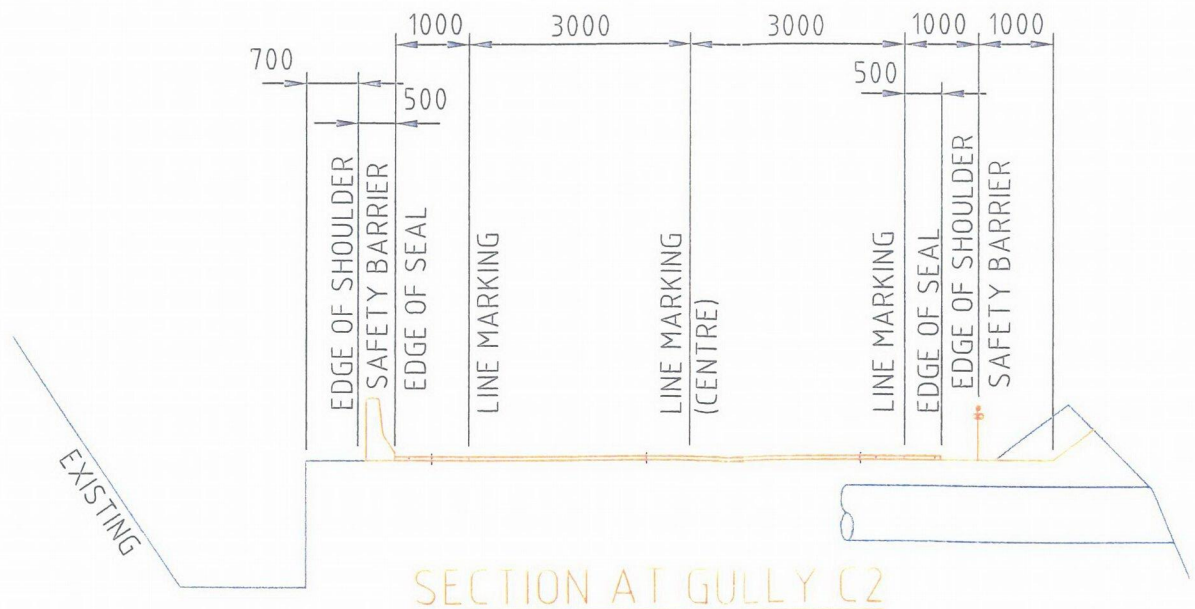

SECTION AT GULLY C2

22 11493

CANGAI BLUFF
MODIFIED SECTIONS

SKETCH 24

Appendix C

Correspondence and
Database Search Results

Australian Heritage Database

Search Results

edit search | new search | about the Australian Heritage Database | Heritage home | Australian Heritage Council home

48 results found.

Anemone Bay - North Solitary Island Grey Nurse Shark Habitat	Woolgoolga, NSW	(Place rejected for Emergency Listing) National Heritage List
Bawden Bridge Old Glen Innes Rd	Chambigne via Grafton, NSW	(Registered) Register of the National Estate
Bindery Wilderness Area Gwydir Hwy	Jackadgery, NSW	(Indicative Place) Register of the National Estate
Burns Scrub Burns Rd	Glenreagh, NSW	(Indicative Place) Register of the National Estate
Central Eastern Rainforest Reserves (New England Group)	Dorrigo, NSW	(Declared property) World Heritage List
Central Eastern Rainforest Reserves (Washpool and Gibraltar Range) Gwydir HWY	Glen Innes, NSW	(Declared property) World Heritage List
Crowleys Creek Area Firths Rd	Tucabia, NSW	(Indicative Place) Register of the National Estate
Crowsnest Swamp Area Deep Creek Rd	Tucabia, NSW	(Indicative Place) Register of the National Estate
Gibraltar Range National Park (1977 boundary) Gwydir Hwy	Gibralter Range via Jackadgery, NSW	(Registered) Register of the National Estate
Guy Fawkes River National Park (1980 boundary)	Glen Innes, NSW	(Registered) Register of the National Estate

Guy Fawkes River Natural Area Old Grafton Rd	Ebor, NSW	(Interim List) Register of the National Estate
Hortons Creek Nature Reserve Clouds Creek Rd	Nymboida, NSW	(Indicative Place) Register of the National Estate
Indigenous Place	Chambigne via Grafton, NSW	(Registered) Register of the National Estate
Indigenous Place	Chambigne via Grafton, NSW	(Registered) Register of the National Estate
Indigenous Place	Chambigne via Grafton, NSW	(Registered) Register of the National Estate
Indigenous Place	Copmanhurst, NSW	(Registered) Register of the National Estate
Indigenous Place	Copmanhurst, NSW	(Registered) Register of the National Estate
Indigenous Place	Coutts Crossing, NSW	(Registered) Register of the National Estate
Indigenous Place	Coutts Crossing, NSW	(Registered) Register of the National Estate
Indigenous Place	Coutts Crossing, NSW	(Registered) Register of the National Estate
Indigenous Place	Coutts Crossing, NSW	(Indicative Place) Register of the National Estate
Indigenous Place	Coutts Crossing, NSW	(Indicative Place) Register of the National Estate
Indigenous Place	Grafton, NSW	(Registered) Register of the National

Indigenous Place	Nymboida, NSW	Estate (Registered) Register of the National Estate
Indigenous Place	Nymboida, NSW	(Indicative Place) Register of the National Estate
Lake Hiawatha and Minnie Water Minnie Water Rd	Wooli, NSW	(Registered) Register of the National Estate
London Bridge State Forest (former) London Bridge Fire Trl	Newton Boyd, NSW	(Indicative Place) Register of the National Estate
Lower Clarence River Area Pacific Hwy	Maclean, NSW	(Indicative Place) Register of the National Estate
Mount Hyland Nature Reserve	Tyringham, NSW	(Registered) Register of the National Estate
Mount Hyland Nature Reserve and Adjacent Area	Tyringham, NSW	(Registered) Register of the National Estate
North Rock Nature Reserve	Red Rock, NSW	(Registered) Register of the National Estate
North Solitary Island Nature Reserve	Wooli, NSW	(Registered) Register of the National Estate
North West Solitary Island Nature Reserve	Red Rock, NSW	(Registered) Register of the National Estate
Nymboida Invertebrate Habitat	Grafton, NSW	(Interim List) Register of the National Estate
Nymboida National Park	Jackadgery, NSW	(Indicative Place) Register of the National Estate

Pimpernel Rock Grey Nurse Shark Habitat	Solitary Islands, NSW	(Nominated place) National Heritage List
Pine Brush Nature Reserve Proposal Somervale Rd	Tucabia, NSW	(Registered) Register of the National Estate
Red Rock National Park (former) Station Creek Rd	Red Rock, NSW	(Registered) Register of the National Estate
Sherwood Nature Reserve	Glenreagh, NSW	(Registered) Register of the National Estate
Solitary Islands Marine Area	Wooli, NSW	(Registered) Register of the National Estate
Southern Clarence River Tributaries Catchments	Glen Innes, NSW	(Indicative Place) Register of the National Estate
Ulmarra Courthouse (former) River St	Ulmarra, NSW	(Registered) Register of the National Estate
Ulmarra Flood Refuge Reserve Pillar Valley Rd	Ulmarra, NSW	(Indicative Place) Register of the National Estate
Upper Nymboida River Nature Reserve Proposal Harness Cask Rd	Tyringham, NSW	(Indicative Place) Register of the National Estate
West Chaelundi State Forest Old Grafton Rd	Newton Boyd, NSW	(Interim List) Register of the National Estate
Woolgoolga Area and Solitary Islands Pacific Hwy	Woolgoolga, NSW	(Indicative Place) Register of the National Estate
Wooloweyah Lagoon Angourie Point Rd	Yamba, NSW	(Indicative Place) Register of the National Estate
Yuraygir National Park and Adjacent Areas	Wooli, NSW	(Registered) Register of the National Estate

Report Produced: Wed Aug 10 14:49:56 2005



Statutory Listed Items

Information and items listed in the State Heritage Inventory come from a number of sources. This means that there may be several entries for the same heritage item in the database. For clarity, the search results have been divided into two sections.

- Section 1. contains items listed by the **Heritage Council** under the NSW Heritage Act. This includes listing on the State Heritage Register, an Interim Heritage Order or protected under section 130 of the NSW Heritage Act. This information is provided by the NSW Heritage Office.
- Section 2. contains items listed by **Local Councils & Shires and State Government Agencies**. This section may also contain additional information on some of the items listed in the first section.

Section 1. Items listed under the NSW Heritage Act.

The search results can be re-sorted by clicking on the **(sort)** option at the top of each column.

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	Listed Under Heritage Act
Arcola - house, stables, garden, fence	150 Victoria Street	Grafton	Clarence Valley	Yes
Cathedral Church of Christ the King (inc. hall and cottages)	Duke Street	Grafton	Clarence Valley	Yes
Grafton City railway refreshment room furniture	North Coast railway	South Grafton	Clarence Valley	Yes
Grafton City Railway Station group	North Coast railway	South Grafton	Clarence Valley	Yes
Grafton Correctional Centre	170 Hoof Street	Grafton	Clarence Valley	Yes

Grafton rail and road bridge over Clarence River	North Coast railway	Grafton	Clarence Valley	Yes
High Conservation Value Old Growth Forest	15 Local Government Areas	Upper North East NSW	Multiple LGAs	Yes
North East Rainforest World Heritage Area		Various	Upper Hunter	Yes
Saraton Theatre	95 Prince Street	Grafton	Clarence Valley	Yes
Ulgundahi Island	Clarence River by North Arm	Maclean	Clarence Valley	Yes

There were **10** records in this section matching your search criteria.

Section 2. Items listed by Local Government and State agencies.

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	Information Source (sort)
Abbotsford	11 Alice Street	Grafton	Clarence Valley	LGOV
Administration Building	Trenayr Road	Junction Hill.	Clarence Valley	SGOV
Alumny Creek Public School Museum	465 Lawrence Road	Alumy Creek	Clarence Valley	LGOV
Alumy Creek Reserve	465 Lawrence Road	Alumy Creek	Clarence Valley	LGOV
Anglican Church	Chatsworth Road	Chatsworth Island	Clarence Valley	LGOV
Anglican Church	High Street	Lawrence	Clarence Valley	LGOV
Anglican Rectory	Wharf Street	Maclean	Clarence Valley	LGOV
Arcola	150 Victoria Street	Grafton	Clarence Valley	LGOV

Argyll	170 Fitzroy Street	Grafton	Clarence Valley	LGOV
Baptist Church	Bridge Street	Lawrence	Clarence Valley	LGOV
Baptist Church	Short Street	Maclean	Clarence Valley	LGOV
Baptist Manse	Wharf Street	Maclean	Clarence Valley	LGOV
Bawden Bridge over Orara River	Old Glen Innes Road	Chambigne	Clarence Valley	GAZ
Big River Tourist Association Office	Victoria Street	Grafton	Clarence Valley	LGOV
Bridge	Pacific Highway	South Arm	Clarence Valley	LGOV
Bridge (over Shark Creek)		Tullymorgan	Clarence Valley	LGOV
Bridge over South Arm		Tullymorgan	Clarence Valley	LGOV
Bronte	13 Alice Street	Grafton	Clarence Valley	LGOV
Buildings and Structures		Tullymorgan Reserve, Tullymorgan	Clarence Valley	LGOV
Catholic Church	McIntyres Lane	Maclean	Clarence Valley	LGOV
Catholic Convent	McIntyres Lane	Maclean	Clarence Valley	LGOV
Catholic Rectory	McIntyres Lane	Maclean	Clarence Valley	LGOV
Central Hardware	39 Skinner Street	South Grafton	Clarence Valley	GAZ
Central Hardware	39 Skinner Street	South Grafton	Clarence	LGOV

			Valley	
Christ Church Anglican Cathedral	Victoria Street	Grafton	Clarence Valley	GAZ
Christ Church Anglican Church Deanery	Duke Street	Grafton	Clarence Valley	GAZ
Christ Church Anglican Church Georgian Cottage	Duke Street	Grafton	Clarence Valley	GAZ
Christ Church Anglican Church Hall	Duke Street	Grafton	Clarence Valley	GAZ
Christ Church Cathedral		Grafton	Clarence Valley	LGOV
Christ Church Deanery		Grafton	Clarence Valley	LGOV
Christ Church Georgian Cottage		Grafton	Clarence Valley	LGOV
Christ Church Hall		Grafton	Clarence Valley	LGOV
Christ Church Victorian Cottage		Grafton	Clarence Valley	LGOV
Clarence House	Through Street	South Grafton	Clarence Valley	LGOV
Clarence River Bridge, Grafton	Steel Trusses 0.5 Km Past South Grafton	Grafton	Clarence Valley	SGOV
Clarence River, Grafton Underbridge	Concrete Beams North End Of Bridge	Grafton	Clarence Valley	SGOV
Clock Tower	Prince Street	Grafton	Clarence Valley	LGOV
Collection of Farm Buildings	Trenayr Road	Junction Hill	Clarence Valley	SGOV
Copmanhurst Police Station & Residence	12 Prescott Street	Copmanhurst	Clarence Valley	LGOV

Cottages 2&3	Trenayr Road	Junction Hill	Clarence Valley	SGOV
Court House	McNaughton Place	Maclean	Clarence Valley	LGOV
Courthouse (former)	Victoria Street	Grafton	Clarence Valley	LGOV
Dovedale	8 Breimba Street	Grafton	Clarence Valley	LGOV
Duplex	Stanley Street	Maclean	Clarence Valley	LGOV
Ecology Area (Old Town Common)	Trenayr Road	Junction Hill	Clarence Valley	SGOV
First Manager's Camp Site	Trenayr Road	Junction Hill	Clarence Valley	SGOV
Fitzgerald Building	Victoria Street	Grafton	Clarence Valley	LGOV
Flagpole	Norfolk Park	Yamba	Clarence Valley	LGOV
Foott, Law & Co. Office	Victoria Street	Grafton	Clarence Valley	LGOV
Free Presbyterian Church	Wharf Street	Maclean	Clarence Valley	LGOV
Glenreagh Station Group		Glenreagh	Clarence Valley	SGOV
Gordon Brook Cottage Site	Gordon Brook Road	Gordon Brook	Clarence Valley	LGOV
Gordon Brook Stables	Gordon Brook Road	Gordon Brook	Clarence Valley	LGOV
Grafton Agricultural Research & Advisory Station	Trenayr Road	Junction Hill.	Clarence Valley	SGOV
Grafton Base Hospital	CROWN,MARY,ARTHUR STREETS	GRAFTON	Clarence	SGOV

			Valley	
Grafton Christ Church Cathedral Conservation Area		Grafton	Clarence Valley	LGOV
Grafton City Station Group		South Grafton	Clarence Valley	SGOV
Grafton City Station Group		South Grafton	Clarence Valley	SGOV
Grafton Civic Precinct Conservation Area		Grafton	Clarence Valley	LGOV
Grafton Conservation Area	Turf Street	Grafton	Clarence Valley	GAZ
Grafton Courthouse	Victoria Street	Grafton	Clarence Valley	GAZ
Grafton Courthouse	Victoria Street	Grafton	Clarence Valley	LGOV
Grafton Fire Station	94 Prince Street	Grafton	Clarence Valley	SGOV
Grafton Gaol	Hoof Street	Grafton	Clarence Valley	LGOV
Grafton Post Office	Victoria Street	Grafton	Clarence Valley	GAZ
Grafton Rail and Road Bridge		Grafton	Clarence Valley	LGOV
Grafton Teacher's Centre	97 Mary Street	Grafton	Clarence Valley	LGOV
Grafton Underbridge (Clarence River)		Grafton	Clarence Valley	SGOV
Grafton Viaducts Underbridge (Group Entry)	Concrete Bridges Across A Number Of Town Streets	Grafton	Clarence Valley	SGOV
H.L. Ada's Chemist	27 Skinner Street	South Grafton	Clarence Valley	LGOV

Hospital Operating Theatre (former)	Union Street	Maclean	Clarence Valley	GAZ
Hotel	River Street	Maclean	Clarence Valley	LGOV
Istria	95 Victoria Street	Grafton	Clarence Valley	LGOV
Istria	95 Victoria Street	Grafton	Clarence Valley	GAZ
Maclean Hospital	Union Street	Maclean	Clarence Valley	LGOV
Maclean Public School 1902	Woodford Street	Maclean	Clarence Valley	LGOV
Manager's Cottage	Trenayr Road	Junction Hill	Clarence Valley	SGOV
Methodist Parsonage	133 Fry Street	Grafton	Clarence Valley	LGOV
Michelle's Hairdressers	29 Skinner Street	South Grafton	Clarence Valley	LGOV
National Australia Bank	39 Prince Street	Grafton	Clarence Valley	GAZ
National Australia Bank	39 Prince Street	Grafton	Clarence Valley	LGOV
Newbold Grange complex		Copmanhurst	Clarence Valley	GAZ
Newbold Lookout	Clarence Way	Winegrove	Clarence Valley	LGOV
Northern Rivers Electricity	Prince Street	Grafton	Clarence Valley	LGOV
Office Building	River Street	Maclean	Clarence Valley	LGOV
Office Building	River Street	Maclean	Clarence	LGOV

			Valley	
Offices	River Street	Maclean	Clarence Valley	LGOV
Old Grafton Police Station	Victoria Street	Grafton	Clarence Valley	GAZ
Old Woombah School	Adams Street	Woombah	Clarence Valley	LGOV
Operating Theatre	UNION STREET	MACLEAN	Clarence Valley	SGOV
Plane Trees	Plane Tree Avenue, Fisher Park	Grafton	Clarence Valley	LGOV
Police Residence	Duke Street	Grafton	Clarence Valley	LGOV
Police Station	McNaughton Place	Maclean	Clarence Valley	LGOV
Post Office	Victoria Street	Grafton	Clarence Valley	LGOV
Post Office	Skinner Street	South Grafton	Clarence Valley	LGOV
Post Office	Clarence Street	Brushgrove	Clarence Valley	LGOV
Post Office	River Street	Maclean	Clarence Valley	LGOV
Post Office Hotel	75 Skinner Street	South Grafton	Clarence Valley	LGOV
Post Office Hotel	Victoria Street	Grafton	Clarence Valley	LGOV
Prentice House	158 Fitzroy Street	Grafton	Clarence Valley	LGOV
Presbyterian Manse	Wharf Street	Maclean	Clarence Valley	LGOV

Primary School	Harwood Chatsworth Road	Chatsworth Island	Clarence Valley	LGOV
Pulganbar Smelter & Mines	cnr Clarence Way, Gordon Brook Road	Gordon Brook	Clarence Valley	LGOV
Ramornie meatworks site off Gwydir Hwy		Ramornie	Clarence Valley	GAZ
Registers	Trenayr Road	Junction Hill.	Clarence Valley	SGOV
Remnant Rainforest	Trenayr Road	Junction Hill.	Clarence Valley	SGOV
Residence	99 Oliver Street	Grafton	Clarence Valley	LGOV
Residence	Chatsworth Road	Chatsworth Island	Clarence Valley	LGOV
Residence	Chatsworth Road	Chatsworth Island	Clarence Valley	LGOV
Residence	Farnell Street	Lawrence	Clarence Valley	LGOV
Residence	Church Street	Maclean	Clarence Valley	LGOV
Residence	Woodford Street	Maclean	Clarence Valley	LGOV
Residence	Jubilee Street	Townsend	Clarence Valley	LGOV
Residence	River Street	Maclean	Clarence Valley	LGOV
Residence	River Street	Maclean	Clarence Valley	LGOV
Residence	Woodford Street	Maclean	Clarence Valley	LGOV
Residence	Wharf Street	Maclean	Clarence	LGOV

			Valley	
Residence	River Road	Palmers Island	Clarence Valley	LGOV
Residence	North Arm Drive	Chatsworth Island	Clarence Valley	LGOV
Residence	James Creek Road	James Creek	Clarence Valley	LGOV
Residence	River Road	Palmers Island	Clarence Valley	LGOV
Residence	Yamba Road	Palmers Island	Clarence Valley	LGOV
Residence	Yamba Road	Palmers Island	Clarence Valley	LGOV
Residence	Pacific Highway	Tyndale	Clarence Valley	LGOV
Residence	Pacific Highway	Tyndale	Clarence Valley	LGOV
Residence	Warregah Island Road	Warregah Island	Clarence Valley	LGOV
Residence	137 Victoria Street	Grafton	Clarence Valley	LGOV
Residence	Chatsworth Road	Chatsworth Island	Clarence Valley	LGOV
Residence	Chatsworth Road	Chatsworth Island	Clarence Valley	LGOV
Residence	River Street	Harwood	Clarence Valley	LGOV
Residence	Clarence Street	Maclean	Clarence Valley	LGOV
Residence	Clyde Street	Maclean	Clarence Valley	LGOV

Residence	Oban Street	Maclean	Clarence Valley	LGOV
Residence	River Street	Maclean	Clarence Valley	LGOV
Residence	Howard Street	Maclean	Clarence Valley	LGOV
Residence	Short Street	Maclean	Clarence Valley	LGOV
Residence	Short Street	Maclean	Clarence Valley	LGOV
Residence	Wharf Street	Maclean	Clarence Valley	LGOV
Residence	Yamba Road	Palmers Island	Clarence Valley	LGOV
Residence	Yamba Road	Palmers Island	Clarence Valley	LGOV
Residence	Pacific Highway	Tyndale	Clarence Valley	LGOV
Residence	Harwood Warregah Island Road	Warregah Island	Clarence Valley	LGOV
Residence	Woodford Dale Road	Woodford	Clarence Valley	LGOV
Residence	South Arm School Road	South Arm	Clarence Valley	LGOV
Residence (Duplicate Record)	Yamba Road	Palmers Island	Clarence Valley	LGOV
Residence (Duplicate)	River Street	Harwood	Clarence Valley	LGOV
Residence and Police Station (Former)	Clarence Street	Brushgrove	Clarence Valley	LGOV
Residence and Shop	Chatsworth Road	Chatsworth Island	Clarence	LGOV

			Valley	
Rosslyn	137 Alice Street	Grafton	Clarence Valley	LGOV
Schaeffer House	192 Fitzroy Street	Grafton	Clarence Valley	LGOV
School and Residence (Duplicate)	Morpeth Street	Harwood	Clarence Valley	LGOV
School Building (Former)	Wooli Street	Yamba	Clarence Valley	LGOV
School of Arts	Skinner Street	South Grafton	Clarence Valley	LGOV
School of Arts Building	Bridge Street	Lawrence	Clarence Valley	LGOV
School Residence and School	Morpeth Street	Harwood	Clarence Valley	LGOV
Semi-detached Cottage	58-60 Queen Street	Grafton	Clarence Valley	LGOV
Semi-detached Cottages	30-32 Villiers Street	Grafton	Clarence Valley	LGOV
Shop	River Street	Maclean	Clarence Valley	LGOV
Shop and residence	River Street	Maclean	Clarence Valley	LGOV
Shop Facade	River Street	Maclean	Clarence Valley	LGOV
Silo Building	Yamba Road	Palmers Island	Clarence Valley	LGOV
Silo Building	Yamba Road	Palmers Island	Clarence Valley	LGOV
South Grafton Fire Station	64 Wharf Street	South Grafton	Clarence Valley	SGOV

South Grafton Municipal Council Chambers	Spring Street	South Grafton	Clarence Valley	LGOV
South Grafton Skinner Street Conservation Area	Skinner Street	South Grafton	Clarence Valley	LGOV
South Grafton Super Save	33 Skinner Street	South Grafton	Clarence Valley	LGOV
St Andrew's Presbyterian Church	Oliver Street	Grafton	Clarence Valley	LGOV
St Patrick's Church (3rd)	Skinner Street	Grafton	Clarence Valley	LGOV
Stone Cottage Museum	Grafton Street	Maclean	Clarence Valley	LGOV
Storey House Museum	River Street	Yamba	Clarence Valley	LGOV
Telarah	289 Oliver Street	Grafton	Clarence Valley	LGOV
The Barn	Grafton Showground	Grafton	Clarence Valley	LGOV
The Barn	Showground	Grafton	Clarence Valley	GAZ
Tree Lined Front Drive	Trenayr Road	Junction Hill.	Clarence Valley	SGOV
Trenayr Swamp	Trenayr Road	Junction Hill.	Clarence Valley	SGOV
Trevor and Enid McKew's	45 Skinner Street	South Grafton	Clarence Valley	LGOV
Ulverstone	197 Fitzroy Street	Grafton	Clarence Valley	LGOV
Uniting Church	Church Street	Maclean	Clarence Valley	LGOV
Verona	213 Fitzroy Street	Grafton	Clarence	LGOV

			Valley	
Walker's Marina Hotel	Through Street	South Grafton	Clarence Valley	GAZ
Walker's Marina Hotel	90 Through Street	South Grafton	Clarence Valley	LGOV
Westpac Bank	35 Skinner Street	South Grafton	Clarence Valley	LGOV

There were **182** records in this section matching your search criteria.

There was a total of **192** records matching your search criteria.

Key:
LGA = Local Government Area
GAZ= NSW Government Gazette (statutory listings prior to 1997), HGA = Heritage Grant Application, HS = Heritage Study, LGOV = Local Government, SGOV = State Government Agency.

Note: The Heritage Office seeks to keep the State Heritage Inventory (SHI) up to date, however the latest listings in Local and Regional Environmental Plans (LEPs and REPs) may not yet be included. Always check with the relevant Local Council or Shire for the most recent listings.

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High Conservation Value Old Growth Forest

Item

Name of Item: High Conservation Value Old Growth Forest
Other Name/s: Old Growth Forest; HCVOG Forest; Upper North East NSW
Type of Item: Landscape
Group/Collection: Forestry and Timber Industry
Category: Forest Reserve
Primary Address: 15 Local Government Areas, Upper North East NSW, NSW
Local Govt. Area: Multiple LGAs

Property Description:

Lot/Volume Code	Lot/Volume Number	Section Number	Plan/Folio Code	Plan/Folio Number

Boundary: All those pieces or parcels of land (excluding those subject to easements and leases...) in the Upper North East Region...as described in section 1.4 of the Forest Agreement for the Upper North East Region, NSW Government Gazette, 5 March, 1999. See Physical Description referring to inclusions and exclusions and CD-Rom containing GIS formation.

All Addresses

Street Address	Suburb/Town	LGA	Parish	County	Type
15 Local Government Areas	Upper North East NSW	Multiple LGAs			Primary
15 Local Government Areas	Upper North East NSW	Ballina			Alternate
	Upper North East Region	Byron			Alternate
	Upper North East Region	Coffs Harbour			Alternate

	Upper North East Region	Clarence Valley			Alternate
	Upper North East Region	Glenn Innes Severn			Alternate
	Upper North East Region	Clarence Valley			Alternate
	Upper North East Region	Guyra			Alternate
	Upper North East Region	Kyogle			Alternate
	Upper North East Region	Lismore			Alternate
	Upper North East Region	Clarence Valley			Alternate
	Upper North East Region	Clarence Valley			Alternate
	Upper North East Region	Richmond Valley			Alternate
	Upper North East Region	Glenn Innes Severn			Alternate
	Upper North East Region	Tenterfield			Alternate
	Upper North East Region	Tweed			Alternate

Statement of Significance

Old growth forest is ecologically mature eucalypt forest showing few signs of human disturbance. The upper canopy trees are no longer growing in height or spreading their crowns and show signs of old age. HCOG forest represents the best examples remaining of such forests.

Date Significance Updated: 29 Aug 01

Note: There are incomplete details for a number of items listed on the State Heritage Register. The Heritage Office intends to develop or upgrade statements of significance for these items as resources become available.

Description

Physical Description:

All those pieces or parcels of land in the Upper North East Region* described below:
(i) depicted in the Geographic Information System theme in ESRI grid format called "hcovog1_prtctd' in the sub-directory called "Protected_HCVOG" on the CD-ROM, lodged with the Department of Urban Affairs and Planning and having the volume label "991221_1516 (21 December 1999)"; and
(ii) further described in the corresponding metadata on the CD-ROM.

But excluding those pieces and parcels of land subject to the easements and leases described below:
(i) depicted in the Geographic Information System theme in ESRI ArcInfo coverage format called "easement and leases" in the sub-directory called "Heritage Office OG/Tenure" on CD-ROM lodged with the Heritage Office and having the volume label "001117 1805" (17 November 2000) and provided by State Forests of New South Wales; and
(ii) further described in the corresponding metadata on the CD_ROM.

* The Upper North East Region is the area as described in section 1.4 of the Forest Agreement for the Upper North East Region, New South Wales Government Gazette, 5 March, 1999.

National Parks and Nature Reserves in the UNE Region Containing HCVOG, as defined in the negotiations in the UNE Forest Agreement Comprehensive Regional Assessment (CRA) process, from NPWS submission and CRA-UNE NPWS Estate 27 June 2000 map.

National Parks (24):
1. Bald Rock National Park
2. Barool National Park
3. Basket Swamp National Park
4. Boonoo Boonoo National Park
5. Border Ranges National Park
6. Bundjalung National Park
7. Butterleaf National Park
8. Capoompeta National Park
9. Chaeulundi National Park
10. Gay Fawkes River National Park
11. Gibralta Range National Park
12. Indwarra National Park
13. Maryland National Park
14. Mebbin National Park
15. Mount Jerusalem National Park
16. Mount Nothofagus National Park
17. Mount Warning National Park
18. Nightcap National Park
19. Nymboi- Binderay National Park
20. Nymboida National Park
21. Richmond Range National Park
22. Warra National Park
23. Washpool National Park
24. Yuraygir National Park

Nature Reserves (19):
1. Burnt Down Scrub Nature Reserve
2. Chambigne Nature Reserve
3. Cudgen Nature Reserve
4. Limpinwood Nature Reserve
5. Moore Park Nature Reserve
6. Mount Hyland Nature Reserve
7. Mucklewee Mountain Nature Reserve
8. Tabbiemoble Swamp Nature Reserve
9. Toonumber Nature Reserve
10. Woodford Island Nature Reserve

11. Captains Creek Nature Reserve
12. Couchy Creek Nature Reserve
13. Demon Nature Reserve
14. Mann River Nature Reserve
15. Morro Creek Nature Reserve
16. Mount-Neville Nature Reserve
17. Sherwood Nature Reserve
18. Tallawudjah Nature Reserve
19. Uralba Nature Reserve

Contained within the following Local Governmet Areas: Ballina, Byron Bay, Coffs Harbour, Copmanhurst, Glen Innes, Grafton City, Guyra, Kyogle, Lismore, Maclean, Pristine Waters, Richmond Valley, Severn, Tenterfield, Tweed.

Assessment of Significance

SHR Criteria a) [Historical Significance]	HCVOG Forest is important for its potential to demonstrate the history of their use and exploitation, as well as key sites demonstrating evidence of Aboriginal occupation over a long time period.
SHR Criteria c) [Aesthetic Significance]	HCVOG Forest are by the nature of their tall trees areas of high aesthetic values which are valued and sought after by the community.
SHR Criteria e) [Research Potential]	HCVOG Forest is important for its potential to contribute to our understanding of the life cycle of eucalypt forests.
SHR Criteria f) [Rarity]	HCVOG Forest is a forest type which is now rare or uncommon at a regional and state wide basis. They provide a valuable habitat for a wide range of native animal species including a number of rare and endangered species.
Assessment Criteria	Items are assessed against the **State Heritage Register (SHR) Criteria** to determine the level of significance. Refer to the Listings below for the level of statutory protection.

Procedures /Exemptions

Section of Act	Description	Title	Comments	Action Date
57(2)	Exemption to allow work	Exemptions	HERITAGE ACT 1977 ORDER UNDER SECTION 57(2)	Dec 22 2000

I, the Minister for Urban Affairs and Planning, on the recommendation of the Heritage Council of New South Wales, in pursuance of section 57(2) of the Heritage Act, 1977, do, by this my order, grant an exemption from section 57(1) of the said Act in respect of the engaging in or carrying out of any activities described in Schedule C by or on behalf of the National Parks and Wildlife Service and State Forests New South Wales on the item described in Schedule A situated on the land described in Schedule B.

Andrew Refshauge, MP
Minister for Urban Affairs and Planning

Sydney, December 2000

SCHEDULE A

The item known as High Conservation Value Old Growth Forest in the Upper North East Region, situated on the land described in Schedule B.

SCHEDULE B

All those pieces or parcels of land (excluding those subject to easements and leases described below) in the Upper North East Region*:

(i) depicted in the Geographic Information System theme in ESRI grid format called hcovog1_prtctd in the sub-directory called Protected_HCVOG on the CD-ROM, lodged with Department of Urban Affairs and Planning and having the volume label 991221_1516 (21 December 1999); and

(ii) further described in the corresponding metadata on the CD-ROM.

Easements and leases within the Upper North East Region* means those areas of land which are:

(i) depicted in the Geographic Information System theme in ESRI ArcInfo coverage format called easement and leases in the sub-directory called Heritage Office OG/Tenure on CD-ROM lodged with the Heritage Office and having the volume label 001117 1805 (Date);and

(ii) further described in the corresponding metadata on the CD-ROM.

*The Upper North East Region is the area as described in section 1.4 of the Forest Agreement for the Upper North East Region, New South Wales Government, 5 March, 1999.

SCHEDULE C
Those activities:

(i) authorised under Integrated Forestry Operations Approvals (IFOAs); and/or

(ii) consistent with the provisions and obligations of approved Plans of Management under the National Parks and Wildlife Act, the Forestry and National Parks Estate Act and the resultant Forest Agreements and that of the

			subsequent NSW and Commonwealth Governments joint North East Regional Forest Agreement.	
57(2)	Exemption to allow work	Standard Exemptions	I, the Minister for Planning, pursuant to section 57(2) of the Heritage Act 1977 on recommendation of the Heritage Council of New South Wales grant standard exemptions from section 57(1) of the Heritage Act, 1977 described in the schedule gazetted on 7 March 2003, Gaz No. 59 pages 4066-4070. (As amended on 18 June 2004 and July 2005 and incorporating guidelines as adopted in April 2004) To view the schedule **Click Here**	Mar 7 2003

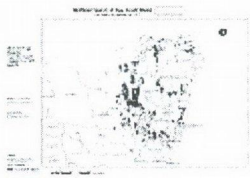
Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		01487	22 Dec 00	168	13896

References, Internet links & Images

Type	Author	Year	Title	Internet Links
Other	NSW Government	1999	HCVOG on CD-ROM	
Written	Heritage Upper North East-High Conservation Value Old Growth Forest		(not stated)	
Written	NSW Government	1998	Forestry and National Park Estate Act 1998	
Written	NSW Government	1999	Forest Agreement for the Upper North East Region	

Note: Internet links may be to web pages, documents or images.



(Click on Thumbnail for Full Size Image and Image Details)

Source of information for this entry

Name: NSW Heritage Office

Email: **watters@heritage.nsw.gov.au**

Web Page: **www.heritage.nsw.gov.au**

Administration

Database Number: 5051503

File Number: H99/00224

Every effort has been made to ensure that information contained in the State Heritage Inventory is correct. If you find any errors or omissions please send your comments to the **Database Manager**.

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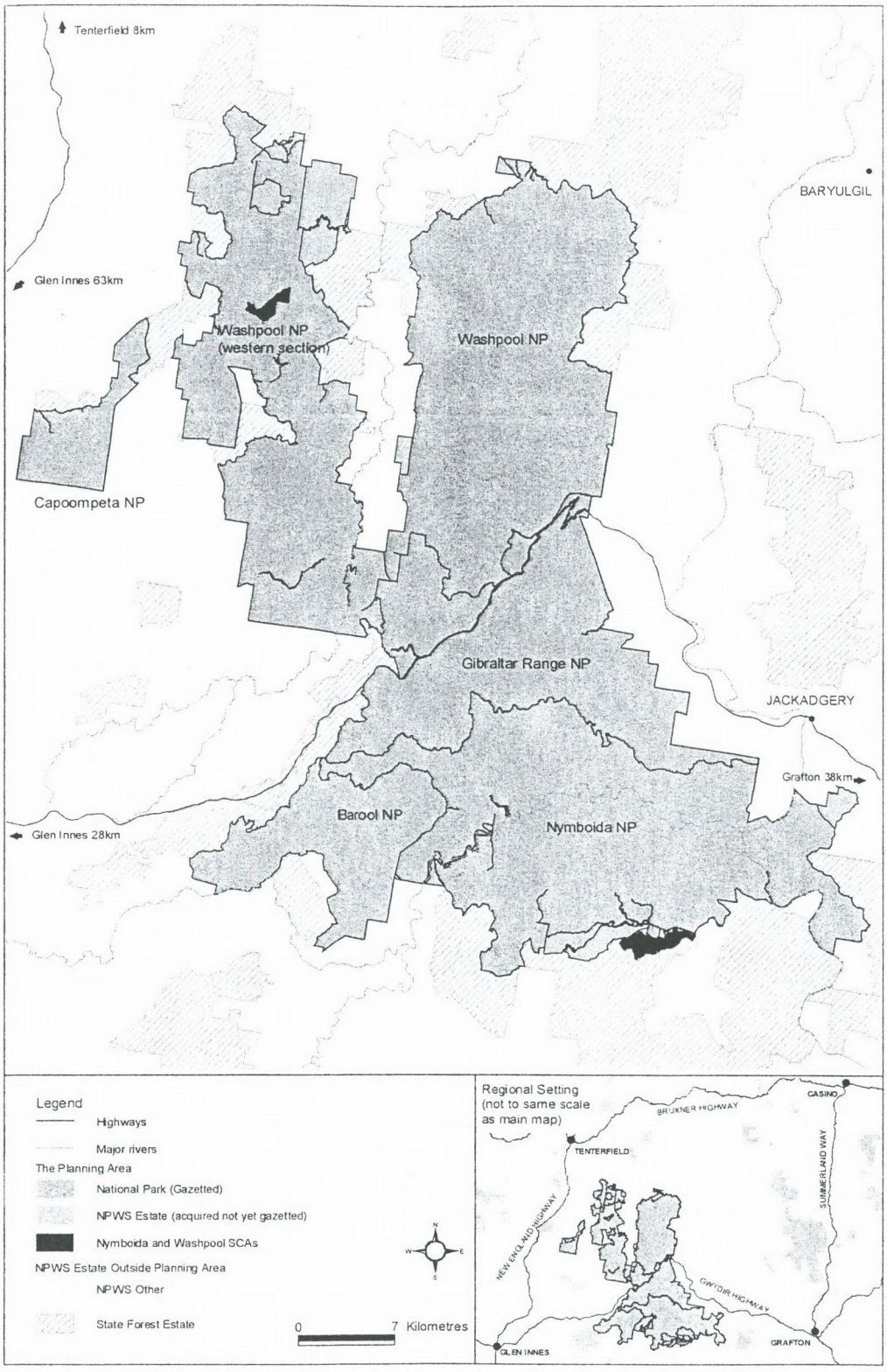
Map 1: The planning area's national parks and state conservation areas.



(2) Subclause (1) does not affect the application, to or in respect of development to which that subclause applies, of such of the provisions of this plan as are not inconsistent with that subclause or with a consent granted by the Council in respect of the development.

47 What is exempt and complying development?

(1) Development of minimal environmental impact listed as exempt development in *Development Control Plan No 3: Exempt and Complying Development*, as adopted by the Council on 18 April 2001, is ***exempt development*** despite any other provision of this plan.

(2) Development listed as complying development in *Development Control Plan No 3: Exempt and Complying Development*, as adopted by the Council on 18 April 2001, is ***complying development*** if:

(a) it is local development of a kind that can be carried out with consent on the land on which it is proposed, and

(b) it is not an existing use, as defined in section 106 of the Act.

(3) Development is exempt or complying development only if it complies with the development standards and other requirements applied to the development by *Development Control Plan No 3: Exempt and Complying Development*, as adopted by the Council on 18 April 2001.

(4) A complying development certificate issued for any complying development is to be subject to the conditions for the development specified in *Development Control Plan No 3: Exempt and Complying Development*, as in force when the certificate is issued.

Schedule 1 Items of environmental heritage

(Clause 5 (1))

1 All cemeteries and burial grounds both private and public situated within the Shire of Nymboida whether in use at the appointed day or not.

2 Ramornie meat works site, being part of portions 4 and 8, Parish of Turville, County of Fitzroy.

3 Convict built road tunnel, Old Glen Innes Road.

4 Ramornie homestead and barn.

5 Dalmorton police lock-up and court house.

6 Nymboida Hydro-electric Power Station.

7 Mount Remarkable Gold Mine on Sheep Station Creek, Parish of Springbrook, County of Gresham.

8 Nymboida Coal Mines, portions 58 and 79, Parish of Nymboida.

9 Goolang and Blaxlands Creeks Fossil Wood Deposits, Parishes of Koukandowie, Blaxland and Nymboida.

Schedule 2 Allotments subject to exception

(Clause 44)

Lots 1–3, DP 615886, Parish of Southampton.

Lots 2–21, DP 247573, Parish of Southampton.

Lot 24, DP 247573, Parish of Southampton.

Northern region

Northern Region	
Ashby Dry Dock	4300303
Barraba Creek Bridge	4309531
Bawden Bridge over the Orara River	4300640
Bridge over Five Day Creek, Kempsey	4300008
Bridge over Gwydir River at Bundarra	4301681
Bridge over Halls Creek at Bingara	4301685
Bridge over Orara River at Coramba	4301093
Briner Bridge over Upper Coldstream River	4300158
Chimney Swamp Creek Bridge	4309527
Clarence River Road Bridge, Tabulam	4301043
Cohens Bridge over Namoi River at Gunnedah	4301683
Colemans Bridge over Leycester Creek	4301053
Fladbury Bridge	4301623
Four Mile Creek Bridge	4309534
Glebe Bridge over the Richmond River	4300641
Glenreagh Bridge over the Orara River, The	4301671
Gwydir River Bridge at Bingara	4301686
Korns Crossing Bridge over Rous River	4300160
Macadamized Road Bruxner Highway	4302674
McFarlane Bridge over the Clarence River South Arm	4300642
Namoi River Bridge at Manilla	4301687
Oaky Creek Bridge	4309532
Pollacks Bridge over the Nymboida River	4300643

In This Section

- Hunter region
- Northern region
- South West region
- Southern region
- Sydney region
- Western region

Shark Creek Bridge	4309568
Sportsmans Creek Road Bridge	4301024
St Helena Creek Bridge	4309533
Surveyors Creek Bridge	4309526
Swanbrook Creek Bridge	4309524

Back to top

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Your Ref:
Our Ref: AHIMS #9674

RTA Environment Technology
Po Box 3035
Parramatta NSW 2124

Monday, 3 May 2004

Attention: Stephanie Fennessy

Dear Sir or Madam:

NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

ABN 30 841 387 271

Re: AHIMS Search for the following area at West of Grafton
Zone 56 Eastings: 448000-450000 Northings: 6734700-6736700

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW National Parks and Wildlife Service (NPWS) at the above location.

A search of the NPWS Aboriginal Heritage Information Management System (AHIMS) has shown that 1 Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to NPWS;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and NPWS assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the NPWS Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;
- It is known to the Aboriginal community; or
- It is located during an investigation of the area conducted for a development application.

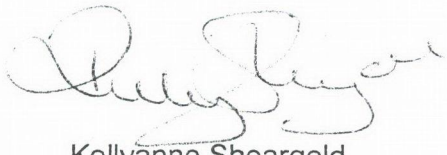
If you considering undertaking a development activity in the area subject to the AHIMS search, NPWS would recommend that an Aboriginal Heritage Assessment be

Head Office
43 Bridge Street
P.O. Box 1967
Hurstville NSW
2220 Australia
Tel: (02) 9585 6444
Fax: (02) 9585 6555
www.npws.nsw.gov.au

Australian-made 100% recycled paper

undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely



Kellyanne Sheargold
Aboriginal Information Officer
Information Systems Unit
Cultural Heritage Division
Phone: (02) 9585 6345
Fax: (02) 9585 6094

AHIMS
Aboriginal Heritage Information Management System

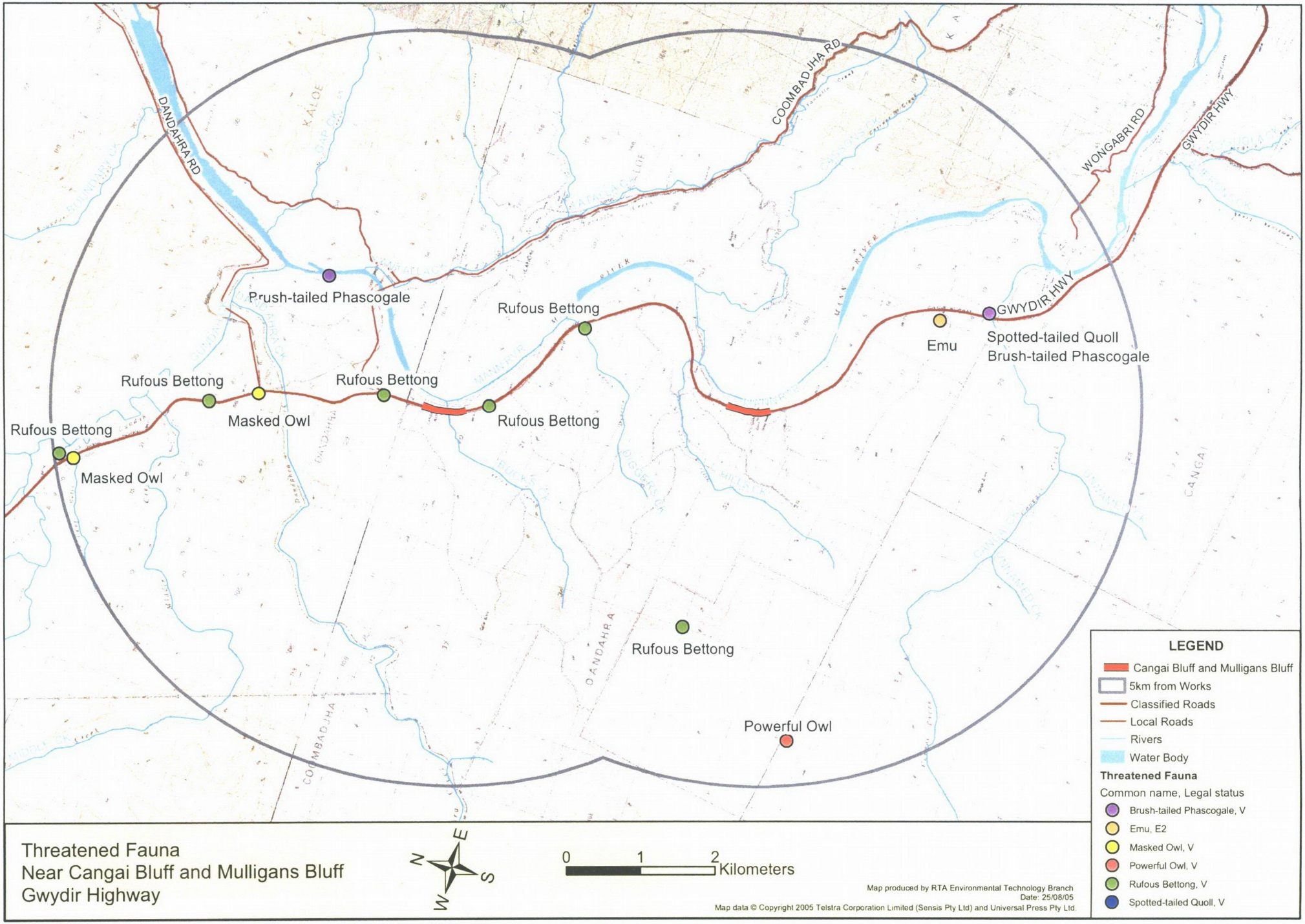
List of Sites (List - Short)

Grid Reference Type = AMG Zone = 56 Easting From = 448000 Easting to = 450000 Northing From = 6734700 Northing to = 6736700 Requestor = RTA - Environment Technology/Parramatta (3605) Service ID = 9674 Feature Search Type = AHIMS Features

Site ID	Site Name	Grid.Ref Type	Zone	Easting	Northing	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)
12-5-0001	Cangai	AMG	56	448700	6736700	ACD,	Natural Mythological (Ritual)	Kelly,R (01-JAN-73)	
		Status Valid							
		Primary Contact							

Number of Sites :1 Page 1 of 1 Userid : SHEARK 03/05/2004 13:25:15

This information is not guaranteed to be free from error omission. The NSW National Parks and .dlife Service and it employees disclaim liability for any act done or omissio. ..ade on the information and consequences of such acts or omission.


DANDAHRA RD
COOMBADJHA RD
WONGABRI RD
GWYDIR HWY
GWYDIR HWY
Prush-tailed Phascogale
Rufous Bettong
Rufous Bettong
Rufous Bettong
Masked Owl
Rufous Bettong
Rufous Bettong
Masked Owl
Emu
Spotted-tailed Quoll
Brush-tailed Phascogale
Rufous Bettong
Powerful Owl
LEGEND
Cangai Bluff and Mulligans Bluff
5km from Works
Classified Roads
Local Roads
Rivers
Water Body
Threatened Fauna
Common name, Legal status
Brush-tailed Phascogale, V
Emu, E2
Masked Owl, V
Powerful Owl, V
Rufous Bettong, V
Spotted-tailed Quoll, V
Threatened Fauna
Near Cangai Bluff and Mulligans Bluff
Gwydir Highway
N
E
S
W
0
1
2
Kilometers
Map produced by RTA Environmental Technology Branch
Date: 25/08/05
Map data © Copyright 2005 Telstra Corporation Limited (Sensis Pty Ltd) and Universal Press Pty Ltd.

SIGHTING_KEY	SPECIES_CODE	CLASS_NAME	FAMILY_NAME	SORT_ORDER	CIENTIFIC_NAM	COMMON_NAME	Distance (m)	LEGAL_STATUS
56069-HO	0250	Aves	Tytonidae	73	novaehollandiae	Masked Owl	4748.907042	V
SPXEI0135439	0250	Aves	Tytonidae	73	novaehollandiae	Masked Owl	2204.871479	V
SPXE00111600	1017	Mammalia	Dasyuridae	122	tapoatafa	Phascogale	2156.466745	V
14856-HO	1187	Mammalia	Potoroidae	135	rufescens	Rufous Bettong	319.3225756	V
SPXEI0172428	1187	Mammalia	Potoroidae	135	rufescens	Rufous Bettong	4928.73835	V
SPXEI0172444	1187	Mammalia	Potoroidae	135	rufescens	Rufous Bettong	2864.131232	V
SPXEI0172448	1187	Mammalia	Potoroidae	135	rufescens	Rufous Bettong	538.778473	V
SPXEI0172454	1187	Mammalia	Potoroidae	135	rufescens	Rufous Bettong	1954.077442	V
100156-035	0001	Aves	Casuariidae	28	novaehollandiae	Emu	2600.90034	E2
SPXEI0074884	0248	Aves	Strigidae	72	Ninox strenua	Powerful Owl	4398.140928	V
SPXEI0172459	1008	Mammalia	Dasyuridae	122	maculatus	Quoll	3240.195656	V
SPXEI0172458	1017	Mammalia	Dasyuridae	122	tapoatafa	Phascogale	3240.195656	V
WD2918	1187	Mammalia	Potoroidae	135	rufescens	Rufous Bettong	3015.516181	V

FIRST_DATE	LAST_DATE	COUNT_	SOURCE	ZONE_	AMG_EASTING	AMG_NORTHING	LATITUDE	LONGITUDE
18-Jun-88	18-Jun-88	1	4	56	444600	6740500	-29.46362293	152.4286499
31-Jul-91	31-Jul-91	1	4	56	446200	6738400	-29.48264497	152.4450471
27-Oct-00	28-Oct-00	1	4	56	448000	6738000	-29.48633107	152.4635946
02-Dec-91	02-Dec-91	1	4	56	447000	6735400	-29.5097537	152.4531534
18-Jan-81	18-Jan-81	1	4	56	444600	6740700	-29.46181796	152.42866
01-Dec-85	01-Dec-85	1	4	56	445900	6739000	-29.47721711	152.4419823
10-Jan-88	10-Jan-88	1	4	56	446700	6736800	-29.49710616	152.4501265
26-Apr-87	26-Apr-87	1	4	56	448400	6734500	-29.51793468	152.4675554
27-May-85	27-May-85	3	4	56	450000	6730000	-29.55861156	152.4838585
17-Feb-92	17-Feb-92	1	4	56	444000	6730200	-29.55655154	152.4219343
13-Oct-79	13-Oct-79	1	4	56	450300	6729400	-29.56403845	152.4869279
28-Aug-86	28-Aug-86	1	4	56	450300	6729400	-29.56403845	152.4869279
20-Jan-81	20-Jan-81		4	56	445000	6732000	-29.5403515	152.4323473

CCURACY_COD	ROTAP_CODE	MAP_NO	OBJECTID_1
100		9339	216651
100		9339	216651
1000		9339	216651
100		9338	216651
1000		9339	216651
1000		9339	216651
1000		9339	216651
1000		9338	216651
10000		9338	216651
100		9338	216651
1000		9338	216651
1000		9338	216651
100		9338	216651

Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

17 August 2005 12:13

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.deh.gov.au/epbc/assessmentsapprovals/index.html

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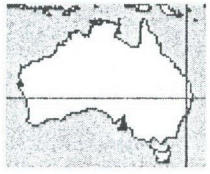
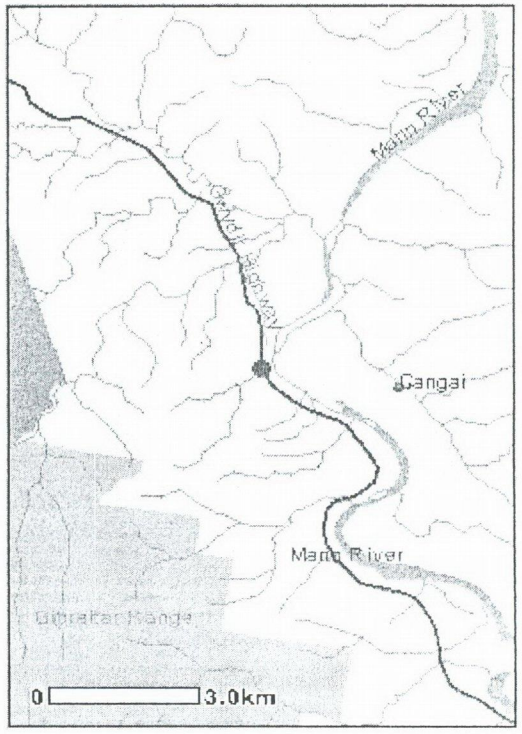
Search Type:	Point
Buffer:	5 km
Coordinates:	-29.5047,152.45147



Report Contents:

Summary
Details
- Matters of NES



- Other matters protected by the EPBC Act
- Extra Information

Caveat
Acknowledgments

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties: 1

National Heritage Places:	None
Wetlands of International Significance: **(Ramsar Sites)**	1
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	23
Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None

Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

World Heritage Properties [Dataset Information]

Central Eastern Rainforest Reserves (Washpool and Gibraltar Ran NSW

Wetlands of International Significance [Dataset Information]
(Ramsar Sites)

LITTLE LLANGOTHLIN NATURE RESERV		Within same catchment as Ramsar site
Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Lathamus discolor Swift Parrot	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
Xanthomyza phrygia Regent Honeyeater	Endangered	Species or species habitat may occur within area

Fishes

Maccullochella ikei * Clarence River Cod, Eastern Freshwater Cod	Endangered	Species or species habitat likely to occur within area

Frogs

Mixophyes balbus * Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus * Southern Barred Frog, Giant Barred Frog	Endangered	Species or species habitat likely to occur within area

Mammals

Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
Pseudomys oralis * Hastings River Mouse	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox	Vulnerable	Species or species habitat may occur within area

Plants

Callistemon pungens	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant	Endangered	Species or species habitat likely to occur within area
Grevillea mollis	Endangered	Species or species habitat likely to occur within area
Grevillea rhizomatosa	Vulnerable	Species or species habitat likely to occur within area

Haloragis exalata subsp. velutina	Vulnerable	Species or species habitat likely to occur within area
Hydrocharis dubia Frogbit	Vulnerable	Species or species habitat likely to occur within area
Marsdenia longiloba Clear Milkvine	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax	Vulnerable	Species or species habitat likely to occur within area
Tylophora woollsii	Endangered	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Xanthomyza phrygia Regent Honeyeater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat.	Migratory	Species or species habitat may occur within area

Painted Snipe

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Breeding likely to occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Breeding likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Lathamus discolor Swift Parrot	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Listed - overfly	Breeding likely to occur within area

	marine area	
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed -- overfly marine area	Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Dataset Information]

Gibraltar Range National Park, NSW

Regional Forest Agreements [Dataset Information]
Note that all RFA areas including those still under consideration have been included.

Upper North East NSW RFA, New South Wales

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point

location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. Environment Australia acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA

- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCLIM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated:

Department of the Environment and Heritage
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

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Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

17 August 2005 12:11

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.deh.gov.au/epbc/assessmentsapprovals/index.html

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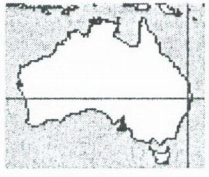
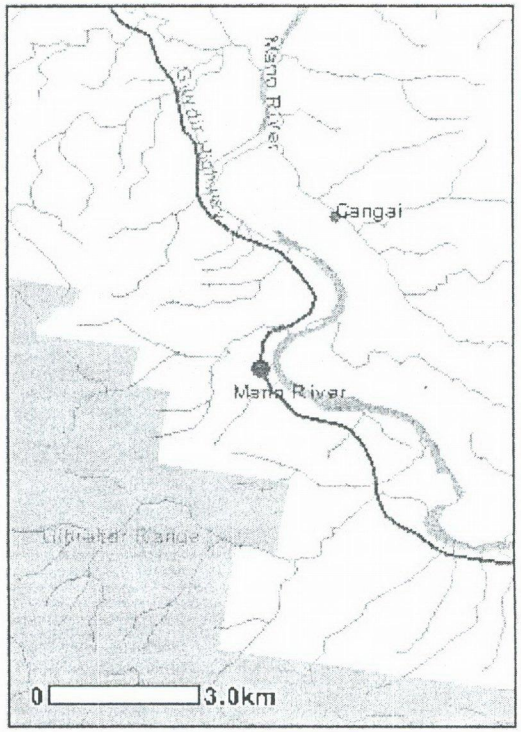
Search Type:	Point
Buffer:	5 km
Coordinates:	-29.5385,152.46405



Report Contents:

Summary
Details
- Matters of NES



- Other matters protected by the EPBC Act
- Extra Information

Caveat
Acknowledgments

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.deh.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties: None

National Heritage Places:	None
Wetlands of International Significance: **(Ramsar Sites)**	1
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	22
Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None

Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Wetlands of International Significance [Dataset Information]
(Ramsar Sites)

LITTLE LLANGOTHLIN NATURE RESERV	Within same catchment as Ramsar site

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Lathamus discolor Swift Parrot	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
Xanthomyza phrygia Regent Honeyeater	Endangered	Species or species habitat may occur within area
Fishes		
Maccullochella ikei *	Endangered	Species or species habitat likely to occur within area

Clarence River Cod, Eastern Freshwater Cod

Frogs

Mixophyes balbus * Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus * Southern Barred Frog, Giant Barred Frog	Endangered	Species or species habitat likely to occur within area

Mammals

Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby	Vulnerable	Species or species habitat may occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
Pseudomys oralis * Hastings River Mouse	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox	Vulnerable	Species or species habitat may occur within area

Plants

Callistemon pungens	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant	Endangered	Species or species habitat likely to occur within area
Grevillea mollis	Endangered	Species or species habitat likely to occur within area
Haloragis exalata subsp. velutina	Vulnerable	Species or species habitat likely to occur within area
Hydrocharis dubia Frogbit	Vulnerable	Species or species habitat likely to occur within area

Marsdenia longiloba Clear Milkvine	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax	Vulnerable	Species or species habitat likely to occur within area
Tylophora woollsii	Endangered	Species or species habitat likely to occur within area
Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Xanthomyza phrygia Regent Honeyeater	Migratory	Species or species habitat may occur within area
Migratory Wetland Species		
Birds		
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence

Birds

Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Breeding likely to occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Breeding likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Listed - overfly marine area	Species or species habitat may occur within area
Lathamus discolor Swift Parrot	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Breeding likely to occur within area

Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Dataset Information]

Gibraltar Range National Park, NSW

Regional Forest Agreements [Dataset Information]
Note that all RFA areas including those still under consideration have been included.

Upper North East NSW RFA, New South Wales

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known,

point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

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- Department of Primary Industries, Water and Environment, Tasmania
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- Birds Australia

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- National Herbarium of NSW
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- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

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Last updated:

Department of the Environment and Heritage
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

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NATIONAL NATIVE TITLE TRIBUNAL

Level 25
25 Bligh Street
SYDNEY NSW 2000
AUSTRALIA

GPO Box 9973, SYDNEY NSW 2001
Telephone: (02) 9235 6300
Facsimile: (02) 9233 5613
Website: www.nntt.gov.au

Our Ref: 740/04af
Your Ref: H/43191/A

Stephanie Hennessy
RTA Operations
Environmental Technology
PO Box 3035
Parramatta NSW 2150

13 May 2004

Dear Ms Fennessy

Native title search results of Pristine Waters Council Area

Thank you for your letter of 13 May 2004.

My search on 13 May 2004 found:

Register Type	NNTT Reference Numbers
National Native Title Register	Nil.
Register of Native Title Claims	NC96/8, NC97/34.
Unregistered Claimant applications	Nil.
Register of Indigenous Land Use Agreements	Nil.

I have included more detailed information and a fact sheet to help you understand the search result.

Please note, recent applications lodged or amended in the Federal Court may not have been sent to us.

If you need more information please call me on (02) 9235 6300.

Yours sincerely

Amy Fitzell
Administration Assistant

740/04AF

COPY

RTA Operations
Environmental Technology

Level 5, Pod D, 99 Phillip Street, Parramatta, NSW 2150
(PO Box 3035, Parramatta, NSW 2124) Australia

RECEIVED
13 MAY 2004
National Native Title Tribunal
SYDNEY

Facsimile Transmission

Date: 13/05/04

Reference No: H/43191/A

From:	Stephanie Fennessy	**To:**	**Registry**
Phone:	8837 0589	**Organisation:**	National Native Title Tribunal
Fax:	8837 0053	**Fax:**	9233 5613
Email:	stephanie_fennessy@rta.nsw.gov.au	**No. of Pages:**	1 (including Cover Sheet)
Subject:	Search for Native Title applications or claims		

Dear Sir/Madam,

I would like to order a Native Title application or claims search for the **Pristine Waters Local Government Area** (with particular interest on the Gwydir Highway west of Jackadgery).

I would greatly appreciate your assistance on this matter. In the meantime should you require any further information please do not hesitate to contact me via the above details.

Yours sincerely,

Stephanie Fennessy

Date 13.5.04
Action Officer M Mann
Attached To File
Document No 140219
Copy on

CONFIDENTIALITY NOTICE FOR RECIPIENTS EXTERNAL TO THE RTA

The information contained in this facsimile is intended for the named recipient only. It may contain privileged and confidential information. If you are not the intended recipient, you must not copy, distribute, take any action in reliance on it, or disclose any details of the facsimile to any other person, firm or corporation. If you have received this facsimile in error, please notify us immediately by reverse charge call and return the original to us by mail. We will reimburse you any costs you may incur in notifying us and returning the original facsimile to us. Views expressed in the message are those of the individual sender and are not necessarily the views of the RTA.

NATIONAL NATIVE TITLE TRIBUNAL

Claimant Application Summary

Application numbers	Federal Court number: NG6027/98 NNTT number: NC96/8
Application name	Baryulgil Bundjalung
Name of body where application lodged	National Native Title Tribunal
Date application lodged	12/03/1996
Current stage(s)	Notification Complete, In Mediation
Applicants	Mr Ken "Linky" Gordon
Address for service	Simon Blackshield 23 Hunter Street SYDNEY NSW 2000 Phone: 02 9365 2122 Fax: 02 9475 0093
Persons claiming to hold native title	The native title claim group consists of those persons who meet the following criteria: a) they are descended from the following persons: (i) Mick "Buckey" Robinson and Jane "Jenny" Brown (ii) Dick Donelly and Jane "Jenny" Brown (iii) Ethel Bawden and Tom Gordon (iv) Elsie Bawden and Mr. Crambal (v) Mariah Little and Charles Charles; and (b) they are personally known to the acknowledged elders of the native title claim group, or (in the case of children) are personally known to senior members of subsidiary families who are themselves members of the native title claim group; and (c) their primary identification is as members of the indigenous people referred to in this application as the Baryulgil Bundjalung, who assert ownership of country which includes but is not limited to the lands and waters which are subject to this application; and (d) either: (i) they are resident with the claimant community in the traditional country of the native title claim group; or (ii) they have maintained their primary identification with the native title claim group through regular visits with the claimant community in the traditional country of the native title claim group; and (e) they are accepted by the acknowledged elders of the native title claim group as recognising and observing the laws and customs of the native title claim group. * a person may be said to be "descended" from the named pairs of ancestors for the purposes of criterion (a) if they: (i) are direct biological descendants of one of those pairs of ancestors; (ii) have been adopted and brought up by, and take their primary identification from, a

	direct biological descendant of one of those pairs of ancestors; or (iii) are direct biological descendants of a person who had been adopted and brought up by, and had taken their primary identification from, a direct biological descendant of one of those pairs of ancestors. , The process by which it can be ascertained whether any particular person is a member of the native title claim group involves the following steps: 1. Identifying the ancestry of the person through undertaking genealogical research, including obtaining oral history from members of the native title claim group (in particular) the acknowledged elders of the native title claim group; 2. Establishing whether the person is known to other members of the native title claim group and (in particular) whether the person is known to the acknowledged elders of the native title claim group; 3. Investigating the personal history of the person to establish their places of residence at birth, in childhood and in adulthood and (where relevant) the frequency and nature of their visits to the claimant community; and 4. Making appropriate inquiries to establish whether the acknowledged elders of the native title cliaim group accept the person as acknowledging and observing the laws and customs of the native title claim group. This would include making enquiries to establish whether the person is accepted as recognising the importance of meeting kinship obligations, showing respect for elders and of caring for and protecting the traditional country of the native title claim group.
Native title rights and interests claimed	1. The native title rights and interests claimed in relation to the land and waters covered by the application: a) The right to own the application area b) the right to possess the application area c) the right to occupy the application area. d) the right to use and enjoy the application area. e) the right to make decisions about the use and enjoyment of the application area. f) the right to control the access of others to the application area. g) the right to use and enjoy resources of the application area including, but not lmited to: (i) the right to hunt and fish on or from the land and waters, and to collect food from the land and waters; (ii) the right to take items from the land and waters such as timber, stones, resin, and shells and to make such things as shelters, tools and hunting implements; (iii) the right to manage animals, plants and minerals on the application area. h) the right to control the use and enjoyment of others of resources of the application area. i) the right to trade in resouces of the application area. j) the right to receive a portion of any resouces taken by others from the application area. k) the right to maintain and protect places of importance under traditional laws, customs, and practices in the application area. l) the right to maintain, protect and prevent the misuse of cultural knowledge of the native title claim group. m) the right to speak for the application area. n) the right to conduct ceremonies on the land and waters. o) the right of free access to the application area for the purpose of satisfying the rights indentified in the preceding sub-paragraphs. 2. Subject to paragraphs 3, 4 and 5, the native title rights and interests specified in paragraph 1 confer possession, occupatiion, use and enjoyumnet of the land and waters covered by the application on the native title claim group to the exclusion of all others

3. The rights and interests claimed in paragraphs 1 and 2 above (the native title rights and interests) is:

a. Subject to the rights and interests of those lawfully exercising rights and interests which have been validly created and vested in then by the State of New South Wales; and

b. Subject to the rights and interest of those lawfully exercising rights and interests which have been validly created or vested in them by the Commonwealth of Australia.

4. Further and in the alternative to paragraph 3 and subject to paragraph 5 below:

a. If

i) the area covered by the application or part of the area covered by the application is or was the subject of a "Previous Non-Exclusive Possession Act" as defined in the Native Title Act (1993) (C'th); and

ii) The previous Non-Exclusive Possession Act involved the grant of rights and interests which were not inconsistent with the rights and interests claimed in paragraph 1 and/or 2 above; then

The native title rights and interests claimed under paragraphs 1 and/or 2 are claimed subject to the rights and interests granted under the Previous Non-Exclusive Possession Act (as provided by section 23G(1)(a) of the Native Title Act (1993)(C'th);

b. If

i) The area covered by the application or a part of the area covered by the application is or was the subject of a Previous Non-Exclusive Possession Act as defined by section 23F of the Native Title Act (1993)(C'th)' and

ii) The previous Non-Exclusive Possession Act involved the grant of rights and interests which were inconsistent with the rights and interests claimed in paragraphs 1 and/or 2 above but did not extinguish them; then

The rights and interests claimed under paragraphs 1 and/or 2 are claimed subject to any suspension of them during the currency of the Previous Non-Exclusive Possession Act as provided by section 23G(1)(b)(ii) of the Native Title Act (1993)(C'th);

c. If

i) The area covered by the application or a part of the area covered by the application is or was the subject of a "Category B Past Act" as defined by section 230 of the Native Title Act (1993)(C'th) or a "Category B Intermediate Period Act" as defined by section 232C of the Native Title Act (1993)(C'th); and

ii) The Category B Past Act or the Category B Intermediate Period Act involved the grant of rights and interests claimed in paragraphs 1 and/or 2 above; and

iii) The Category B Past Act of the Category B Intermediate Period Act was not a Previous Non-Exclusive Possession Act; then

Those rights and interests referred to in paragraphs 1 and/or 2 which are not inconsistent with the rights and interests granted under the Category B Past Act or the Category B Intermediate Period Act are claimed;

d. If:

i) The area covered by the application or a part of the area covered by the application is or was the subject of:

(1) A "Category C Past Act" as defined by section 231 of the Native Title Act (1993)(C'th); or

(2) A "Category C Intermediate Period Act" as defined by section232D of the Native Title Act (1993)(C'th): or

	(3) A "Category D Past Act" as defined by section 232 of the Native Title Act (1993)(C'th); or (4) A "Category D Intermediate Period Act" as defined by section 232E of the Native Title Act (1993)(C'th); and ii) The Category C Past Act, Category C Intermediate Period Act, Category D Past Act and/or Category D Intermediate Period Act referred to in the preceding sub-paragraph was not a Previous Non-Exclusive Act, then Subject to the operation of the "Non-Extinguishment Principle" as defined by section 238 of the Native Title Act (1993)(C'th), those rights and interests claimed under paragraph 1 and/or 2 is claimed. 5. Native title rights and interests is not claimed interests are not claimed in respect of a. Any land excluded from the application area within the boundaries of the area covered by the application by Schedule B; b. Any minerals, petroleum or gas which is wholly owned by the Crown. Details of the activities in exercise of those rights and interests are provided in Schedule F.
Area	**Jurisdiction:** New South Wales **Location:** Areas of land and water in the Parishes of Yulgilbar, Yarrcalkiarra, Mookima, Coombadjah, Ogilvie, Carnham, Churchill, Pleuna and Albert in the State of NSW **Local government region(s):** Copmanhurst Shire Council, Pristine Waters Council, Severn Shire Council, Tenterfield Shire Council **ATSIC region(s):** Kamilaroi Regional Council, Many Rivers Regional Council **Representative A/TSI body(s):** NSW Native Title Services Ltd **Land/water and/or sea:** Land/Water **Area covered by the claim (as detailed in the application):** See Attachment "B"
Registration information	*Please refer to the Register of Native Title Claims/ National Native Title Register (as appropriate) for registered details of this application.* **Date claim entered on Register of Native Title Claims:** 12/03/1996 **Registration test status:** Accepted for registration **Registration history:** Registered from 12/03/1996.
Attachments	1. Map of Claim Area, Attachment A of the Application, 1 page - A4, Attached 13/11/2001. 2. Technical Description of the External and Internal Boundaries, Attachment B of the Application, 7 pages - A4, Attached 13/11/2001. NNTT map attached.
NNTT contact details	**Case manager:** Mishka Holt **Address:** National Native Title Tribunal Level 25 25 Bligh Street SYDNEY NSW 2000 GPO Box 9973 SYDNEY NSW 2001 **Phone:** (02) 9235 6300 Freecall 1800 640 501 **Fax:** (02) 9233 5613 **Web page:** www.nntt.gov.au

NATIONAL NATIVE
TITLE TRIBUNAL

Application Information and Extract from the Register of Native Title Claims

Application Information

Application numbers:	Federal Court number:	NG6027/98
	NNTT number:	NC96/8
Application name:	Baryulgil Bundjalung	
Registration history:	Registered from 12/03/1996.	

Register Extract (pursuant to s.186 of the *Native Title Act 1993*)

Application lodged with: National Native Title Tribunal

Date application lodged: 12/03/1996

Date claim entered on Register: 12/03/1996

Applicants: Mr Ken "Linky" Gordon

Address for service:
Simon Blackshield
50 Denham Street
BONDI NSW 2026
Phone: 02 9689 4418
Fax: 02 9687 1238

Area covered by the claim:

See Attachment "B"

Persons claiming to hold native title:

The native title claim group consists of those persons who meet the following criteria:

a) they are descended from the following persons:
(i) Mick "Buckey" Robinson and Jane "Jenny" Brown
(ii) Dick Donelly and Jane "Jenny" Brown

(iii) Ethel Bawden and Tom Gordon
(iv) Elsie Bawden and Mr. Crambal
(v) Mariah Little and Charles Charles; and

(b) they are personally known to the acknowledged elders of the native title claim group, or (in the case of children) are personally known to senior members of subsidiary families who are themselves members of the native title claim group; and

(c) their primary identification is as members of the indigenous people referred to in this application as the Baryulgil Bundjalung, who assert ownership of country which includes but is not limited to the lands and waters which are subject to this application; and

(d) either:

(i) they are resident with the claimant community in the traditional country of the native title claim group; or

(ii) they have maintained their primary identification with the native title claim group through regular visits with the claimant community in the traditional country of the native title claim group; and

(e) they are accepted by the acknowledged elders of the native title claim group as recognising and observing the laws and customs of the native title claim group.

* a person may be said to be "descended" from the named pairs of ancestors for the purposes of criterion (a) if they:

(i) are direct biological descendants of one of those pairs of ancestors;

(ii) have been adopted and brought up by, and take their primary identification from, a direct biological descendant of one of those pairs of ancestors; or

(iii) are direct biological descendants of a person who had been adopted and brought up by, and had taken their primary identification from, a direct biological descendant of one of those pairs of ancestors.
, The process by which it can be ascertained whether any particular person is a member of the native title claim group involves the following steps:

1. Identifying the ancestry of the person through undertaking genealogical research, including obtaining oral history from members of the native title claim group (in particular) the acknowledged elders of the native title claim group;

2. Establishing whether the person is known to other members of the native title claim group and (in particular) whether the person is known to the acknowledged elders of the native title claim group;

3. Investigating the personal history of the person to establish their places of residence at birth, in childhood and in adulthood and (where relevant) the frequency and nature of their visits to the claimant community; and

4. Making appropriate inquiries to establish whether the acknowledged elders of the native title cliaim group accept the person as acknowledging and observing the laws and customs of the native title claim group. This would include making enquiries to establish whether the person is accepted as recognising the

importance of meeting kinship obligations, showing respect for elders and of caring for and protecting the traditional country of the native title claim group.

Registered native title rights and interests:

The following Native Title Rights & Interests were entered on the Register on 17/12/2001:
1. The native title rights and interests claimed in relation to the land and waters covered by the application:

a) The right to own the application area
b) the right to possess the application area
c) the right to occupy the application area.
d) the right to use and enjoy the application area.
e) the right to make decisions about the use and enjoyment of the application area.
f) the right to control the access of others to the application area.
g) the right to use and enjoy resources of the application area including, but not lmited to:

(i) the right to hunt and fish on or from the land and waters, and to collect food from the land and waters;

(ii) the right to take items from the land and waters such as timber, stones, resin, and shells and to make such things as shelters, tools and hunting implements;

(iii) the right to manage animals, plants and minerals on the application area.

h) the right to control the use and enjoyment of others of resources of the application area.

j) the right to receive a portion of any resouces taken by others from the application area.

k) the right to maintain and protect places of importance under traditional laws, customs, and practices in the application area.

m) the right to speak for the application area.

n) the right to conduct ceremonies on the land and waters.

o) the right of free access to the application area for the purpose of satisfying the rights indentified in the preceding sub-paragraphs.

2. Subject to paragraphs 3, 4 and 5, the native title rights and interests specified in paragraph 1 confer possession, occupatiion, use and enjoyumnet of the land and waters covered by the application on the native title claim group to the exclusion of all others

3. The rights and interests claimed in paragraphs 1 and 2 above (the native title rights and interests) is:

a. Subject to the rights and interests of those lawfully exercising rights and interests which have been validly created and vested in then by the State of New South Wales; and

b. Subject to the rights and interest of those lawfully exercising rights and interests which have been validly created or vested in them by the Commonwealth of Australia.

4. Further and in the alternative to paragraph 3 and subject to paragraph 5 below:

a. If

i) the area covered by the application or part of the area covered by the application is or was the subject of a "Previous Non-Exclusive Possession Act" as defined in the Native Title Act (1993) (C'th); and

ii) The previous Non-Exclusive Possession Act involved the grant of rights and interests which were not inconsistent with the rights and interests claimed in paragraph 1 and/or 2 above; then

The native title rights and interests claimed under paragraphs 1 and/or 2 are claimed subject to the rights and interests granted under the Previous Non-Exclusive Possession Act (as provided by section 23G(1)(a) of the Native Title Act (1993)(C'th);

b. If

i) The area covered by the application or a part of the area covered by the application is or was the subject of a Previous Non-Exclusive Possession Act as defined by section 23F of the Native Title Act (1993)(C'th)' and

ii) The previous Non-Exclusive Possession Act involved the grant of rights and interests which were inconsistent with the rights and interests claimed in paragraphs 1 and/or 2 above but did not extinguish them; then

The rights and interests claimed under paragraphs 1 and/or 2 are claimed subject to any suspension of them during the currency of the Previous Non-Exclusive Possession Act as provided by section 23G(1)(b)(ii) of the Native Title Act (1993)(C'th);

c. If

i) The area covered by the application or a part of the area covered by the application is or was the subject of a "Category B Past Act" as defined by section 230 of the Native Title Act (1993)(C'th) or a "Category B Intermediate Period Act" as defined by section 232C of the Native Title Act (1993)(C'th); and

ii) The Category B Past Act or the Category B Intermediate Period Act involved the grant of rights and interests claimed in paragraphs 1 and/or 2 above; and

iii) The Category B Past Act of the Category B Intermediate Period Act was not a Previous Non-Exclusive Possession Act; then

Those rights and interests referred to in paragraphs 1 and/or 2 which are not inconsistent with the rights and interests granted under the Category B Past Act or the Category B Intermediate Period Act are claimed;

d. If:

i) The area covered by the application or a part of the area covered by the application is or was the subject of:

(1) A "Category C Past Act" as defined by section 231 of the Native Title Act (1993)(C'th); or

(2) A "Category C Intermediate Period Act" as defined by section232D of the Native Title Act (1993)(C'th): or

(3) A "Category D Past Act" as defined by section 232 of the Native Title Act (1993)(C'th); or

(4) A "Category D Intermediate Period Act" as defined by section 232E of the Native Title Act (1993)(C'th); and

ii) The Category C Past Act, Category C Intermediate Period Act, Category D Past Act and/or Category D Intermediate Period Act referred to in the preceding sub-paragraph was not a Previous Non-Exclusive Act, then

Subject to the operation of the "Non-Extinguishment Principle" as defined by section 238 of the Native Title Act (1993)(C'th), those rights and interests claimed under paragraph 1 and/or 2 is claimed.

5. Native title rights and interests are not claimed in respect of

a. Any land excluded from the application area within the boundaries of the area covered by the application by Schedule B;

b. Any minerals, petroleum or gas which is wholly owned by the Crown.

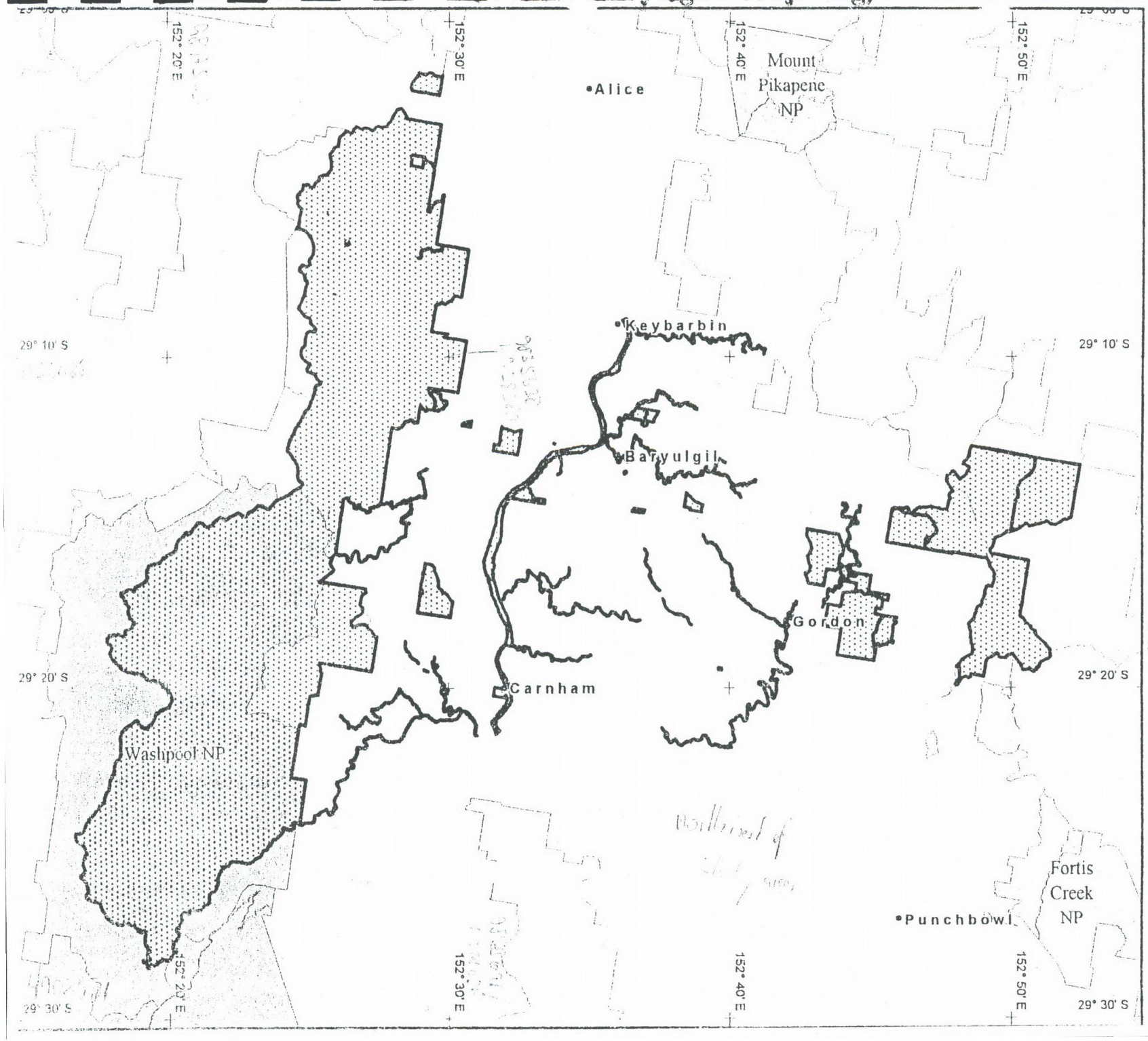
Details of the activities in exercise of those rights and interests are provided in Schedule F.

Register attachments:

1. Map of Claim Area, Attachment A of the Application, 1 page - A4, Attached 13/11/2001.
2. Technical Description of the External and Internal Boundaries, Attachment B of the Application, 7 pages - A4, Attached 13/11/2001.

Note: The Register may, in accordance with s.188 of the Native Title Act 1993, contain confidential information that will not appear on the Extract.

NATIVE TITLE APPLICATION: NC96/008 (Baryulgil Bundjalung) NC60[illegible]/08



Area of Application (geographic extent) = 490 sq km

NOTE: To determine areas subject to claim within the external boundary, reference to the application description is necessary.

Map created by: Geospatial Analysis & Mapping Branch, National Native Title Tribunal (18/10/2000)

Application boundary data compiled by NNTT from data sourced from DITM (NSW).
National Parks and Wildlife Estate data sourced from NP&WS (NSW).
State Forest data sourced from SFNSW.
Location data sourced from AUSLIG.

LEGEND

- STATE FOREST
- NATIONAL PARK
- NATURE RESERVE

NOTE. This map does not form part of the Register of Native Title Claims. It is provided as general information only and to assist in locating the area involved.

The Registrar, the National Native Title Tribunal and its staff and officers and the Commonwealth, accept no liability and or give no undertakings, guarantees or warranties concerning the accuracy, completeness or fitness for purpose of the map.

NORTH

0 10
KILOMETRES

Latitude and Longitude based on Australian Geodetic Datum 1984

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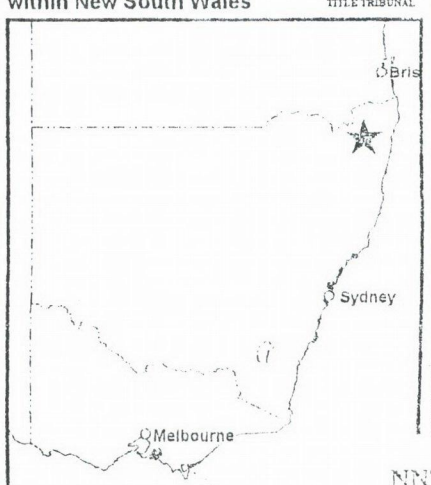
NATIONAL NATIVE TITLE TRIBUNAL

Location of NC96/008 within New South Wales



NNTT Map

NATIONAL NATIVE TITLE TRIBUNAL

Claimant Application Summary

Application numbers	Federal Court number: NG6086/98 NNTT number: NC97/34
Application name	Gumbangirri People
Name of body where application lodged	National Native Title Tribunal
Date application lodged	24/11/1997
Current stage(s)	Notification Complete, In Mediation
Applicants	Mr Cecil Thomas Briggs, Ms Janet Layton, Ms Vicki Cameron, Mr Stanley Boney
Address for service	Mr Eduard Neumann Craddock Murray and Neumann 2nd Floor 255 Castlereagh Street SYDNEY NSW 2000 Phone: 02 9283 4755 Fax: 02 9283 4180
Persons claiming to hold native title	Gumbangirri people of NSW New England Tablelands, Members of the Dorodong Association Inc.
Native title rights and interests claimed	The rights and interests claimed involve a holistic interaction between all aspects of the lives of the members of the claim group and the claim area. The claim group claim 'ownership' of the land and waters covered by the application ('the claim area') in accordance with their traditional law and custom. There is no appropriate non-indigenous legal method of evoking this 'ownership'. However, to satisfy the requirements of the registration test the claim group claims the native title rights and interests set out in Attachments E. Description of Native Title Rights and Interests (Attachment E). Subject to (2) - (6) below, the full and free enjoyment of the following Native Title rights and interests area are claimed in relation to the land and waters the subject of the application: (i) a right to possess, occupy, use and enjoy the claim area; (ii) a right to make decisions about the use and enjoyment of the claim area; (iii) a right of access to the claimed area; (iv) a right to control the access of others to the claimed area; (v) a right to control the use and enjoyment of others or resources of the claimed area; (vi) a right to trade in resources of the claimed area; (vii) the right to receive a portion of any resources taken by others from the claimed area; (viii) the right to maintain, protect and prevent the misuse of cultural knowledge of the common law holders associated with the claim area. With respect of those parts of the area the subject of the application which are, or have been, the subject of a previous non-exclusive possession act within the meaning of s.23F of the Native Title Act 1993, the native title rights and interests are claimed subject to the rights and interest created in the non-exclusive possession act which are not inconsistent with the rights and interests claimed and, in the casse of rights granted which are inconsistent with the rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interest cause.

	With respect to those parts of the area the subject of the application which are, or have been, the subject of: (i) a category B intermediate period act within the meaning of s.232C of the Native Title Act 1993; (ii) a category C intermediate period act within the meaning of s.232D of the Native Title Act 1993; (iii) a category D intermediate period act within the meaning of s.232E of the Native Title Act 1993; The native title rights and interests claimed are subject to the rights and interests created in the non-exclusive possession act which are not inconsistent with the rights and interests claimed and, in the case of any rights granted which are inconsistent with the rights and interests which those rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interests cause. With respect to those parts of the area of the application which are, or have been the subject of: (i) a Category B Past Act within the meaning of s.230 of the Native Title Act 1993; (ii) a Category C Past Act within the meaning of s.231 of the Native Title Act 1993; (iii) a Category D Past Act within the meaning of s.232 of the Native Title Act 1993; The native title rights and interests claimed are those subject to the rights and interests created in the Non-Exclusive Possession Act which are not inconsistent with the rights and interests claimed and, in the case of any rights granted which are inconsistent with the rights and interests claimed, subject to any extinguishment or suspension of the native title rights and interests which those inconsistent rights and interests cause. 5. The native title rights and interests identified above do not extended to ownership of any minerals, petroleum or gas which are wholly owned by the Crown. 7. The native title rights and interests identified above do not include a claim for exclusive occupation and use of offshore areas as defined by s.253 of the Native Title Act 1993. 8. Current activities in exercise of these rights and interests are set out in Schedule G below.
Area	**Jurisdiction:** New South Wales **Location:** The application covers areas of crown land and waters between the Mann and Macleay Rivers in Northeast NSW. **Local government region(s):** Armidale Dumaresq Council, Bellingen Shire Council, Coffs Harbour City Council, Guyra Shire Council, Kempsey Shire Council, Pristine Waters Council, Nambucca Shire Council **ATSIC region(s):** Kamilaroi Regional Council, Many Rivers Regional Council **Representative A/TSI body(s):** NSW Native Title Services Ltd **Land/water and/or sea:** Land/Water **Area covered by the claim (as detailed in the application):** (a) Boundaries of the area covered by this application 1. At Attachment B there is description of the external boundary of the claim area provided by the National Native Title Tribunal and generated by the Tribunal's Geospatial Unit from the external boundary data produced by the NSW Surveyor General's Department, which in turn was based on the area description provided in the application as originally lodged. 2. All internal waters, rivers, creeks, water reserves, lakes and other bodies of water within the boundary of the claim area as denoted on the map of the claim area lodged with the original application and Attachment B. (b) Areas within those boundaries that are not covered by the application See "Attachment B.2" Attachment B Area of application (geographic extent) = 4,466 sq km.

Commencing at 152.507028 longitude east and 29.655567 latitude south, being the junction of the Mann and Nymboida Rivers, the application boundary traverses generally westerly along the centre of the Mann River to its junction with the Henry River at approx. 152.260525 longitude east and 29.729281 latitude south.

From here the boundary traverses generally southerly along the centre of the Henry River until 152.251037 longitude east and 29.754856 latitude south, the boundary continues in a generally southerly direction through points 1 to 127 (Geographic Description - Attachment B), the latter being a point on Gap Creek.

From this point the boundary continues in a generally southerly direction along the centre of Gap Creek to its junction with the Boyd River at approx 152.281333 longitude east and 29.860507 latitude south, then along the centre of the Boyd River to its junction with the Sara River at approx. 152.271068 longitude east and 29.943286 latitude south.

From here the boundary continues in a generally southerly direction along the centre of the Sara River to its junction with Bobs Creek at approx. 152.243672 longitude east and 29.982038 latitude south, then along the centre of the Bobs Creek until 152.223693 longitude east and 30.027862 latitude south.

From this point the boundary traverses generally south easterly through points 128 to 358, the latter being a point on the Aberfoyle River, then traverses generally south westerly along the centre of the Aberfoyle River to its junction with Cedar Creek at approx. 152.215587 longitude east and 30.129325 latitude south.

From here the boundary traverses southerly along the centre of Cedar Creek until 152.219024 longitude east and 30.161328 latitude south, then through points 359 to 992, the latter being a point on the Sandy River.

From this point the boundary traverses generally south westerly along the centre of Sandy River until 152.177507 longitude east and 30.496216 latitude south, then traverses easterly through points 993 to 1001, the latter being a point on Long Creek, then traverses south westerly along the centre of Long Creek to its junction with the Oaky River at approx. 152.178119 longitude east and 30.516847 latitude south.

From this point the boundary traverses generally south easterly along the centre of the Oaky River until 152.197065 longitude east and 30.5267281 latitude south, then traverses generally southerly through points 1002 to 1080, the latter being a point on the boundary of the Styx River State Forest.

From here the boundary traverses easterly coincidental with the boundary of the Styx River State Forest until 152.231741 longitude east and 30.548119 latitude south, then traverses generally south easterly through points 1081 to 1256, the latter being a point on the Georges River.

From this point the boundary traverses generally north easterly along the centre of the Georges River then Cunnarwarra Creek until its junction with Turners Creek at approx 152.385144 longitude east and 30.529559 latitude south, then traverses generally south easterly along the centre of Turners Creek to its junction with Five Day Creek at approx. 152.419989 longitude east and 30.5565833 latitude south.

From here the boundary traverses generally north easterly along the centre of five Day Creek until 152.427806 longitude east and 30.541983 latitude south, then continues in a north easterly direction through points 1257 to 1373, the latter being a point on Platypus Creek, then along the centre of Platypus Creek until its junction with Cooks Creek at approx. 152.504983 longitude east and 30.483050 latitude south.

From this point the boundary traverses generally north westerly along the centre of Cooks Creek until 152.416416 longitude east and 30.440438 latitude south, then through points 1374 to 1388, the latter being a point on the boundary of New England National Park.

From here the boundary traverses generally north easterly coincidental with the boundary of New England National park until 152.475489 longitude east and 30.398399 latitude south, then traverses generally easterly through points 1389 to 1519, the latter being a point on the boundary of the New England National Park.

From this point the boundary continues in a generally easterly direction coincidental with the boundary of the New England National Park until the boundary of the Bellinger River

National Park at approx. 152.654752 longitude east and 30.389091 latitude south, then coincidental with the northern boundary of the Bellinger River National Park until the boundary of the Dorrigo National Park at approx. 152.741897 longitude east and 30.401910 latitude south.

From here the boundary continues in a generally easterly direction coincidental with the southern boundary of the Dorrigo Nation Park to where it meets the boundary of the Never Never State Forest at approx. 152.786311 longitude east and 30.402458 latitude south, then traverses generally north easterly coincidental with the boundary of the Never Never State Forest until 152.838559 longitude east and 30.354595 latitude south.

From this point the boundary traverses generally westerly across the Dorrigo National Park through points 1520 to 1702, the latter being on the boundary of the Dorrigo National Park, then traverses generally northerly coincidental with the boundary of the Dorrigo National Park until its northern most point at 152.803296 longitude east and 30.304332 latitude south.

From here the boundary traverses generally north westerly then generally north easterly through points 1703 to 2078, the latter being a point on the Bobo Creek, then traverses generally north along the centre of Bobo Creek to its junction with the Little Nymboida River at approx. 152.806924 longitude east and 30.127872 latitude south.

From this point the boundary traverses generally northerly through point 2079 to 2404, the latter being a point on Kangaroo Creek, then continuing in a northerly direction along the centre of Kangaroo Creek to its junction with Sheep Station Creek at approx. 152.822206 longitude east and 30.020780 latitude south, then traverses generally north westerly through points 2405 to 3327, back to the commencement point.

Geographic coordinates are in decimal degrees and referenced to Australian Geodetic Datum 1984 (AGD84). These coordinates are based on the position of spatial reference data as sourced from the Land Information Centre, Department of Information Technology and Management NSW at the time.

Unless otherwise defined where points are referenced by number, these refer to Geographic Description-attachment B.

Use of Coordinates

Where coordinates are used within the description to represent cadastral boundaries or the intersection with such, they are intended as a guide only. As an outcome to the custodians of cadastral data continuously recalculating the geographic position of their data based on improved survey and data maintenance procedures, it is not possible to accurately define such a position other than by ground survey.

Attachment B.2

Areas within those boundaries that are not covered by the application.

1. Subject to clauses (b)5. and (b)6l, the area covered by the application excludes any land or waters covered by:

(i) a Schedule Interest;
(ii) a freehold estate;
(iii) a commercial lease that is neither an agricultural lease nor a pastoral lease;
(iv) an exclusive agricultural lease or an exclusive pastoral lease;
(v) a residential lease
(vi) a community purpose lease;
(vii) a lease dissected from a mining lease as referred to in s.23B(2)(vii) of the Native Title Act 1993;
(viii) any lease (other than a mining lease) that confers a right of exclusive use over particular land or waters;
(ix) any other exclusive possession act as defined by s23B of the Native Title Act 1993

which was validly vested or granted on or before 23 December 1996.

2. Subject to clauses (b)3. and (b)4., the area covered by the application excludes any area covered by the valid construction or establishment of any public work, where the construction or establishment of the public work commenced on or before 23 December

	1996. 3. Where the act specified in (b)1. and (b)2. falls within the province of: (i) s.23B(9) of the Native Title Act 1993 dealing with the exclusion of acts benefiting Aboriginal peoples or Torres Strait Islanders; (ii) s.23B(9A) of the Native Title Act 1993 dealing with the establishment of a national or state park; (iii) s.23B(9B) of the Native Title Act 1993 dealing with the acts where legislation provides for non-extinguishment; (iv) s.23B(9C) of the Native Title Act 1993 dealing with the exclusion of Crown to Crown grants; and (v) s.23B(10) of the Native Title Act 1993 dealing with the exclusion by regulation the area covered by the act is not excluded from this application. 4. Where an act referred to in clauses (b)1. and (b)2. covers land or waters referred to in: (i) s.47 of the Native Title Act 1993 dealing with the pastoral leases held by native title claimants; (ii) s.47A of the Native Title Act 1993 dealing with reserves etc. covered by claimant applications; and (iii) s.47B of the Native Title Act 1993 dealing with vacant crown land covered by claimant applications, the area covered by the act is not excluded from the application. 5. Where an area is covered by a previous non-exclusive possession act under s.23F of the Native Title Act 1993 the native title claim group does not claim possession, occupation, use and enjoyment to the exclusion of all others. 6. The area covered by the application excludes land where native title has been extinguished at common law.

Registration information	*Please refer to the Register of Native Title Claims/National Native Title Register (as appropriate) for registered details of this application.* **Date claim entered on Register of Native Title Claims:** 24/11/1997 **Registration test status:** Accepted for registration **Registration history:** Registered from 24/11/1997.

Attachments	1. Map of claim area, Attachment A of the Application, 1 page - A4, Attached 22/09/1999.

NNTT contact details	**Case manager:**	Amy Barrett
	Address:	National Native Title Tribunal Level 25 25 Bligh Street SYDNEY NSW 2000 GPO Box 9973 SYDNEY NSW 2001
	Phone:	(02) 9235 6300 Freecall 1800 640 501
	Fax:	(02) 9233 5613
	Web page:	www.nntt.gov.au

NATIONAL NATIVE TITLE TRIBUNAL

Application Information and Extract from the Register of Native Title Claims

Application Information

Application numbers:	Federal Court number: NNTT number:	NG6086/98 NC97/34
Application name:	Gumbangirri People	
Registration history:	Registered from 24/11/1997.	

Register Extract (pursuant to s.186 of the *Native Title Act 1993*)

Application lodged with:	National Native Title Tribunal
Date application lodged:	24/11/1997
Date claim entered on Register:	24/11/1997
Applicants:	Mr Cecil Briggs, Ms Janet Layton, Ms Vicki Cameron, Mr Stanley Boney
Address for service:	Mr Eduard Neumann Craddock Murray and Neumann 2nd Floor 255 Castlereagh Street SYDNEY NSW 2000 Phone: 02 9283 4755 Fax: 02 9283 4180

Area covered by the claim:

(a) Boundaries of the area covered by this application

1. At Attachment B there is description of the external boundary of the claim area provided by the National Native Title Tribunal and generated by the Tribunal's Geospatial Unit from the external boundary

data produced by the NSW Surveyor General's Department, which in turn was based on the area description provided in the application as originally lodged.

2. All internal waters, rivers, creeks, water reserves, lakes and other bodies of water within the boundary of the claim area as denoted on the map of the claim area lodged with the original application and Attachment B.

(b) Areas within those boundaries that are not covered by the application
See "Attachment B.2"

Attachment B

Area of application (geographic extent) = 4,466 sq km.

Commencing at 152.507028 longitude east and 29.655567 latitude south, being the junction of the Mann and Nymboida Rivers, the application boundary traverses generally westerly along the centre of the Mann River to its junction with the Henry River at approx. 152.260525 longitude east and 29.729281 latitude south.

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From this point the boundary traverses generally south westerly along the centre of Sandy River until 152.177507 longitude east and 30.496216 latitude south, then traverses easterly through points 993 to 1001, the latter being a point on Long Creek, then traverses south westerly along the centre of Long Creek to its junction with the Oaky River at approx. 152.178119 longitude east and 30.516847 latitude south.

From this point the boundary traverses generally south easterly along the centre of the Oaky River until 152.197065 longitude east and 30.5267281 latitude south, then traverses generally southerly through points 1002 to 1080, the latter being a point on the boundary of the Styx River State Forest.

From here the boundary traverses easterly coincidental with the boundary of the Styx River State Forest until 152.231741 longitude east and 30.548119 latitude south, then traverses generally south easterly through points 1081 to 1256, the latter being a point on the Georges River.

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From here the boundary traverses generally north easterly along the centre of five Day Creek until 152.427806 longitude east and 30.541983 latitude south, then continues in a north easterly direction through points 1257 to 1373, the latter being a point on Platypus Creek, then along the centre of Platypus Creek until its junction with Cooks Creek at approx. 152.504983 longitude east and 30.483050 latitude south.

From this point the boundary traverses generally north westerly along the centre of Cooks Creek until 152.416416 longitude east and 30.440438 latitude south, then through points 1374 to 1388, the latter being a point on the boundary of New England National Park.

From here the boundary traverses generally north easterly coincidental with the boundary of New England National park until 152.475489 longitude east and 30.398399 latitude south, then traverses generally easterly through points 1389 to 1519, the latter being a point on the boundary of the New England National Park.

From this point the boundary continues in a generally easterly direction coincidental with the boundary of the New England National Park until the boundary of the Bellinger River National Park at approx. 152.654752 longitude east and 30.389091 latitude south, then coincidental with the northern boundary of the Bellinger River National Park until the boundary of the Dorrigo National Park at approx. 152.741897 longitude east and 30.401910 latitude south.

From here the boundary continues in a generally easterly direction coincidental with the southern boundary of the Dorrigo Nation Park to where it meets the boundary of the Never Never State Forest at approx. 152.786311 longitude east and 30.402458 latitude south, then traverses generally north easterly coincidental with the boundary of the Never Never State Forest until 152.838559 longitude east and 30.354595 latitude south.

From this point the boundary traverses generally westerly across the Dorrigo National Park through points 1520 to 1702, the latter being on the boundary of the Dorrigo National Park, then traverses generally northerly coincidental with the boundary of the Dorrigo National Park until its northern most point at 152.803296 longitude east and 30.304332 latitude south.

From here the boundary traverses generally north westerly then generally north easterly through points 1703 to 2078, the latter being a point on the Bobo Creek, then traverses generally north along the centre of Bobo Creek to its junction with the Little Nymboida River at approx. 152.806924 longitude east and 30.127872 latitude south.

From this point the boundary traverses generally northerly through point 2079 to 2404, the latter being a point on Kangaroo Creek, then continuing in a northerly direction along the centre of Kangaroo Creek to its junction with Sheep Station Creek at approx. 152.822206 longitude east and 30.020780 latitude south, then traverses generally north westerly through points 2405 to 3327, back to the commencement point.

Geographic coordinates are in decimal degrees and referenced to Australian Geodetic Datum 1984 (AGD84). These coordinates are based on the position of spatial reference data as sourced from the Land Information Centre, Department of Information Technology and Management NSW at the time.

Unless otherwise defined where points are referenced by number, these refer to Geographic Description-attachment B.

Use of Coordinates

Where coordinates are used within the description to represent cadastral boundaries or the intersection with such, they are intended as a guide only. As an outcome to the custodians of cadastral data continuously recalculating the geographic position of their data based on improved survey and data maintenance procedures, it is not possible to accurately define such a position other than by ground survey.

Attachment B.2

Areas within those boundaries that are not covered by the application.

1. Subject to clauses (b)5. and (b)6l, the area covered by the application excludes any land or waters covered by:

(i) a Schedule Interest;
(ii) a freehold estate;
(iii) a commercial lease that is neither an agricultural lease nor a pastoral lease;
(iv) an exclusive agricultural lease or an exclusive pastoral lease;
(v) a residential lease
(vi) a community purpose lease;
(vii) a lease dissected from a mining lease as referred to in s.23B(2)(vii) of the Native Title Act 1993;
(viii) any lease (other than a mining lease) that confers a right of exclusive use over particular land or waters;
(ix) any other exclusive possession act as defined by s23B of the Native Title Act 1993

which was validly vested or granted on or before 23 December 1996.

2. Subject to clauses (b)3. and (b)4., the area covered by the application excludes any area covered by the valid construction or establishment of any public work, where the construction or establishment of the public work commenced on or before 23 December 1996.

3. Where the act specified in (b)1. and (b)2. falls within the province of:

(i) s.23B(9) of the Native Title Act 1993 dealing with the exclusion of acts benefiting Aboriginal peoples or Torres Strait Islanders;
(ii) s.23B(9A) of the Native Title Act 1993 dealing with the establishment of a national or state park;
(iii) s.23B(9B) of the Native Title Act 1993 dealing with the acts where legislation provides for non-extinguishment;
(iv) s.23B(9C) of the Native Title Act 1993 dealing with the exclusion of Crown to Crown grants; and
(v) s.23B(10) of the Native Title Act 1993 dealing with the exclusion by regulation

the area covered by the act is not excluded from this application.

4. Where an act referred to in clauses (b)1. and (b)2. covers land or waters referred to in:

(i) s.47 of the Native Title Act 1993 dealing with the pastoral leases held by native title claimants;
(ii) s.47A of the Native Title Act 1993 dealing with reserves etc. covered by claimant applications; and
(iii) s.47B of the Native Title Act 1993 dealing with vacant crown land covered by claimant applications,

the area covered by the act is not excluded from the application.

5. Where an area is covered by a previous non-exclusive possession act under s.23F of the Native Title Act 1993 the native title claim group does not claim possession, occupation, use and enjoyment to the exclusion of all others.

6. The area covered by the application excludes land where native title has been extinguished at common law.

Persons claiming to hold native title:

Members of the Dorodong Association Inc.

Registered native title rights and interests:

The following Native Title Rights & Interests were entered on the Register on 24/11/1997:
The rights and interests claimed involve a holistic interaction between all aspects of the lives of the members of the claim group and the claim area. The claim group claim 'ownership' of the land and waters covered by the application ('the claim area') in accordance with their traditional law and custom. There is no appropriate non-indigenous legal method of evoking this 'ownership'. However, to satisfy the requirements of the registration test the claim group claims the native title rights and interests set out in Attachments E.

Description of Native Title Rights and Interests (Attachment E).

Subject to (2) - (6) below, the full and free enjoyment of the following Native Title rights and interests area are claimed in relation to the land and waters the subject of the application:
(i) a right to possess, occupy, use and enjoy the claim area;
(ii) a right to make decisions about the use and enjoyment of the claim area;
(iii) a right of access to the claimed area;
(iv) a right to control the access of others to the claimed area;
(v) a right to control the use and enjoyment of others or resources of the claimed area;
(vi) a right to trade in resources of the claimed area;
(vii) the right to receive a portion of any resources taken by others from the claimed area;
(viii) the right to maintain, protect and prevent the misuse of cultural knowledge of the common law holders associated with the claim area.

With respect of those parts of the area the subject of the application which are, or have been, the subject of a previous non-exclusive possession act within the meaning of s.23F of the Native Title Act 1993, the native title rights and interests are claimed subject to the rights and interest created in the non-exclusive possession act which are not inconsistent with the rights and interests claimed and, in the casse of rights granted which are inconsistent with the rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interest cause.

With respect to those parts of the area the subject of the application which are, or have been, the subject of:

(i) a category B intermediate period act within the meaning of s.232C of the Native Title Act 1993;
(ii) a category C intermediate period act within the meaning of s.232D of the Native Title Act 1993;
(iii) a category D intermediate period act within the meaning of s.232E of the Native Title Act 1993;

The native title rights and interests claimed are subject to the rights and interests created in the non-exclusive possession act which are not inconsistent with the rights and interests claimed and, in the case of any rights granted which are inconsistent with the rights and interests which those rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interests cause.

With respect to those parts of the area of the application which are, or have been the subject of:

(i) a Category B Past Act within the meaning of s.230 of the Native Title Act 1993;
(ii) a Category C Past Act within the meaning of s.231 of the Native Title Act 1993;
(iii) a Category D Past Act within the meaning of s.232 of the Native Title Act 1993;

The native title rights and interests claimed are those subject to the rights and interests created in the Non-Exclusive Possession Act which are not inconsistent with the rights and interests claimed and, in the case of any rights granted which are inconsistent with the rights and interests claimed, subject to any extinguishment or suspension of the native title rights and interests which those inconsistent rights and interests cause.

5. The native title rights and interests identified above do not extended to ownership of any minerals, petroleum or gas which are wholly owned by the Crown.

7. The native title rights and interests identified above do not include a claim for exclusive occupation and use of offshore areas as defined by s.253 of the Native Title Act 1993.

8. Current activities in exercise of these rights and interests are set out in Schedule G below.

Register attachments:

1. Map of claim area, Attachment A of the Application, 1 page - A4, Attached 22/09/1999.

Note: The Register may, in accordance with s.188 of the Native Title Act 1993, contain confidential information that will not appear on the Extract.

NATIVE TITLE APPLICATION

as at 11/04/1999

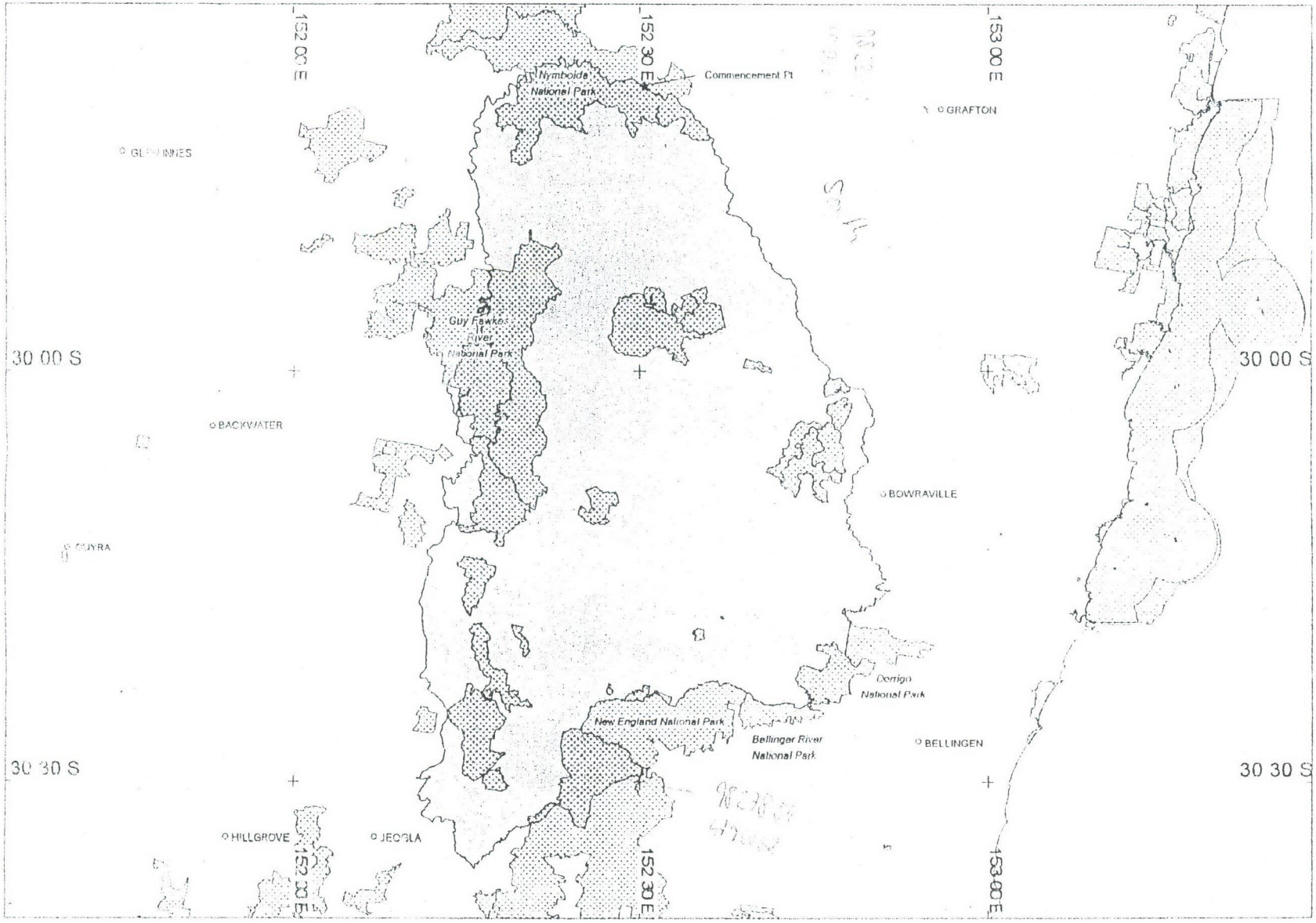
Map created from data sourced from Land Information Centre, DiTM
by Geospatial Analysis & Mapping Branch, National Native Title Tribunal

0 30
KILOMETRES

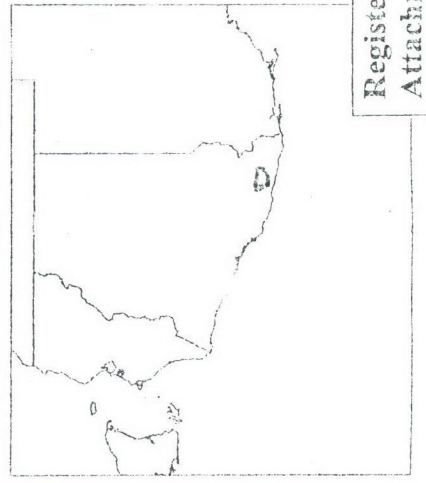
Latitude and Longitude based on Australian Geodetic Datum 1984

NORTH

NC97/034
Gumbangirri people
Area of Application
(geographic extent)
4465.7 sqkm



Location of NC97/098
Within New South Wales



Register of Native Title Claims – NC97/34 Gumbayynggirr People
Attachment "A" is a map of claim area's.
Attached 22/09/1999

National Native Title Tribunal

Searching the NNTT Registers for New South Wales

Search service

The National Native Title Tribunal will search its public registers for you. A search may assist you in finding out whether any native title applications, determinations or agreements exist over a particular area of land or water.

In New South Wales native title cannot exist on privately owned land including family homes or farms.

What information can a search provide?
Because the Tribunal cannot search individual parcels of land in New South Wales we search by local government area.

A search can confirm whether any applications, agreements or determinations are registered in a local government area. Relevant information, including register extracts and application summaries, will be provided.

Most native title applications do not identify each parcel of land claimed. They have an external boundary and then identify the areas *not* claimed within the boundary by reference to types of land tenure eg: freehold, agricultural leasehold, public works.

What if the search shows no current applications?
If there is no application covering the local government area this only indicates that at the time of the search either the Federal Court had not received any claims in relation to the local government area or the Tribunal has not yet been notified of any new native title applications.

It does not mean that native title does not exist in the area.

Native title may exist over an area of land or waters whether or not a claim for native title has been made.

What we search

National Native Title Register
The National Native Title Register contains determinations of native title by the High Court, Federal Court and other courts.

Register of Native Title Claims
The Register of Native Title Claims contains applications for native title that have passed a registration test.

Registered claims attract rights, including the right to negotiate about some types of proposed developments.

Register of Indigenous Land Use Agreements
The Register of Indigenous Land Use Agreements contains agreements made with people who hold or assert native title in an area.

The register identifies development activities that have been agreed by the parties.

Application summaries
An application summary contains a description of the location, content and status of a claimant application.

This information *may* be different to the information on the Register of Native Title Claims, eg; because an amendment has not yet been tested.

How do you request a search?
A search request form is available on the Tribunal's website at: www.nntt.gov.au. This form says how much searches cost.

Mail, fax or email your request to the Tribunal, identifying the local government area/s you want searched.

Email: sydney_search@nntt.gov.au
Fax: (02) 9233 5613
Address: GPO Box 9973, Sydney NSW 2001
Phone: (02) 9235 8300

NSW DEPARTMENT OF PRIMARY INDUSTRIES | AGRICULTURE

Noxious weed declarations in NSW

Clarence Valley

The following weeds are declared noxious in the Clarence Valley control area. The 'details' link on each listing provides further information on the legal requirements of the weed's listing and any variation in status within the local control area. A complete list of all weeds in all control areas is also available as a PDF document.

Common name	Scientific name	Category	
Alligator weed	*Alternanthera philoxeroides*	W1	details
Bathurst Noogoora Californian Cockle burrs	*Xanthium spp.*	W2	details
Bitou bush Boneseed	*Chrysanthemoides monilifera*	W3	details
Black knapweed	*Centaurea nigra*	W1	details
Black willow	*Salix nigra*	W2	details
Blackberry	*Rubus fruticosus (agg. spp.)*	W2	details
Broadleaf pepper	*Schinus terebinthifolia*	W2	details
Broomrape	*Orobanche spp.*	W1	details
Cabomba	*Cabomba spp.*	W4g	details
Camphor laurel	*Cinnamomum camphora*	W4d	details
Chinese celtis	*Celtis sinensis*	W2	details
Columbus grass	*Sorghum x almum*	W2	details
Crofton weed	*Ageratina adenophora*	W2	details
Giant Parramatta grass	*Sporobolus fertilis syn. Sporobolus indicus var. major*	W3	details
Giant rat's tail grass	*Sporobolus pyramidalis*	W2	details
Green cestrum	*Cestrum parqui*	W2	details

Groundsel bush	*Baccharis halimifolia*	W2	details
Harrisia cactus	*Harrisia spp.*	W4f	details
Hawkweed	*Hieracium spp.*	W1	details
Horsetail	*Equisetum spp.*	W1	details
Johnson grass	*Sorghum halepense*	W2	details
Karroo thorn	*Acacia karroo*	W1	details
Kochia	*Kochia scoparia*	W1	details
Lagarosiphon	*Lagarosiphon major*	W1	details
Lantana (Red flowered)	*Lantana camara*	W2	details
Mexican feather grass	*Nassella tenuissima syn Stipa tenuissima*	W1	details
Miconia	*Miconia spp.*	W1	details
Mistflower	*Ageratina riparia*	W2	details
Mother-of-millions	*Bryophyllum tubiflorum*	W2	details
Mother-of-millions	*Bryophyllum pinnatum*	W2	details
Mother-of-millions	*Bryophyllum daigremontianum X tubliflorum*	W2	details
Mother-of-millions	*Bryophyllum delagoense*	W2	details
Mysore thorn	*Caesalpinia decapetala*	W2	details
Nodding thistle	*Carduus nutans*	W2	details
Pampas grass	*Cortaderia spp.*	W2	details
Parthenium weed	*Parthenium hysterophorus*	W1	details
Prickly pears	*Opuntia spp.*	W4f	details
Privet - broadleaf	*Ligustrum lucidum*	W2	details
Privet - narrowleaf	*Ligustrum sinense*	W2	details
Rhus tree	*Toxicodendron succedaneum*	W2	details
Salvinia	*Salvinia molesta*	W2	details
Senegal tea plant	*Gymnocoronis spilanthoides*	W1	details
Siam weed	*Chromolaena odorata*	W1	details
Spiny burrgrass	*Cenchrus longispinus*	W2	details
Spiny burrgrass	*Cenchrus incertus*	W2	details
Spotted knapweed	*Centaurea maculosa*	W1	details

St John's wort	*Hypericum perforatum*	W2	details
Water hyacinth	*Eichhornia crassipes*	W2	details
Water lettuce	*Pistia stratiotes*	W1	details
Willows	*Salix spp.*	W4g	details

Return to start page

The information contained in this web page is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of NSW Department of Primary Industries or the user's independent adviser.
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Management overview
Site auditor scheme
Guidelines under the CLM Act
Record of EPA notices
Engaging a consultant
Frequently asked questions
More information about land

Search results

Your search for: LGA: Clarence Valley Council

Search again | Refine search

did not find any records in our database.

If a site does not appear on the record it may still be affected by contamination. For example:

- Contamination may be present but the site has not been regulated by the EPA under the Contaminated Land Management Act 1997 or the Environmentally Hazardous Chemicals Act 1985.
- The EPA may be regulating contamination at the site through a licence or notice under the Protection of the Environment Operations Act 1997 (POEO Act).
- Contamination at the site may be being managed under the planning process.

Search TIP

To search for a specific site, search by LGA (local government area) and carefully review all sites listed.

... more search tips

More information about particular sites may be available from:

- The POEO public register
- The appropriate planning authority: for example, on a planning certificate issued by the local council under section 149 of the Environmental Planning and Assessment Act.

See What's in the record and What's not in the record.

Print-friendly version

10 August 2005








Send feedback
Service charter

30 April 2004

Mr Ken Boyle
General Manager
Clarence Valley Council
PO Box 171
Maclean NSW 2463

Dear Sir:

Re: Slope Stabilisation Works at Mulligans Bluff and Cangai Bluff, Gwydir Highway (SH12).

Invitation to Comment

The NSW Roads and Traffic Authority propose to implement slope stabilisation measures at Mulligans Bluff and Cangai Bluff on the Gwydir Highway, west of Jackadgery (refer to attached location map).

Mulligans and Cangai Bluff have a history of extensive rock falls generally coinciding with heavy rainfall events, which have resulted in closure of the Gwydir Highway on numerous occasions. The purpose of the proposed slope stabilisation measures is to reduce the Assessed Risk Level (ARL) of the sites to three or below in order to reduce the risk to road users.

A preliminary assessment of **Mulligans Bluff** showed that stabilising the batter face was not feasible and it was therefore proposed to erect a rock fall fence at the toe of the Bluff to contain ARL 1 and 2 rock fall events. Due to the height and slope of the existing Bluff, a 4m high fence in a distance of 3m from the toe would be required. In order to provide sufficient space for this fence, the formation requires widening. It is proposed to shift the road centreline towards the Mann River by placing additional fill and widening the formation to a width of 11m to allow for two 3.5m wide traffic lanes and 2m shoulders on both roadsides. For this option approximately 40.000m^3 of fill would be placed along the riverside at two locations of Mulligans Bluff (fill would be generated from batter flattening at Cangai Bluff). The toe of the fill would be approximately 20 to 30m from the low river mark. The design will keep clear of the riparian vegetation along the riverbanks. Rock fill will be placed along the toe of the fill to prevent scouring during high river flows.

At **Cangai Bluff** widening on the riverside is not feasible due to the high fill height and the difficulty to obtain access. It is therefore proposed to shift the centre line 1.5m towards the batter in order to achieve the desirable formation width and cut into the existing batter. At the same time, in order to stabilise the batter face, it would be flattened to a safe angle of slope of 35°. For an 11m formation approximately 40.000m^3 of cut would be excavated, which would be used as fill at Mulligans Bluff.

Road works at Mulligans and Cangai Bluff would extent for an approximate length of 600m at each site. The works would be undertaken under traffic; however, temporary restriction of traffic to one lane using traffic signals or flagmen would be required.

Roads and Traffic Authority
ABN 64 480 155 255
PO Box 3035
Parramatta NSW 2124
stephanie_fennessy@rta.nsw.gov.au
T 02 8837 0589
F 02 8837 0053
www.rta.nsw.gov.au

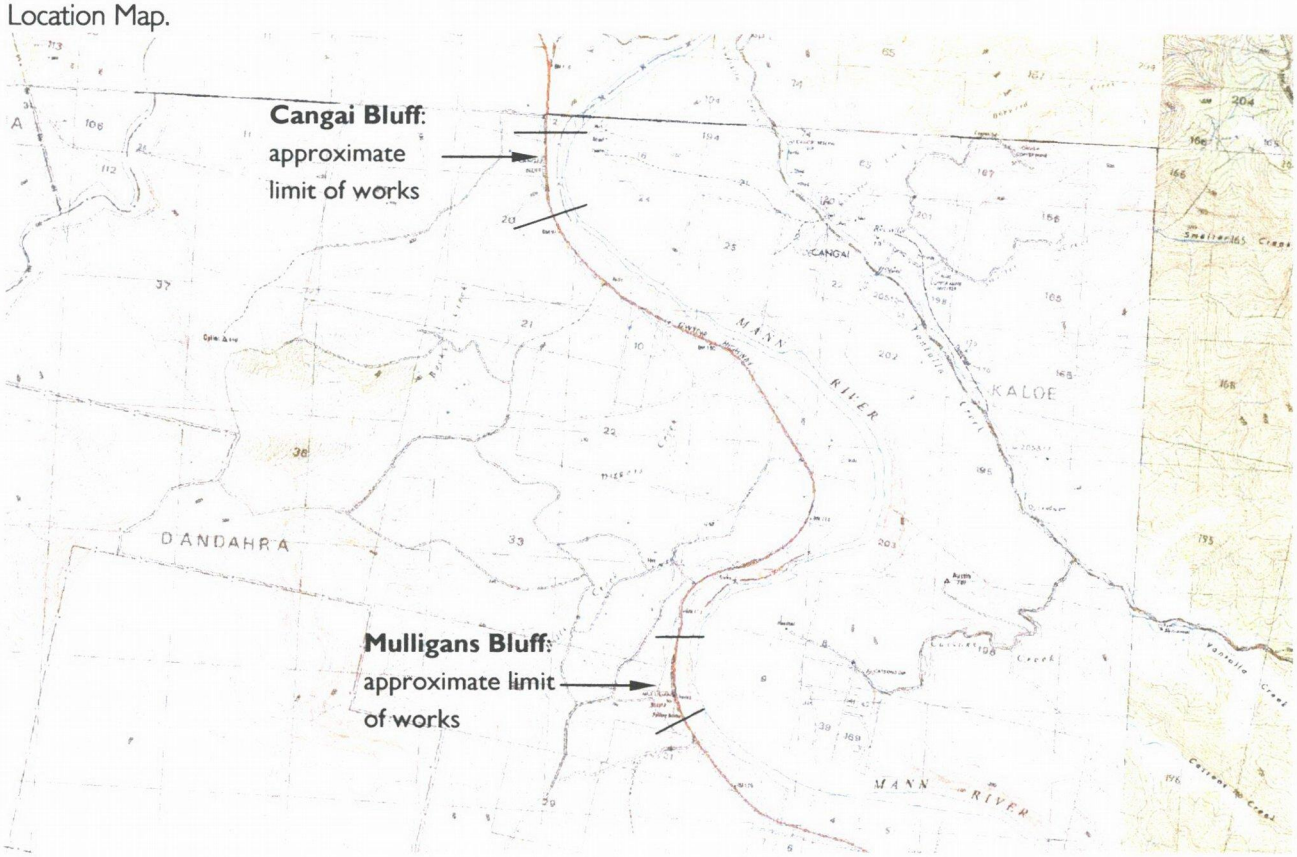
RTA Environmental Technology Branch has been engaged to prepare a Review of Environmental Factors (REF) for this Proposal. As part of the REF consultation process, Copmanhurst Shire Council is invited to comment on the proposed works and to advise of any interests, concerns or requirements it has, statutory or otherwise. Comments received would be considered in the preparation of this REF. As the Proposal would include rather extensive vegetation removal at both sites, a Flora and Fauna Assessment will be undertaken as part of the REF.

To enable consideration of your comments in the REF, a written response would be appreciated by 21 May 2004. A facsimiled response on (02) 8837 0053, as soon as possible, would assist in the early consideration of your response. If you require any further information, please do not hesitate to contact me on (02) 8837 0589.

Yours sincerely,

Stephanie Fennessy
Environmental Officer

Location Map.



Clarence Valley Council

Facsimile cover sheet

Administrator: Mr Neil Payne
Acting General Manager: Mr Ken Boyle

South Grafton Office
PO Box 51, SOUTH GRAFTON NSW 2460
Telephone: (02) 6641 7200
Fax: (02) 6641 7271

To	Roads & Traffic Authority			
Attention	Stephanie Fennessy			
Subject	Slope Stabilisation Works at Mulligans Bluff and Cangai Bluff Gwydir Highway (SH 12).			
Fax no.	(02) 8837 0053			
Contact details	Phone	(02) 66417 218	Return fax (if different to above)	(02) 66417 271
Date	4 June 2004			
No. of pages	1	(including cover sheet)		

Thank you for your letter dated 5 May 2004 requesting comments on the proposed cut and fill works at Mulligans Bluff and Cangai Bluff consideration in the project REF.

Council's Design and Contract Engineer inspected the sites with Council's Overseer. There comments relating to the fill proposal at Mulligans Bluff are:

1) Access to the toe of the existing road batter is extremely difficult and will require the construction of a substantial access track along the batter over several hundred metres.

2) There is a considerable quantity of uncompacted loose fill lying on the existing batter below the road. Presumably this material has been deposited on the batter over a number of years from land slips.

Should you have any questions regarding this matter please contact Council's Contract and Design Engineer, Mr Greg Tory, on (02) 6641 7218.

Greg Tory
DESIGN AND CONTRACT ENGINEER

30 April 2004

Mr Steve Murray
Deputy Regional Director
Department of Infrastructure, Planning and Natural Resources (DIPNR)
PO Box 6
Grafton NSW 2460

Dear Sir:

Re: Slope Stabilisation Works at Mulligans Bluff and Cangai Bluff, Gwydir Highway (SH12).

Invitation to Comment

The NSW Roads and Traffic Authority propose to implement slope stabilisation measures at Mulligans Bluff and Cangai Bluff on the Gwydir Highway, west of Jackadgery (refer to attached location map).

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A preliminary assessment of **Mulligans Bluff** showed that stabilising the batter face was not feasible and it was therefore proposed to erect a rock fall fence at the toe of the Bluff to contain ARL 1 and 2 rock fall events. Due to the height and slope of the existing Bluff, a 4m high fence in a distance of 3m from the toe would be required. In order to provide sufficient space for this fence, the formation requires widening. It is proposed to shift the road centreline towards the Mann River by placing additional fill and widening the formation to a width of 11m to allow for two 3.5m wide traffic lanes and 2m shoulders on both roadsides. For this option approximately 40.000m^3 of fill would be placed along the riverside at two locations of Mulligans Bluff (fill would be generated from batter flattening at Cangai Bluff). The toe of the fill would be approximately 20 to 30m from the low river mark. The design will keep clear of the riparian vegetation along the riverbanks. Rock fill will be placed along the toe of the fill to prevent scouring during high river flows.

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Roads and Traffic Authority
ABN 64 480 155 255

PO Box 3035
Parramatta NSW 2124

stephanie_fennessy@rta.nsw.gov.au

T 02 8837 0589
F 02 8837 0053

www.rta.nsw.gov.au

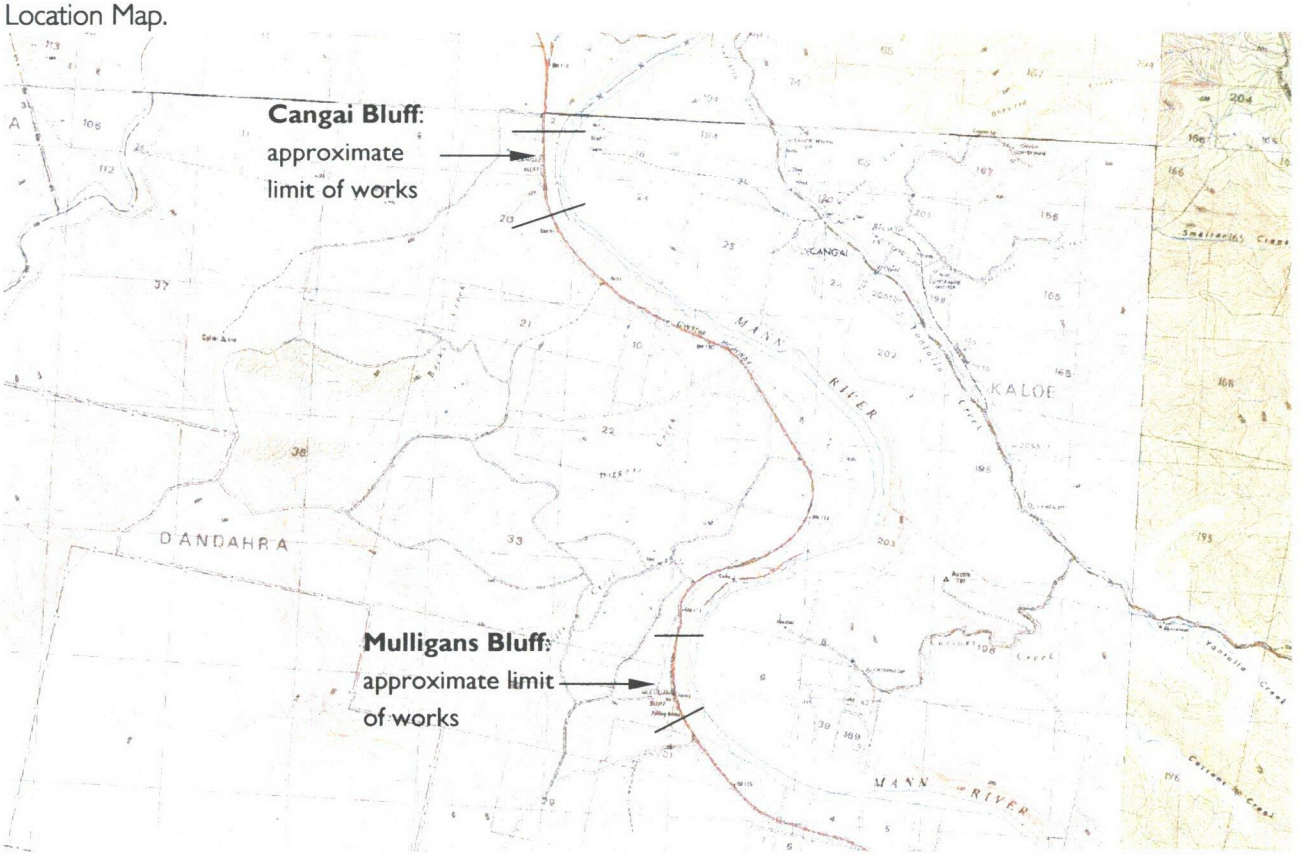
RTA Environmental Technology Branch has been engaged to prepare a Review of Environmental Factors (REF) for this Proposal. As part of the REF consultation process, DIPNR is invited to comment on the proposed works and to advise of any interests, concerns or requirements it has, statutory or otherwise. Comments received would be considered in the preparation of this REF. As the Proposal would include rather extensive vegetation removal at both sites, a Flora and Fauna Assessment will be undertaken as part of the REF.

To enable consideration of your comments in the REF, a written response would be appreciated by 21 May 2004. A facsimiled response on (02) 8837 0053, as soon as possible, would assist in the early consideration of your response. If you require any further information, please do not hesitate to contact me on (02) 8837 0589.

Yours sincerely,

Stephanie Fennessy
Environmental Officer

Location Map.



Department of
Infrastructure, Planning and Natural Resources

Contact: John Finlay
Phone: 02 6642 0621
Fax: 02 6642 0640
Email: john.finlay@dipnr.nsw.gov.au

Our ref: G04/00060
Your ref:
File: Document2

Ms Stephanie Fennessy
Environmental Officer
Roads and Traffic Authority
P O Box 3035
PARRAMATTA NSW 2124

2 June 2004

Dear Ms Fennessy

Subject: Slope Stabilisation works at Mulligans Bluff and Cangai Bluff, Gwydir Highway

Thank you for your letter of 30 April 2004 requesting advice regarding a review of environmental factors for the above two projects. I apologise for the delay in responding to your request.

The Department has considered the proposals and provides the following advice for your consideration.

- A detailed Erosion and Sediment Control Plan should be prepared to address all potential impacts.
- A licence under the Native Vegetation Conservation Act will be required for all clearing/ lopping works carried out within 20m of the river bank which is State Protected Land but outside the road reserve
- For all excavation works carried out outside the road reserve but within 40m of the high bank of the river a permit under the Rivers and Foreshores Improvement Act. Works involving either fill or excavation within the bed of the river will also require a permit. Where excavation works fall within the road reserve a permit is not required by RTA or their contractors.
- For further information contact:
    - Tony Broderick for RFI permits on (02) 66402075
    - Greg Lollback for vegetation matters on (02) 66402094
    - David Thompson for general information on (02) 66402125

Yours sincerely

John Finlay
Environmental Planner
(North Coast)

Appendix D

Ecological Assessment

Slope Stabilisation at Mulligans and Cangai Bluffs, Gwydir Highway.

ECOLOGICAL ASSESSMENT AND EIGHT PART TEST



PREPARED BY SANDPIPER ENVIRONMENTAL FOR THE ROADS AND TRAFFIC AUTHORITY

4 June 2004

Slope Stabilisation at Mulligans and Cangai Bluff, Gwydir Highway.

ECOLOGICAL ASSESSMENT AND EIGHT PART TEST

4 June 2004

Sandpiper Environmental
PO Box 401
ALSTONVILLE NSW 2477

Approved by:_____
Project Manager

This report has been prepared in accordance with the scope of services described in the contract or agreement between Sandpiper Environmental (ABN 47 327 438 027) and the Roads and Traffic Authority. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Roads and Traffic Authority. Furthermore, the report has been prepared solely for use by the Roads and Traffic Authority and Sandpiper Environmental accepts no responsibility for its use by other parties.

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 BACKGROUND 1
1.2 DESCRIPTION OF THE PROPOSED WORKS 1
1.3 STUDY AREA 2

2 ASSESSMENT METHODOLOGY 2

2.1 LITERATURE REVIEW AND DATABASE SEARCH 2
2.2 FLORA SURVEY 2
2.2.1 Random Meander Survey 2
2.2.2 Quadrat Sampling 2
2.3 HABITAT ASSESSMENT 4
2.3.1 SEPP 44 Koala Habitat Assessment 4
2.3.2 Habitat Assessment 4

3 ASSESSMENT RESULTS 5

3.1 VEGETATION COMMUNITIES IN THE STUDY AREA 5
3.1.1 Grey Box/Tallowwood Very Tall Open Forest 5
3.1.2 Tallowwood/White Mahogany Tall to Very Tall Open Forest 6
3.1.3 Narrow-leaved Red Gum/White Mahogany Vary Tall Open Forest 6
3.1.4 Weeping Lilly Pilly/Weeping Bottlebrush Low Closed Forest 7
3.1.5 Castor Oil Plant/Wild Tobacco Tree Very Tall Open Shrubland 7
3.2 THREATENED FLORA SPECIES 8
3.3 HABITAT RESOURCES IN THE STUDY AREA 8
3.3.1 Koala Habitat 8
3.3.2 Terrestrial Fauna Habitat Assessment 9
3.3.3 Aquatic Fauna Habitat Assessment 10
3.3.4 Fauna Habitat Summary 14
3.3.5 Important Opportunistic Fauna Records 15
3.4 THREATENED FAUNA RECORDS 15

4 IMPACT ASSESSMENT 18

4.1 HABITAT REMOVAL 18
4.2 EDGE EFFECTS 19
4.3 POLLUTION OF AQUATIC HABITAT 19
4.4 IMPACTS ON THREATENED AND MIGRATORY SPECIES 20
4.4.1 Threatened Species Listed on the TSC Act 20
4.4.2 Threatened and Migratory Species Listed on the EPBC Act 20

5 RECOMMENDATIONS 21

5.1 MITIGATION MEASURES 21

6 REFERENCES 22

LIST OF TABLES

Table 3.1: Vegetation communities recorded in the study area. 5

Table 3.2: Results of the koala habitat assessment. 8

Table 3.3a: General fauna habitat features recorded at five sites during the Cangai and Mulligans Bluff's slope stabilisation habitat assessment. 11

Table 3.3b: Fauna habitat features recorded at five sites during the Cangai and Mulligans Bluff's slope stabilisation habitat assessment. 11

Table 3.4: Results of hollow bearing tree searches undertaken to assess the impact. 14

Table 3.5: Aquatic habitats identified in the study area. 16

Table 3.6: Threatened species and endangered populations listed on the Atlas of NSW Wildlife that have been recorded previously from the locality. 17

Table 3.7: Predicted use of each habitat type by threatened fauna. 17

LIST OF FIGURES

1.1 The location of Mulligans and Cangai Bluff's in relation to the Mann River, conservation reserves and state forests. 3

3.1a Distribution of vegetation communities and habitat types within the subject site at Mulligans Bluff, Gwydir Highway. 12

3.1b Distribution of vegetation communities and habitat types within the subject site at Cangai Bluff, Gwydir Highway. 13

1 INTRODUCTION

1.1 BACKGROUND

Mulligans and Cangai Bluffs have a history of rock falls, which result in the frequent closure of the Gwydir Highway. Both Bluffs have an Assessed Risk Level (ARL) rating of two, which is the second highest and generally regarded as tolerable in the short to medium term. The RTA propose slope stabilisation measures to increase the ARL to three or above, thereby reducing the risk to road users and property.

The purpose of the assessment was to:

- assess the potential impacts of the proposed slope stabilisation works on flora and fauna habitat in accordance with the requirements of relevant NSW and Commonwealth legislation;
- as required, provide an assessment and recommendation in accordance with Part 5A of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act);
- determine if a Species Impact Statement under NSW legislation is required; and
- determine if there would be a significant impact on biodiversity related Matters of National Environmental Significance, as defined in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

1.2 DESCRIPTION OF THE PROPOSED WORKS

The proposal involves:

- Mulligans Bluff – straightening and moving the road centreline 4m from the existing batter; selective removal of a small number of trees and rocks from the batter slope; rounding the top of the batter and selective removal of trees from the batter edge along the northern end of the Bluff; place additional fill on the riverside of the road at two sites in order to widen the existing formation; stabilise an existing drainage channel; and erect a rock fall fence near the toe of the existing batter. The toe of the proposed fill would be approximately 20-30m from the low river mark and an excavator would need to traverse below the fill.
- Cangai Bluff – clear and round the top of the batter and construct a catch drain; cut into the existing batter (cut depth would vary from 0.5 to 2m at toe) and flatten to ensure a safe angle of slope of 35^0. The final batter would include a 4m wide bench. The material extracted from Cangai Bluff would be used as fill at Mulligans Bluff.

Work at both sites would extend for a distance of approximately 600m.

1.3 STUDY AREA

The study area includes two sections (subject sites) of the Gwydir Highway, adjacent to the Mann River near Cangai in northeastern NSW (Figure 1.1). The subject site at Mulligans Bluff extended from the Mann River up to the edge of the existing highway and then from the edge of the highway to 10m behind the top edge of the batter. The extent of the subject site above the batter was restricted to the area accessible to heavy machinery and extended for a distance of approximately 300m from the northern end of the bluff. The entire subject site extended for a distance of approximately 600m along the highway. The subject site at Cangai Bluff included the batter slope and an area 20m from the top of the batter. The site extended for the entire length of the cutting along the existing highway.

2 ASSESSMENT METHODOLOGY

The methods used to conduct the ecological assessment were based on the tasks outlined by the RTA in the ecological assessment brief, discussions with RTA staff on-site and best practice survey methods (refer to references cited in Methods). The fieldwork components of the assessment were undertaken on 25 May 2004 and the Atlas of NSW Wildlife database search was dated 19 May 2004. The following sections provide detailed descriptions of the data collection and sampling techniques used during the survey.

2.1 LITERATURE REVIEW AND DATABASE SEARCH

A search was undertaken of the Atlas of NSW Wildlife to obtain historical and recent flora and fauna species records for the locality. The Atlas search covered an area of 140km^2 surrounding the subject sites. Previous ecological surveys in the vicinity of the subject site were also reviewed. Specific information was obtained from the ecological assessments undertaken as part of the Clarence Valley/Coffs Harbour Regional Water Supply Project.

2.2 FLORA SURVEY

2.2.1 Random Meander Survey

A random meander flora survey was conducted at each site to assess the distribution and extent of vegetation communities present. The random meander survey technique used was based on the technique described by Cropper (1993).

2.2.2 Quadrat Sampling

Quadrat sampling was conducted at the Cangai Bluff site to document the floristic composition and structure of the vegetation community likely to be affected by the proposed works. Each sampling quadrat covered an area of 625m^2 (ie. dimensions 25x25m).

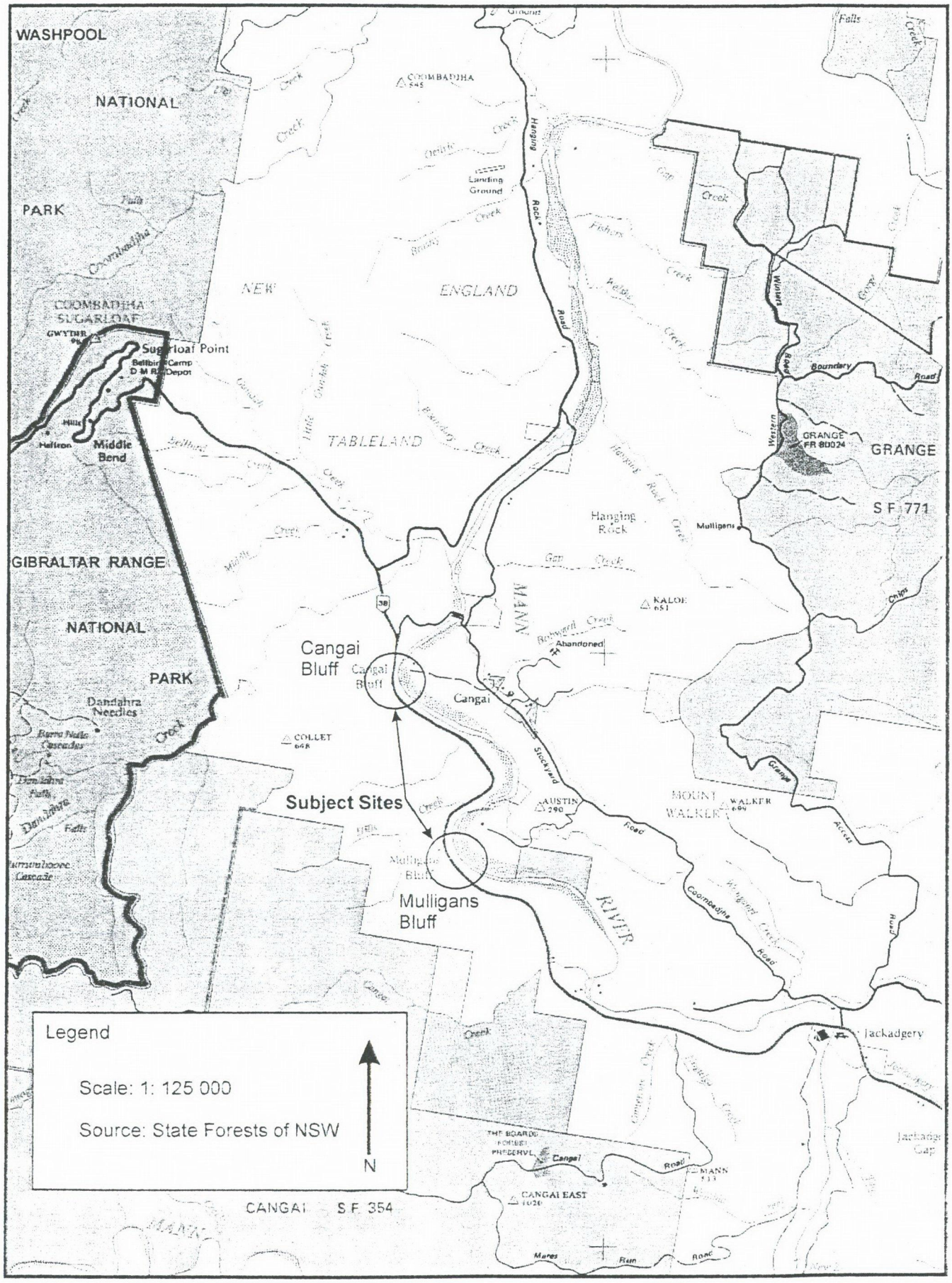


Figure 1.1: The location of Mulligans and Cangai Bluffs in relation to the Mann River, conservation reserves and State Forests.

The proposed works at the Mulligans Bluff site are expected to cause minimal disturbance to native vegetation communities. Hence flora sampling at that site was restricted to a random meander survey as described in *Section 2.2.1* and a general vegetation description.

The vegetation classification scheme used in this report is based on the method described by Walker & Hopkins (1990). The nomenclature used in the report is derived from Harden (1993-2002), Robinson (1994) and Auld and Medd (1992).

2.3 HABITAT ASSESSMENT

The fauna habitat assessment included two components, a general assessment of fauna habitat, and an assessment of koala habitat to comply with *State Environmental Planning Policy No. 44* (SEPP 44).

2.3.1 SEPP 44 Koala Habitat Assessment

For the purpose of the SEPP 44 assessment each site (i.e. Cangai & Mulligans) was treated separately. The initial phase of the SEPP 44 assessment involved the determination of whether each site represented potential koala habitat (i.e. >15% of the trees on site are listed on Schedule 2 of SEPP 44). The occurrence of potential habitat was determined by dividing the total number of trees with a Diameter at Breast Height (DBH) greater than 10cm by the number of feed trees and multiplying this number by 100 to obtain a percentage. Trees were counted within a 625m^2 plot (dimensions 25X25m).

No further assessment was undertaken at locations that did not have potential koala habitat. The method described by Phillips (undated) was applied at all sites with potential habitat. This method involves selecting a tree of any species that is known to be used by koalas or a tree that is considered potentially important to koalas for use as a focal tree. A further 29 trees of any species were then sampled around the focal tree. Scat searches were undertaken within a 1m radius from the base of each tree and each tree had a minimum diameter at breast height of 10cm.

A koala activity level can be calculated by dividing the number of trees with scats by the total number of trees searched. The activity levels provided by Phillips (undated) were used to interpret the results.

2.3.2 Habitat Assessment

A quantitative assessment of fauna habitat was conducted at each site using a standard habitat assessment proforma. Information was gathered on land use, disturbance, vegetation structure and floristics, density of hollows and the occurrence of important fauna habitat resources. Information on vegetation structure and floristics is discussed in section 3.1. Two, 625m^2 quadrats (dimensions 25X25m) were sampled at Cangai Bluff, whilst the assessment at Mulligans Bluff was based on a traverse of the different habitat types present. A separate proforma was completed for each habitat type. An assessment of aquatic habitat was undertaken at Mulligans Bluff. This assessment involved a general description of the attributes of aquatic habitats present at that site.

3 ASSESSMENT RESULTS

Chapter three provides a detailed description of the vegetation communities and habitat resources identified in the study area during the survey. It also discusses the known and likely occurrence of threatened flora and fauna species currently listed on the TSC Act and EPBC Act.

3.1 VEGETATION COMMUNITIES IN THE STUDY AREA

Four native vegetation communities and one modified vegetation community were recorded in the study area (Table 3.1). The distribution and extent of each vegetation community is illustrated in Figure 3.1.

Table 3.1: Vegetation communities recorded in the study area.

Location	Vegetation Community
Cangai Bluff	Grey Box (*Eucalyptus moluccana*)/Tallowwood (*E. microcorys*) Very Tall Open Forest
	Tallowwood/White Mahogany (*E. acmenoides*) Tall Open Forest
Mulligans Bluff	Tallowwood/White Mahogany Very Tall Open Forest
	Narrow-leaved Red Gum (*E. seeana*)/White Mahogany Very Tall Open Forest
	Weeping Lilly Pilly (*Waterhousia floribunda*)/Weeping Bottlebrush (*Callistemon viminalis*) Low Closed Forest
	Castor Oil Plant (*Ricinus communis*)/Wild Tobacco Tree (*Solanum mauritianum*) Very Tall Open Shrubland

3.1.1 Grey Box/Tallowwood Very Tall Open Forest

The Grey Box/Tallowwood Very Tall Open Forest vegetation community occurred in drier more exposed sections of the existing road reserve at the northern end of the proposed works at Cangai Bluff.

The dominant tree species in the overstorey stratum were grey box (*Eucalyptus moluccana*) and tallowwood (*E. microcorys*). Other tree species present included grey ironbark (*E. siderophloia*), white mahogany (*E. acmenoides*), pink bloodwood (*Corymbia intermedia*) and narrow-leaved red gum (*E. seeana*). The overstorey extended to a height of 18 metres, with a vegetative cover of approximately 15 percent.

The midstorey stratum consisted of a mixture of grey box, tallowwood, narrow-leaved red gum and white mahogany. The midstorey was 10 to 12 metres high, with a vegetative cover of approximately 15 percent.

The understorey stratum consists mainly of eucalypt saplings and cherry ballart (*Exocarpus cuppressiformis*). The understorey stratum was 2.5 to five metres high, with a vegetative cover of 20 percent.

The groundcover stratum was dominated by threeawn grass (*Aristida* sp.) and kangaroo grass (*Themeda australis*). Other common groundcover species include many-flowered mat-rush (*Lomandra multiflora*), slender wire lily (*Laxmania gracilis*), wallaby grass (*Danthonia* sp.)

and two colour panic (*Panicum simile*). The groundcover stratum was less than one metre high, with a vegetative cover of approximately 25 percent.

3.1.2 Tallowwood/White Mahogany Tall to Very Tall Open Forest

The Tallowwood/White Mahogany Tall to Very Tall Open Forest vegetation community occurred on the sheltered mid and lower slopes of the existing road reserve at the southern end of the proposed works at Cangai Bluff and northern end at Mulligans Bluff.

The overstorey stratum was dominated by tallowwood and white mahogany. Other tree species present include grey ironbark, pink bloodwood and brush box (*Lophostemon confertus*). The overstorey stratum was 18 to 24 metres high, with a vegetative cover of 25 to 30 percent.

The midstorey stratum consisted of a mixture of brush box, tallowwood and forest oak (*Allocasuarina torulosa*). The midstorey was eight to 15 metres high, with a vegetative cover of 15 to 25 percent.

The understorey stratum consists mainly of juvenile eucalypt species and forest oak. Other common understorey species include southern salwood (*Acacia disparrima*), brushbox saplings and cherry ballart. The understorey stratum was 1.5 to four metres high, with a patchy vegetative cover ranging from five to 25 percent.

The groundcover stratum was dominated by threeawn grass, kangaroo grass, *Entolasia stricta* and red natal grass (*Rhynchelytrum repens*). Other common groundcover species included many-flowered mat-rush, slender wire lily (*Laxmania gracilis*), bunch spear grass (*Heteropogon contortus*), blady grass (*Imperata cylindrica*) and two colour panic. The groundcover stratum was less than one metre high, with a patchy vegetative cover ranging from 10 to 30 percent.

3.1.3 Narrow-leaved Red Gum/White Mahogany Vary Tall Open Forest

The Narrow-leaved Red Gum/White Mahogany Vary Tall Open Forest vegetation community occurred on the exposed upper slope of Mulligans Bluff at the southern end of the area accessible to machinery and extended down the batter.

The overstorey stratum was dominated by narrow-leaved red gum and white mahogany. Other tree species present included grey ironbark and pink bloodwood. The overstorey stratum was 22 metres high, with a vegetative cover of approximately 25 percent.

The dominant species in the midstorey stratum were narrow-leaved red gum and pink bloodwood. The midstorey was 10 to 15 metres high, with a vegetative cover of 10 percent.

The understorey stratum consisted mainly of juvenile eucalypt species and grass trees (*Xanthorrhoea* sp.). The understorey stratum was 1.5 to two metres high, with a sparse vegetative cover of five percent.

The groundcover stratum was dominated by threeawn grass and kangaroo grass. Other common groundcover species included two colour panic and barbed-wire grass

(*Cymbopogon refractus*). The groundcover stratum was less than one metre high, with a vegetative cover of 15 percent.

3.1.4 Weeping Lilly Pilly/Weeping Bottlebrush Low Closed Forest

The Weeping Lilly Pilly/Weeping Bottlebrush Low Closed Forest vegetation community formed the riparian vegetation along the western bank of the Mann River, which is situated adjacent to the proposed works at the Mulligans Bluff site.

The overstorey stratum was dominated by weeping lilly pilly (*Waterhousia floribunda*) and weeping bottlebrush (*Callistemon viminalis*). Other tree species present included river oak (*Casuarina cunninghamiana*) and black bean (*Castanospermum australe*). The overstorey stratum was six metres high, with a vegetative cover of approximately 70 percent.

The understorey stratum consists primarily of lantana (*Lantana camara*), weeping lilly pilly and weeping bottlebrush. Other species present in this stratum included sandpaper fig (*Ficus coronata*), black bean, green bolly gum (*Neolitsea australiensis*) and senna (*Senna septemtrionalis*). The understorey stratum was 1.5 to three metres high, with a vegetative cover of five to 10 percent.

The groundcover stratum was dominated by water couch (*Paspalum distichum*). Other groundcover species present included billygoat weed (*Ageratum houstonianum*), glossy nightshade (*Solanum americanum*) and Johnson grass (*Sorghum halepense*). The groundcover stratum was less than one metre high, with a vegetative cover of 95 percent.

3.1.5 Castor Oil Plant/Wild Tobacco Tree Very Tall Open Shrubland

The Castor Oil Plant/Wild Tobacco Tree Very Tall Open Shrubland vegetation community occurred within the eastern road reserve at Mulligans Bluff. The area in which this vegetation community occurred had been previously cleared of native vegetation.

The overstorey stratum consisted of castor oil plant and wild tobacco tree. The overstorey stratum was 5.5 metres high, with a vegetative cover of approximately 25 percent.

The groundcover stratum was dominated by red natal grass, lantana and stinking roger (*Tagetes minuta*). Other common groundcover species present included purple top (*Verbena bonariensis*), paspalum (*Paspalum dilatatum*), billygoat weed and cobbler's pegs (*Bidens pilosa*). The groundcover stratum was one to two metres high, with a vegetative cover of 95 percent.

3.1.6 Introduced plants and noxious weeds

A total of 21 introduced plant species were recorded in the study area (refer to Table B1, Appendix B), with the majority occurring in previously cleared or riparian habitat. Two species, Johnson grass (Sorghum halepense) and lantana (Lantana camara) are listed as noxious by the Grafton Weed Control Authority. Both of these weed species were recorded in three of the vegetation communities on site, including:

- tallowwood/white mahogany tall open forest;
- weeping lilly pilly/weeping bottlebrush low closed forest; and
- castor oil plant/wild tobacco tree very tall open shrubland.

3.2 THREATENED FLORA SPECIES

A review of the NPWS Wildlife Atlas records indicated that no threatened flora species have been previously recorded within the locality of the study area. Furthermore, the study area is unlikely to represent suitable habitat for any flora species currently listed as threatened on the TSC Act.

The threatened plant species, soft grevillea (*Grevillea mollis*), has been recorded in the nearby Gibralter Range National Park. However, this conspicuous species was not detected on site, and the study area does not contain the typical overstorey species that accompany this species, such as New England blackbutt (*Eucalyptus campanulata*), thick-leaved mahogany (*E. carnea*) and Tindale's stringybark (*E. tindaliae*) (NPWS 2002).

3.3 HABITAT RESOURCES IN THE STUDY AREA

3.3.1 Koala Habitat

Potential koala habitat was recorded at Cangai Bluff and at the top of Mulligans Bluff. No potential koala habitat was recorded below the road at Mulligans Bluff. Koala scat searches were conducted at three locations, two at Cangai Bluff and one at Mulligans Bluff. A total of 90 trees were searched and no koala scats were identified (Table 3.2). Brushtail possum scats were recorded below five trees, with scats recorded in all three plots.

Table 3.2: Results of the koala habitat assessment.

Location	Tree Species	No. Trees Searched	No. Trees with Scats	Type of Scats
Cangai - S1	Narrow-leaved Red Gum	12	2	Brushtail Possum
	Grey Box	5	0	
	White Mahogany	5	1	Brushtail Possum
	Ironbark	1	0	
	Pink Bloodwood	2	0	
	Tallowwood	5	0	
Cangai - S2	Tallowwood	14	1	Brushtail Possum
	Brush Box	5	0	
	White Mahogany	6	0	
	Pink Bloodwood	2	0	
	Forest Oak	2	0	
	Ironbark	1	0	
Mulligans - S1	Tallowwood	18	1	Brushtail Possum
	White Mahogany	2	0	
	Narrow-leaved Redgum	8	0	
	Ironbark	1	0	
	Forest Oak	1	0	
Total		90	5	

3.3.2 Terrestrial Fauna Habitat Assessment

The quality of fauna habitat varied throughout each site and between sites (Table 3.3a, b). Three terrestrial fauna habitats were identified during the survey (Figure 3.1). Dry Open Forest (DOF) occurred on the batter slopes and tops of batters. Disturbed Land occurred below the road at Mulligans Bluff, whilst Riparian habitat was restricted to the edge of the Mann River (refer to Plates in Appendix A). Riparian habitat intergrades into Disturbed Land at Mulligans Bluff.

A moderate to severe level of disturbance was recorded in the DOF sites, with all sites being burnt in the past 2-3 years and all sites experiencing either severe (totally cleared) or moderate (partial clearing) logging in the past 20 to 30 years (Table 3.3a). Evidence of weed infestation or grazing was either nil or light in the DOF habitat. No evidence of logging or fire was recorded from the riparian habitat, however, this habitat experiences frequent disturbance from floods. A moderate level of weed infestation was recorded in the riparian habitat. The Disturbed Land has experienced severe impacts from fire and logging. A severe fire event appears to have killed most of the overstorey vegetation, whilst frequent clearing or dumping of rocks has further degraded the habitat. The level of disturbance has resulted in severe weed infestation (Table 3.3a).

Ground cover was sparse in the DOF ranging from 10 to 30%. Dense ground cover (i.e. 90%) was recorded in the Disturbed Land whilst about 40% cover was recorded in the riparian habitat. Tussocks were the dominant ground cover in all habitats and litter depth was shallow in the riparian and DOF habitats (Table 3.3a).

Important fauna features were sparsely distributed within all habitat types (Table 3.3b). Acacias were uncommon (i.e. <5% of trees and shrubs) but present at all sites. *Allocasuarina torulosa* was present at each of the DOF sites but more common at the southern end of Cangai Bluff and at the northern end of Mulligans Bluff. Acacias provide a potential food resource for arboreal and scansorial mammals, whilst Allocasuarina's provide an essential food resource for glossy black cockatoos and food for other parrots and ground mammals. Allocasuarina fruit was uncommon, with mostly young trees recorded.

Permanent water, in the form of the Mann River or farm dams was situated in close proximity (i.e. within 100m) to all habitats. Temporary water was expected to occur on-site in all habitat types. Fallen logs were present at all sites, although only small numbers of hollow logs were recorded (Table 3.3b). No nest or roost trees were identified during the survey. Rock fissures were recorded on both bluffs.

Tree hollows were common in the DOF at both Cangai and Mulligans Bluffs. No hollows were recorded in the Disturbed Land and only a small number of hollows were identified during the traverse of the riparian habitat. Hollows ranged in size from small to large, although small branch hollows were most abundant (Table 3.4). No large trunk hollows were recorded, and only one large branch hollow was recorded at Mulligans Bluff. A total of 47 hollows were recorded in the DOF habitat.

Fifteen Hollow Bearing Trees (HBT) were recorded at Cangai Bluff, of which nine were stags (i.e. dead trees). Four of the 15 HBT at Cangai were located on the opposite side of the fenceline and are marked as off-site in Table 3.4. Six HBT were recorded at Mulligans Bluff, of which one was a stag (Table 3.4).

3.3.3 Aquatic Fauna Habitat Assessment

Two aquatic habitats were recorded in the study area, riverine and sheltered water (Table 3.5). Riverine habitat was characterised by a pool/riffle sequence and moderate water flow. Riffles were shallow and pools ranged in depth from 0.5 to 2m. Water clarity was good, with the substratum visible in at least 1.5m deep water. A large (150m long by 40m wide) pool occurs adjacent to the subject site at Mulligans Bluff. No obvious snags were recorded in the riverine habitat and the substratum was dominated by rocks (20cm diameter) and boulders (40-70cm diameter), with bedrock protruding above the water in most pools. *Vallisneria* spp. was recorded in more sheltered and shallow sections of the riverine habitat.

Sheltered water habitat occurred in the overflow channel situated beside the main river channel. This habitat would become inundated and connected to the riverine habitat during flood events. Sheltered water had slow or no water flow, although pools and riffle zones were present. The maximum depth of pools was 0.5m and water clarity was poor. Several pools were characterised by dense aquatic vegetation, including both submerged and emergent aquatic plants. Snags were common in the sheltered water habitat and the substratum was dominated by coarse gravel and rocks. Exposed bedrock with sparse weeping bottlebrush separated the sheltered water habitat from the riverine habitat. Weeping bottle brush and Weeping Lilly Pilly occurred along the edge of the sheltered water habitat.

Table 3.3a: General fauna habitat features recorded at five sites during the Cangai and Mulligans Bluff's slope stabilisation habitat assessment.

Site	Habitat Type	Topographic Position		Disturbance History (severity; time ; accuracy)				Ground Cover (%)			Litter Depth	Age Structure	Shrub Growth Form	Ground Growth Form
		Morphology	Element	Fire	Logging	Grazing	Weeds	Rhizomatous	Tussocks	Total				
S1 Cangai (west bluff)	Dry Open Forest	Lower Slope	Hill Slope	mod;2yrs ± 6mnths	severe;20yrs ± 5yrs	nil	nil	0	20%	25	0-2cm	adv regen	mixed	herb/grass
S2 Cangai (east bluff)	Dry Open Forest	Lower Slope	Hill Slope	mod;2yrs ± 6mnths	severe;20yrs ± 5yrs	light	Light	0	10%	10	0-2cm	uneven age	mixed	herb/grass
S3 Mulligans (top bluff)	Dry Open Forest	Mid Slope	Hill Slope	mod;3yrs ± 1yr	mod;30yrs ± 5yrs	nil	nil	5	25	30	0-2cm	uneven age	mixed	herb/grass
S4 Mulligans (below road)	Disturbed Land	Lower Slope	Stream Channel	severe;3yrs ± 1yr	severe;30yrs ± 5yrs	nil	Severe	0	50	90	0-2cm	early regen	mixed	herb/grass
S5 Mulligans (riparian)	Riparian	Open Depression	Stream Channel	nil	nil	nil	Moderate	0	35%	40%	0-2cm	mature age	mixed	herb/grass/sedge

Table 3.3b: Fauna habitat features recorded at five sites during the Cangai and Mulligans Bluff's slope stabilisation habitat assessment.

Site	Fauna Features (% of trees & shrubs)							Permanent Water	Temporary Water	Caves/Rock Fissures	Nest or roost trees	No. Fallen Logs	No. Hollow Logs
	Mistletoe	Epiphytes	Fleshy Fruit	Flowers	Acacia	Banksia	Allocasuarina						
S1 Cangai (west bluff)	0	0	0	<5%	<5%	0	<5%	100m	on-site	on-site	nil	11	0
S2 Cangai (east bluff)	0	0	0	0	<5%	0	5-25%	100m	on-site	on-site	nil	2	0
S3 Mulligans (top bluff)	0	0	0	0	<5%	0	5-25%	100m	on-site	on-site	nil	numerous	occasional
S4 Mulligans (below road)	0	0	0	0	<5%	0	0	50m	on-site	50m	nil	sparse	nil
S5 Mulligans (riparian)	0	0	0	0	<5%	0	0	on-site	on-site	nil	nil	numerous	occasional

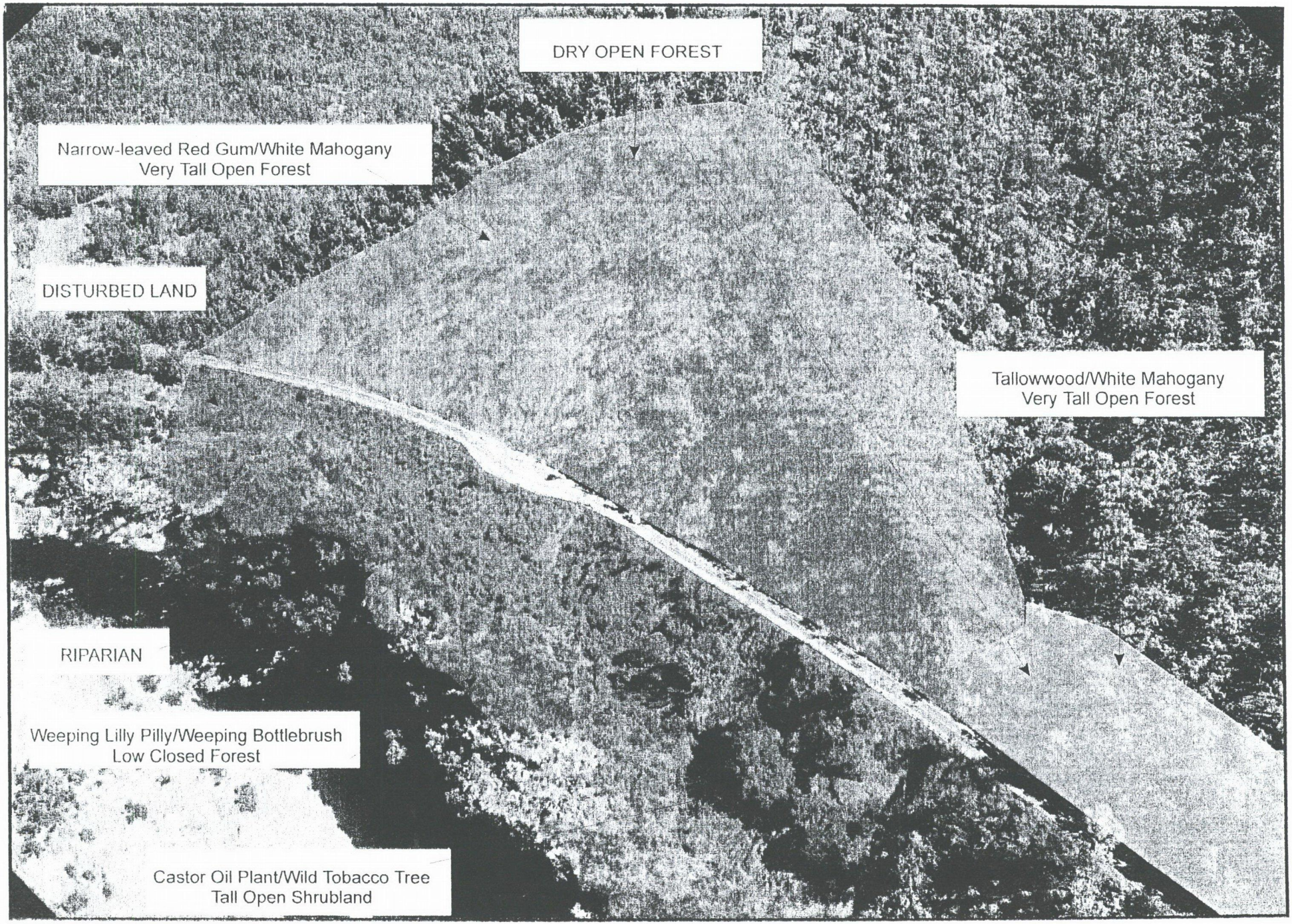


Figure 3.1a: Distribution of vegetation communities and habitat types within the subject site at Mulligans Bluff, Gwydir Highway.

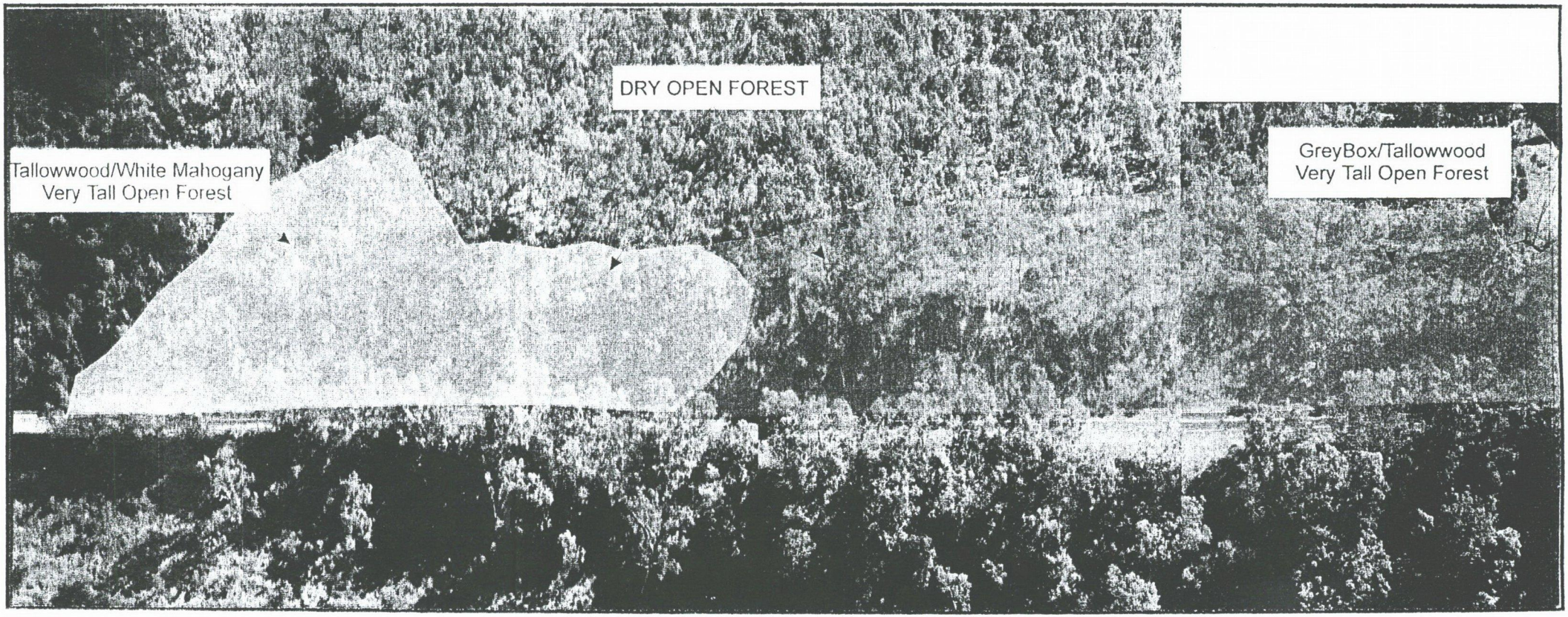


Figure 3.1b: Distribution of vegetation communities and habitat types at Cangai Bluff, Gwydir Highway.

Table 3.4: Results of hollow bearing tree searches undertaken to assess the impact of proposed slope stabilisation works at Cangai and Mulligans Bluffs, Gwydir Highway.

Site	Tree Species		Branch			Trunk		
		Notes	Small	Medium	Large	Small	Medium	Large
Cangai	Stag		3					
	White Mahogany						1	
	White Mahogany					1		
	White Mahogany					1		
	Stag						1	
	Stag		3					
	Stag		1					
	Stag					5		
	Stag						1	
	Grey Box	Off-site	1					
	Stag		3	3				
	Stag	Off-site		2				
	Tallowwood	Off-site	2					
	Stag	Off-site	4					
	White Mahogany		2	5				
Totals	**No HBT - 15**		**19**	**10**	**0**	**7**	**3**	**0**
Mulligans	Tallowwood		1					
	Stag						Spout	
	Narrow-leaved Red Gum		2					
	Narrow-leaved Red Gum		1				1	
	Narrow-leaved Red Gum		2		1			
Totals	**No. HBT - 5**		**6**	**0**	**1**	**0**	**1**	**0**

3.3.4 Fauna Habitat Summary

Several aquatic and terrestrial habitats were identified in the study area. These habitats contain resources for a variety of fauna. The study area includes good quality habitat for insectivorous bats, with numerous small hollows a varied vegetation structure and water all occurring in close proximity. Rock fissures also occur along the batter slopes at both Bluffs. These fissures could provide roosting sites for insectivorous bats, although the quality of habitat is reduced by the unstable nature of the rock face.

The DOF provides suitable foraging habitat for arboreal mammals and nocturnal birds. Hollows provide potential shelter habitat for arboreal mammals, and several species of diurnal bird, although they are too small for large forest owls. The DOF habitat is considered to be marginal for small ground mammals and reptiles, with sparse leaf litter, and only moderate ground cover. Likewise the study area includes only marginal habitat for macropods, such as the rufous bettong. There are a variety of niches for diurnal birds that prefer dry forests. Suitable foraging habitat for glossy black-cockatoos is limited.

Potential koala habitat (i.e. >15% of trees are potential feed trees) occurs above each cutting, although no evidence of koalas was recorded during the scat searches. In addition, the Atlas of NSW Wildlife contains no records of koalas for the study area. Based on the available information it is concluded that the study area does not represent "core" koala habitat as defined in SEPP 44. Tallowwood is the only preferred koala feed tree recorded in the study area. This species is dominant or sub-dominant in three of the four vegetation communities recorded above both cuttings (Table 3.1).

Several tallowwoods would be removed as a result of the proposed works. However, impacts on koalas are considered unlikely, as there is no evidence that they utilise this habitat. The highest densities of tallowwoods occurred within the southern half of Cangai Bluff and at the northern end of Mulligans Bluff.

The aquatic habitat would be used for foraging by insectivorous bats and provides suitable habitat for several species of waterbird. Riverine habitat is suitable for eastern cod (*Maccullochella ikei*) and silver perch (*Bidyanus bidyanus*).

3.3.5 Important Opportunistic Fauna Records

Very few important opportunistic records were made during the survey. This can be attributed to the duration and timing of the survey, the degraded nature of the study sites and the focus of the survey on assessing fauna habitat. Important records include call identification of glossy black cockatoos on the opposite side of the Mann River at Mulligans Bluff.

3.4 THREATENED FAUNA RECORDS

The Atlas of NSW Wildlife database search identified six species and one endangered population that have been recorded previously from the locality (Table 3.6). A further nine species may potentially utilise habitat in the study area based on the results of the field surveys and from the review of background information. Apart from the grey-headed flying fox and squirrel glider all of the additional species were recorded in the vicinity of the study area during surveys for the Clarence Valley/Coffs Harbour Regional Water Supply Project (Rohweder & Goldingay 1998; ERM 1999a, b). The grey-headed flying fox and squirrel glider have been included on the basis of habitat alone.

Of those species identified from the Atlas search the emu is the only species unlikely to utilise habitat in the study area (Table 1C, Appendix C). Emus prefer open plains and are unlikely to utilise hilly terrain or dense shrublands, such as occur in the study area. Fifteen species of threatened fauna may utilise habitats in the study area.

Use of the study area by threatened fauna is expected to vary substantially between the different habitats (Table 3.7). Dry Open Forest provides foraging habitat for several species, roosting habitat for glossy black cockatoo, squirrel glider, rufous bettong and several species of insectivorous bat and sub-optimal breeding habitat for squirrel gliders and brush-tailed phascogale. The geographic location of the DOF habitat, on the edge of a large tract of vegetation is likely to reduce its importance for several threatened species.

Disturbed Land provides sub-optimal foraging habitat for several species and suitable foraging habitat for masked owl. Insectivorous bats and white-crowned snakes could potentially use the riparian habitat, whilst bats would also forage over the sheltered water and riverine habitat. The riverine habitat provides foraging, refuge and breeding habitat for eastern cod and silver perch.

Table 3.5: Aquatic habitats identified in the study area.

Habitat Type	Water Depth	Aquatic Vegetation (P/A)	Dominant Vegetation	Flow Rate	Snags (P/A)	Substratum Type	Pool/Riffle Sequence	Pool Dimensions
River Channel	0.5-2m	Present	*Vallisneria* spp.	Moderate	Absent	Rock & Boulder	Present	150m * 40m
Sheltered Water	0.25-0.5m	Present	*Ludwigia peploides*, *Persicaria* sp., *Lepironia articulata*, *Schoenoplectus mucronatus*, *Cyperus exaltatus*, *Cyperus eragrostis*, *Cyperus polystachyos*, *Myriophyllum aquaticum*, *Vallisneria* spp	Slow	Present	Rock & Gravel	Present (during high flows only)	N/A

Table 3.6: Threatened species and endangered populations listed on the Atlas of NSW Wildlife that have been recorded previously from the locality. EP = endangered population, V = vulnerable, E = endangered, TSC Act = Threatened Species Conservation Act, EPBC Act = Environment Protection and Biodiversity Conservation Act.

Scientific Name	Common Name	Status	Source of Record
Dromaius novaehollandiae	Emu (Eastern Population)	EP - TSC Act	Atlas
Calyptorhynchus lathami	Glossy Black-cockatoo	V - TSC Act	Atlas
Ninox strenua	Powerful Owl	V - TSC Act	Atlas
Tyto novaehollandiae	Masked Owl	V - TSC Act	Atlas
Dasyurus maculatus	Spotted-tailed Quoll	V - TSC Act, E - EPBC Act	Atlas
Phascogale tapoatafa	Brush-tailed Phascogale	V - TSC Act	Atlas
Aepyprymnus rufescens	Rufous bettong	V - TSC Act	Atlas
Petaurus norfolcensis	Squirrel Glider	V - TSC Act	No previous records
Scoteanax reuppelli	Greater Broad-nosed Bat	V - TSC Act	ERM (1999b)
Myotis adversus	Large-footed Myotis	V - TSC Act	ERM (1999b)
Mormopterus norfolcensis	Eastern Freetail Bat	V - TSC Act	ERM (1999b)
Chalinalobis nigrogriseus	Hoary Bat	V - TSC Act	ERM (1999b)
Pteropus poliocephalus	Grey-headed Flying Fox	V - TSC Act & EPBC Act	No previous records
Cacophis harriettae	White-crowned Snake	V - TSC Act	Rohweder & Goldingay (1998)
Maccullochella ikei	Eastern Cod	E - TSC Act & EPBC Act	ERM (1999a)
Bidyanus bidyanus	Silver Perch	V - TSC Act	ERM (1999a)

Table 3.7: Predicted use of each habitat type by threatened fauna.

Threatened Species	Dry Open Forest	Disturbed Land	Riparian	Sheltered Waters	Riverine
Glossy Black-cockatoo	F*, R				
Powerful Owl	F*				
Masked Owl	F*	F			
Spotted-tailed Quoll	F*				
Brush-tailed Phascogale	F, R, B*				
Rufous Bettong	F				
Squirrel Glider	F, R, B*				
Greater Broad-nosed Bat	F, R	F*		F	F
Large-footed Myotis			R, B	F	F
Eastern Freetail Bat	F, R	F*	R, F	F	F
Hoary Bat	F, R				F
Grey-headed Flying Fox	F		F		
White-crowned Snake		F*, R	F, R		
Eastern Cod					F, R, B
Silver Perch					F, R, B

f – Foraging Resources
r – Roosting/Shelter Resources
b – Breeding Resources
*- Sub-optimal or Limited Resources
a – no resources

4 IMPACT ASSESSMENT

There are several forms of ecological impact likely to be associated with the proposed slope stabilisation works. The main forms of ecological impact include habitat removal, edge effects and pollution of aquatic habitat. The proposal would not increase the extent of existing habitat fragmentation and isolation as habitat removal would occur along an existing forest/habitat edge and would affect only a small area of habitat. Likewise the proposal is unlikely to increase the risk of road strike or the barrier effect. This conclusion is based on the limited increase in road width, the topography of each site (i.e. steep batter), and the change in habitat type from one side of the road to the other.

The steepness of the existing batter slope is likely to reduce movement by all but the most mobile species (eg. birds and bats). These species would not perceive the slight increase (2m) in road width as a barrier, nor would arboreal or ground fauna should they choose to scale the batter. The value of the subject sites as fauna crossing points is questionable given the change in habitat from DOF on the western side of the road to disturbed land and pasture on the eastern side of the road. Insectivorous bats are likely to move from roosts in DOF to foraging habitat along the Mann River. Potential crossing opportunities occur at the northern end of Cangai Bluff where a small area of DOF occurs on the eastern side of the road. The increase in gap created in this location would be limited as it occurs at the end of the proposed works. Finally, the proposal would not result in an increase in vehicle traffic or a substantial increase in vehicle speed, two factors that contribute to road strike.

4.1 HABITAT REMOVAL

Clearing of native vegetation from the study area would displace native fauna species that currently reside or utilise those habitat resources. The adjacent habitats are most likely inhabited by other individuals of the same species or different species, hence the displacement of individuals is likely to place additional pressure on local fauna populations as a result of the sudden reduction in available foraging, roosting and/or nesting resources. The resulting shortage of resources and/or reduction in territories could potentially lead to mortality of displaced individuals.

However, given the small extent of proposed habitat removal, the predicted variability in use of the different habitats, and the location of these habitats in the landscape the proposed works are unlikely to result in significantly reduced rates of breeding success or noticeable declines in local fauna populations. It is unlikely that any fauna rely solely on habitat within the sites or that this habitat constitutes an important part of an individuals home range.

Apart from the aquatic habitats that would not be subject to removal the DOF habitat provides resources for the highest number of threatened species. Whilst accurate estimates are unavailable it is predicted that the proposal would result in the removal of less than 2ha of previously disturbed DOF habitat. This represents a minor proportion of this habitat type in the locality. The value of this habitat is further reduced by its location at the edge of an extensive tract of vegetation. There is a low likelihood that important populations of threatened fauna occur along forest edges.

The proposal would remove several HBT, some of which may be used by fauna, including insectivorous bats that forage along the Mann River. Similar hollows occur in adjacent habitats and the proposal would not result in the total removal of the hollow resource. Detrimental impacts would occur if any of the subject hollows were occupied during tree removal operations. Insectivorous bats, brush-tailed phascogales and squirrel gliders could utilise hollows on the subject site.

4.2 EDGE EFFECTS

Edge effects are a diverse array of physical and biotic changes associated with the abrupt, artificial margins of forest fragments (Laurance 1997). The edge exposes remaining forest areas to increased wind velocities and light radiation, which have the potential to alter forest structure and existing microclimates (Andrews 1990; Laurance 1997). The effects of edges can lead to changes in species composition by creating habitats that favour flora and fauna species capable of invading and colonising disturbed habitats (Goosem & Marsh 1997; Laurance 1997; Andrews 1990).

The proposed works would create a new forest edge in DOF at both Mulligans and Cangai Bluffs and a new edge in Disturbed Land at Mulligans Bluff. The creation of a new edge in Disturbed Land would not result in any changes in edge effects. The additional edge effects associated with new edges in DOF are likely to cause further changes in vegetation and habitat characteristics that could alter the species composition and abundance of fauna and flora species in the vicinity of the disturbed areas. Such changes are likely to be minor given the open nature of the habitat and the previous history of disturbance in the study area.

4.3 POLLUTION OF AQUATIC HABITAT

The proposal poses some risk of polluting aquatic habitats within the Mann River. Any pollution of aquatic habitats is of concern, however, in this case the aquatic environment provides known habitat for two species of fish listed on the NSW *Fisheries Management Act 1994*. The risk of pollution is expected to be highest at Mulligans Bluff where fill would be deposited on the riverside of the road. Very minor earthworks are proposed on the riverside shoulder of the road at Cangai Bluff.

At Mulligans Bluff heavy machinery (i.e. one excavator) would be required at the base of fill and to repair an eroded culvert. In most instances the machine would be at least 30m from the riparian zone, however, to access the eroded culvert machinery would need to traverse the edge of riparian habitat.

Pollution of aquatic habitat could occur from erosion of fill at Mulligans Bluff, erosion of material disturbed during construction at both sites and from land disturbed by the traverse of machinery. The dense ground cover within the Disturbed Land is likely to act as a partial filter for sediment washed from the construction site at Mulligans Bluff, however, sediment could still reach the river from drainage lines and from the traverse of heavy machinery close to the riparian zone. The rocky and gravel substratum on the river-side at Mulligans Bluff would reduce the erosion risk as only small amounts of fine sediment are available for transport into the river. The risk of pollution can be further reduced by adhering to best practice erosion

control procedures. The risk of oil and fuel contamination from machinery can be minimised by ensuring that machinery is appropriately serviced prior to the commencement of works.

In the advent that sediment does reach aquatic habitats it is unlikely to have a serious detrimental impact. This conclusion is based on the predicted extent of sediment transfer, the size of the river and high flow rate and the existing background levels of pollution, which includes cattle and farm vehicles.

4.4 IMPACTS ON THREATENED AND MIGRATORY SPECIES

4.4.1 Threatened Species Listed on the TSC Act

The TSC Act made substantial amendments to the EP&A Act. One such amendment was the introduction of a set of eight factors that must be considered for informed decisions to be made regarding the effect of a proposed development or activity on threatened species, populations or ecological communities, or their habitats. These eight factors are commonly referred to as the 'eight part test' and are contained within Section 5A of the EP&A Act.

The impact of the proposal on threatened fauna and flora has been assessed in accordance with Section 5A (Appendix D). The eight part test concludes that the proposal would not have a significant affect on threatened species, endangered populations or endangered ecological communities and therefore a Species Impact Statement is not required. This conclusion has considered the small area of habitat affected, the degraded nature of this habitat, the ability to retain some hollow bearing trees, the ability to mitigate impacts on aquatic habitat, the absence of impacts such as barrier effects, road strike and habitat fragmentation.

4.4.2 Threatened and Migratory Species Listed on the EPBC Act

The 'Matters of National Environmental Significance' listed in the EPBC Act include:

- World Heritage Areas;
- wetlands protected by international treaty (The RAMSAR Convention);
- nationally listed threatened species and ecological communities;
- nationally listed migratory species;
- all nuclear actions; and
- the environment of Commonwealth marine areas.

The study area is not located within or near any World Heritage Areas or wetlands protected by international treaty. The proposal would not involve any nuclear actions, and would not impact on any Commonwealth marine areas.

Several migratory species are likely to use habitat resources on site on an intermittent basis. However, the study area is unlikely to represent an area of "*important habitat*", as defined in the EPBC Act, and is unlikely to represent significant habitat for an ecologically significant proportion of the population of any migratory species.

The study area provides potential foraging habitat for the grey-headed flying fox and spotted-tailed quoll, and known habitat for eastern cod. All of which are nationally listed threatened species. The potential impact of the proposed slope stabilisation works on these species is assessed in *Appendix E*.

The EPBC Act assessment provided in *Appendix E* concludes that the extent of habitat removal and disturbance required for the proposed works would be unlikely to have a significant impact on these species due to:

- the small extent of habitat disturbance and removal;
- the short-term nature of any impacts on aquatic habitat and the ability to mitigate impacts;
- the geographic location of the subject sites on the edge of an extensive tract of native vegetation; and
- the high mobility of the grey-headed flying fox and spotted-tailed quoll.

Therefore the proposed works are expected to have minimal impact on threatened species, and would not require referral to Department of Environment and Heritage.

5 RECOMMENDATIONS

5.1 MITIGATION MEASURES

1. Do not traverse the Mann River with heavy machinery
2. Do not disturb riparian habitat adjacent to the Mann River.
3. Ensure that standard best practice erosion control measures are implemented and adhered to throughout and following the construction phase of the project.
4. Stabilise disturbed land to avoid ongoing erosion and minimise the risk of sediment deposition in the Mann River. Stabilisation may require planting of locally endemic species.
5. Undertake work during the dry season.
6. Ensure that all machinery used on-site and in particular machinery used near the Mann River is appropriately serviced to minimise the leakage of lubricants and fuels.
7. Retain hollow bearing trees wherever possible, by a) moving machinery around trees when accessing construction areas, and b) retaining important trees that occur on the edge of potential clear zones.
8. Minimise the number of Forest Oaks removed by moving machinery around trees when accessing construction areas.

9. Implement appropriate measures to reduce the spread of weeds between and within sites. An extensive area of weed infestation occurs below the road at Mulligans Bluff. Careful planning would be required to minimise the spread of weeds from this area.

10. Retain the large White Mahogany and Tallowwood at the southern end of Cangai Bluff. The White Mahogany has been marked with pink flagging tape and the Tallowwood is situated immediately adjacent.

11. Minimise the extent of habitat removal above each bluff.

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APPENDIX A
PHOTOGRAPHS OF THE STUDY AREA

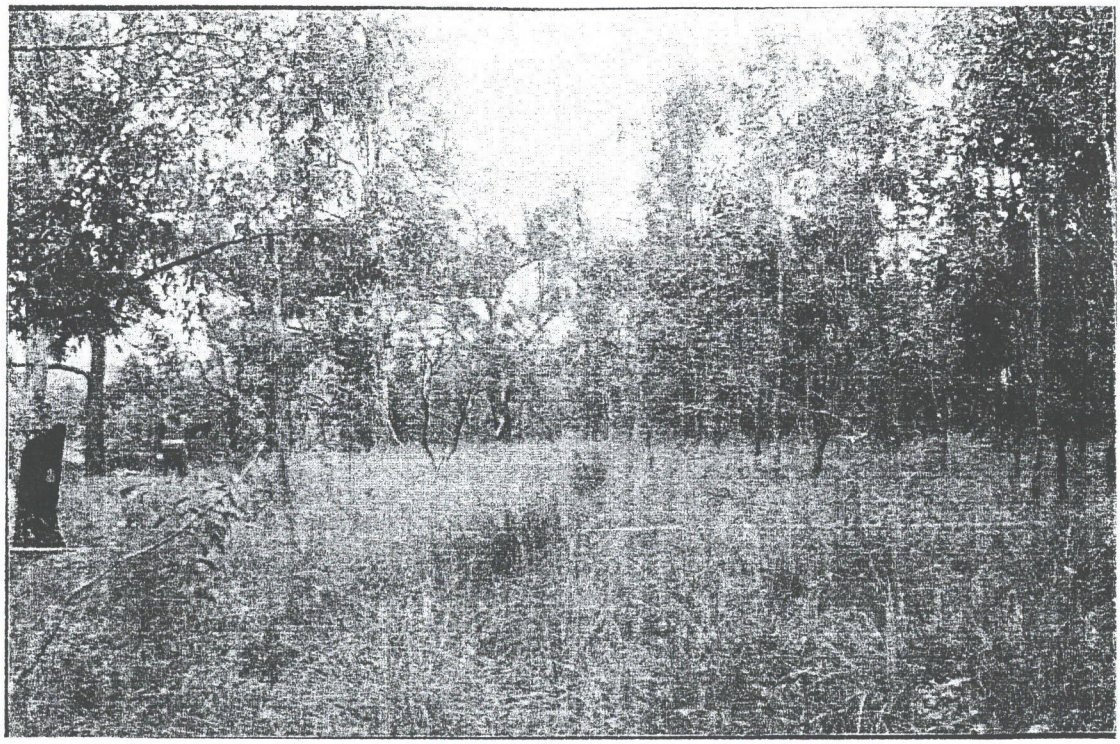


Plate 1: Tallowwood/White Mahogany Very Tall Open Forest at Cangai Buff.l

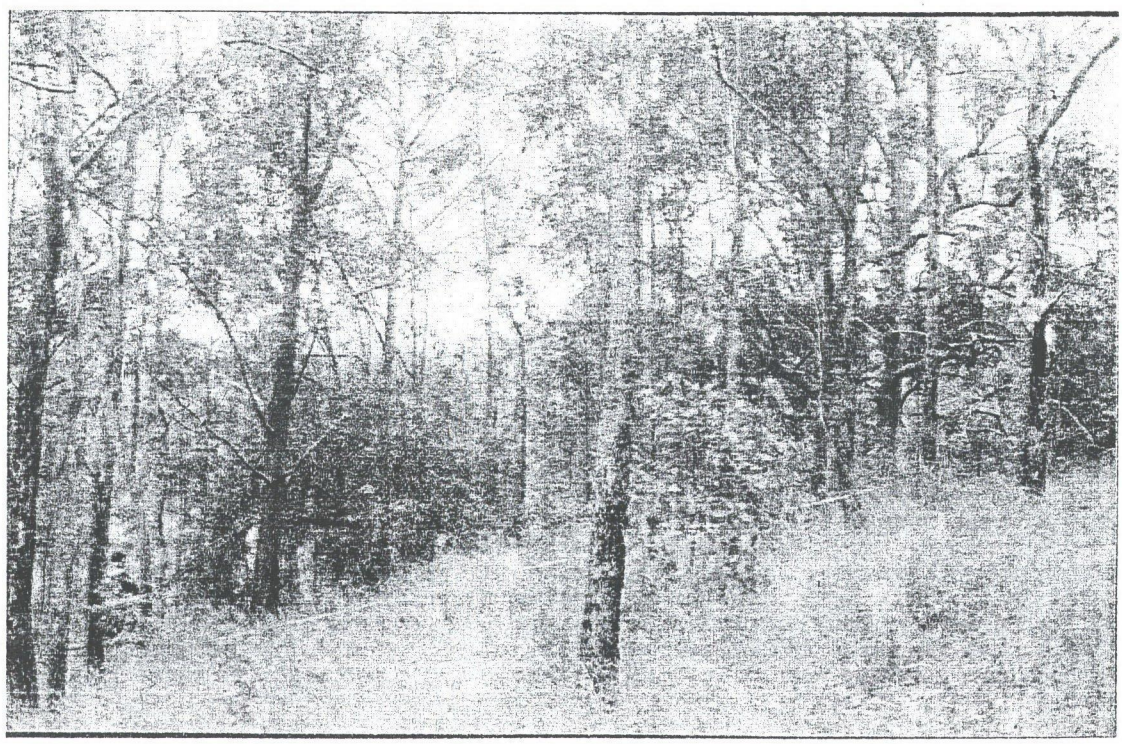


Plate 2: Grey Box/Tallowwood Very Tall Open Forest

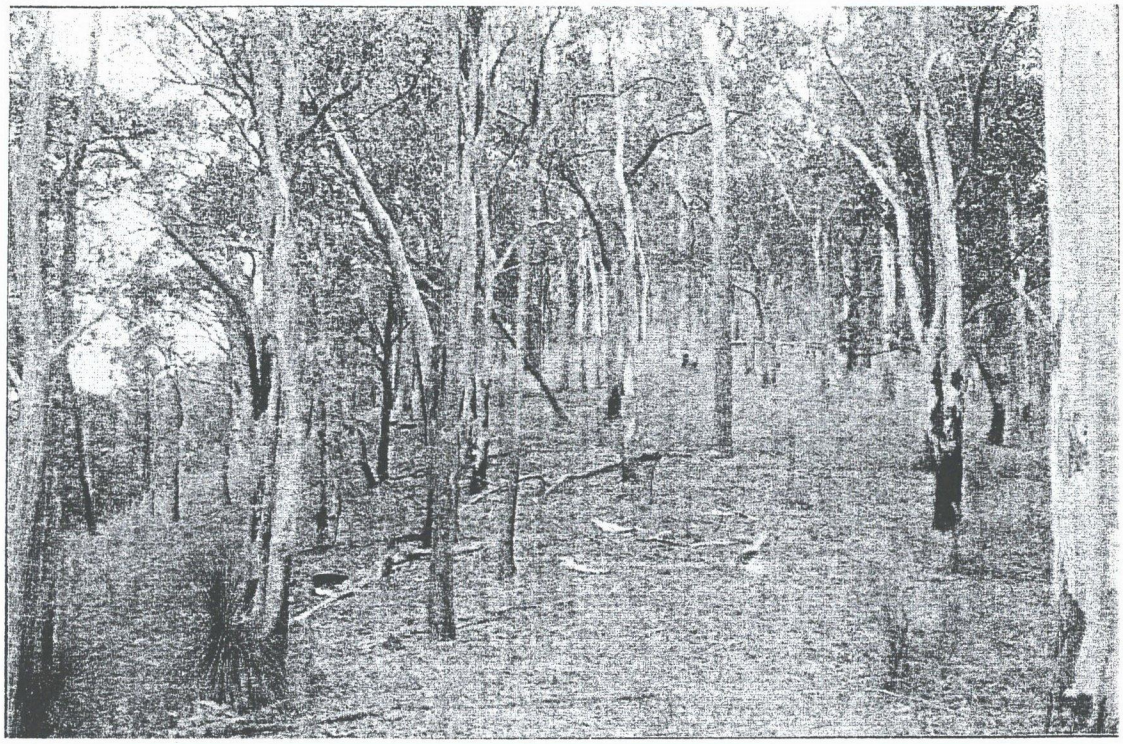


Plate 3: Narrow-leaved Redgum/White Mahogany Very Tall Open Forest at Mulligans Bluff.

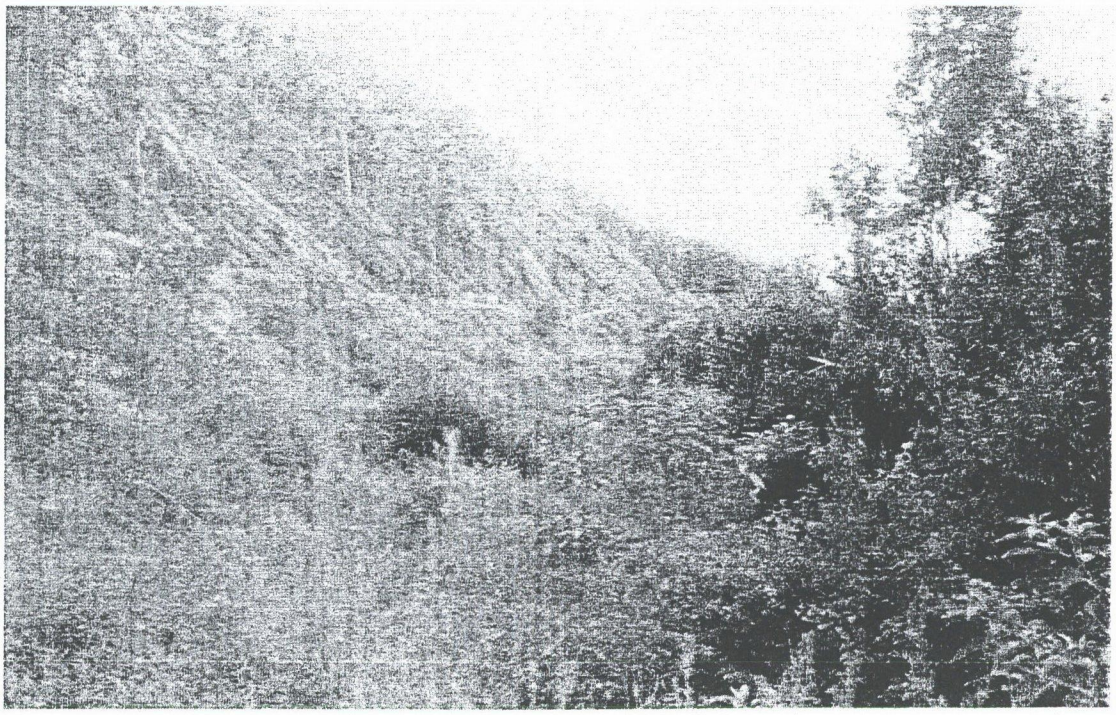


Plate 4: Castor oil plant/Wild Tobacco Tall Open Shrubland (disturbed land), with weeping lilly pilly/weeping bottlebrush low closed forest (riparian habitat) to the right and Mulligans Bluff in the background

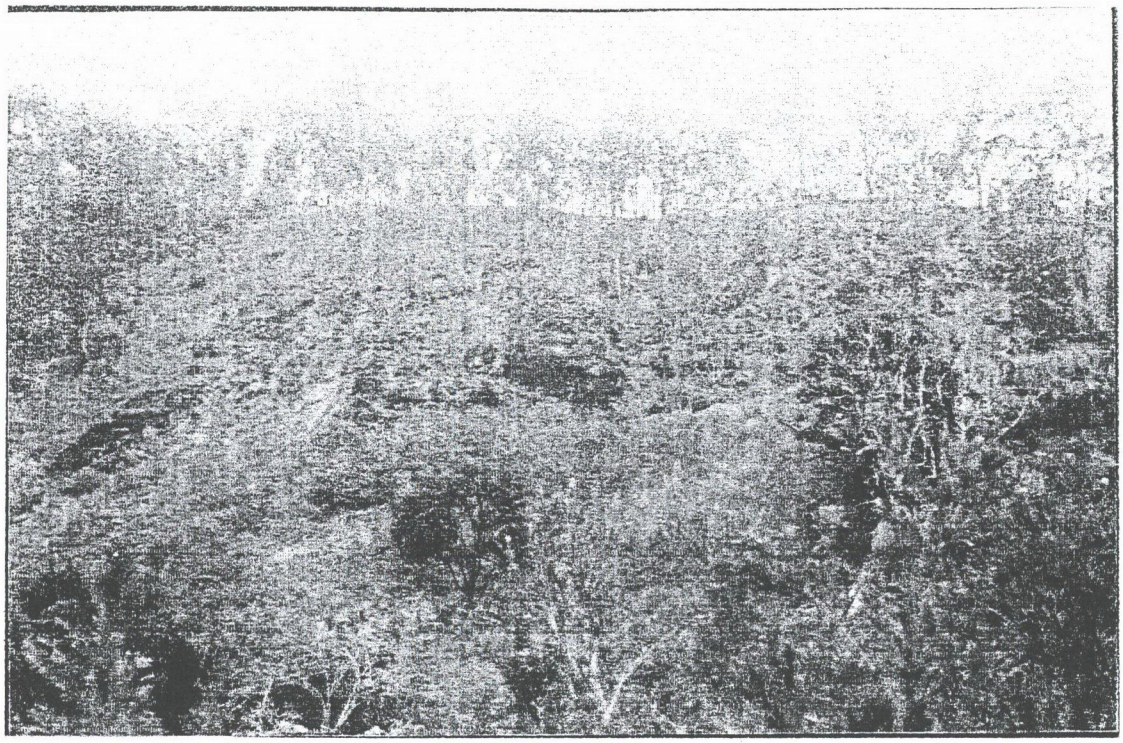


Plate 5: Central section of the Mulligans Bluff site as viewed from the Mann River Riparian forest in the foreground, Disturbed Land in the centre and open forest on the batter and ridge..

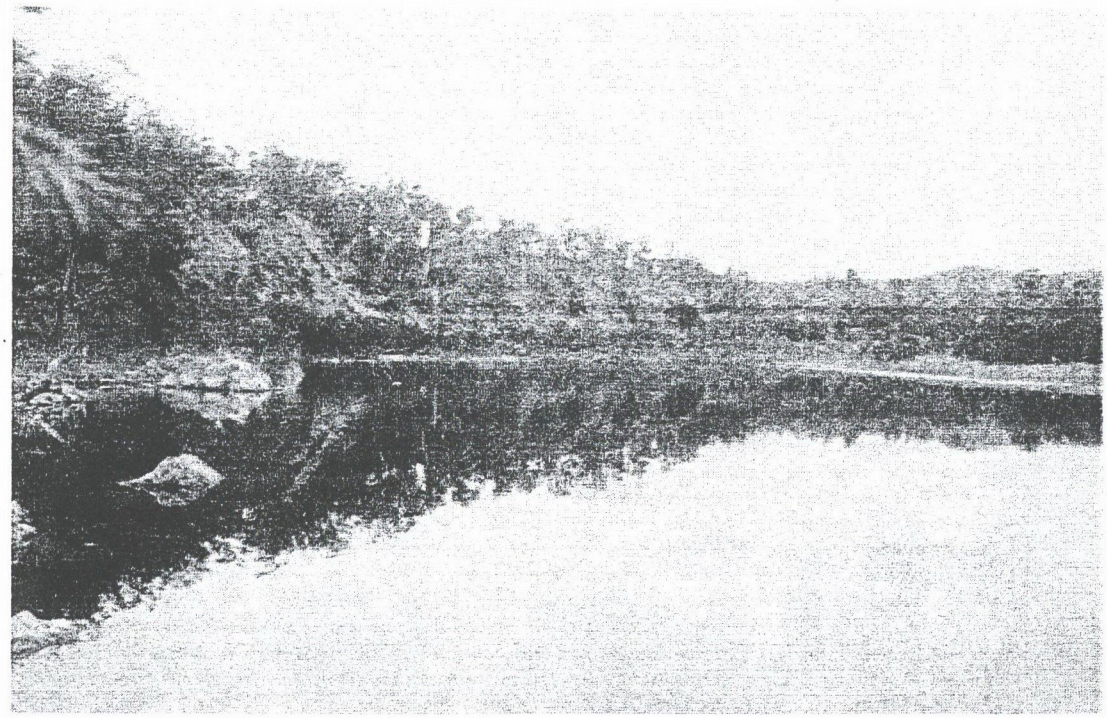


Plate 6: Large pool in the Mann River that adjoins the Mulligans Bluff site. This pool provides suitable habitat for eastern cod.

APPENDIX B
FLORA SPECIES RECORDED DURING THE CURRENT SURVEY

Table B1. Flora species recorded in the study area during the current survey

Family	Scientific Name	Common Name	1	2	3	4	5
Apiaceae	*Centella asiatica*						✓
Asclepiadaceae	*Gomphocarpus* sp.	Cotton Bush				✓	
Asteraceaea	*Ageratum houstonianum**	Billygoat Weed				✓	✓
Asteraceae	*Ambrosia artemisiifolia**	Ragweed				✓	✓
Asteraceae	*Bidens pilosa**	Cobbler's Pegs	✓		✓	✓	✓
Asteracea	*Chrysocephalum apiculatum*	Yellow Buttons	✓	✓			
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane					✓
Asteraceae	*Gnaphalium sphaericum*	Common Cudweed	✓	✓			
Asteraceae	*Senecio madagascariensis**	Fireweed	✓		✓		
Asteraceae	*Tagetes minuta**	Stinking Roger					✓
Cassythaceae	*Cassytha glabella*	Slender Devil's Twine	✓				✓
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	✓	✓			
Cyperaceae	*Cyperus* sp.					✓	✓
Dennstaedtiaceae	*Pteridium esculentum*	Bracken Fern	✓				✓
Dilleniaceae	*Hibbertia linearis*		✓	✓			
Euphorbiaceae	*Euphorbia peplus**	Petty Spurge				✓	✓
Euphorbiaceae	*Ricinus communis**	Castor Oil Plant					✓
Fabaceae	*Acacia disparrima*	Southern Salwood	✓				
Fabaceae	*Acacia falcata*		✓	✓			
Fabaceae	*Acacia floribunda*	White Sallow Wattle	✓				
Fabaceae	*Acacia longissima*		✓	✓	✓		
Fabaceae	*Castanospermum australe*	Black Bean				✓	
Fabaceae	*Crotalaria lanceolata**					✓	✓
Fabaceae	*Davesia ulicifolia*		✓				
Fabaceae	*Desmodium rhytidophyllum*		✓	✓	✓		
Fabaceae	*Desmodium varians*			✓			
Fabaceae	*Glycine clandestina*		✓	✓	✓		
Fabaceae	*Gompholobium pinnatum*				✓		
Fabaceae	*Gompholobium virgatum*	Leafy Wedge Pea	✓				
Fabaceae	*Hardenbergia violaceae*	Hardenbergia	✓	✓			
Fabaceae	*Hovea heterophylla*		✓	✓			
Fabaceae	*Macroptilium atropurpureum**	Siratro	✓				✓
Fabaceae	*Senna septemtrionalis**	Senna				✓	
Fabaceae	*Swainsona* sp.	Pea	✓				
Goodeniaceae	*Goodenia heterophylla*	Variable-leaved Goodenia	✓	✓			
Lamiaceae	*Salvia coccinea**	Red Salvia		✓		✓	✓
Lauraceae	*Neolitsea australiensis*	Green Bolly Gum				✓	✓
Liliaceae	*Laxmannia gracilis*	Slender Wire-lily	✓	✓			
Lobeliaceae	*Pratia purpurascens*	White Root	✓	✓			
Lomandraceae	*Lomandra leucocephala*	Woolly Mat-rush	✓				
Lomandraceae	*Lomandra longifolia*	Mat-rush	✓	✓			
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush	✓	✓			
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	✓				
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily	✓	✓	✓		✓
Malvaceae	*Sida rhombifolia**	Common Sida*					✓
Moraceae	*Ficus coronata*	Sandpaper Fig				✓	✓
Moraceae	*Ficus watkinsiana*	Strangling Fig	✓	✓			✓
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush				✓	
Myrtaceae	*Corymbia intermedia*	Pink Bloodwood	✓	✓	✓		
Myrtaceae	*Eucalyptus acmenoides*	White Mahogany	✓	✓	✓		
Myrtaceae	*Eucalyptus microcorys*	Tallowwood	✓	✓			
Myrtaceae	*Eucalyptus moluccana*	Grey Box	✓				
Myrtaceae	*Eucalyptus seeana*	Narrow-leaved Red Gum	✓		✓		
Myrtaceae	*Eucalyptus siderophloia*	Grey Ironbark	✓	✓	✓		
Myrtaceae	*Eucalyptus umbra*	Broad-leaved White Mahogany	✓				
Myrtaceae	*Lophostemon confertus*	Brush Box		✓			
Myrtaceae	*Waterhousea floribunda*	Weeping Lilly Pilly				✓	
Passifloraceae	*Passiflora edulis**	Passionfruit					✓
Phormiaceae	*Dianella caerulea*	Blue Flax Lily	✓		✓		
Poaceae	*Aristida* sp.	Three-awn Speargrass	✓	✓	✓		
Poaceae	*Chloris gayana**	Rhodes Grass	✓				
Poaceae	*Cymbopogon refractus*	Barbed-wire Grass		✓	✓		

Family	Scientific Name	Common Name	1	2	3	4	5
Poaceae	*Cynodon dactylon*	Couch Grass				✓	✓
Poaceae	*Danthonia* sp.	Wallaby Grass	✓				
Poaceae	*Entolasia stricta*		✓	✓			
Poaceae	*Eragrostis* sp.		✓	✓			
Poaceae	*Heteropogon contortus*	Bunch Spear Grass		✓			
Poacaea	*Imperata cylindrica*	Blady Grass	✓	✓			
Poaceae	*Panicum simile*	Two Colour Panic	✓	✓	✓	✓	✓
Poaceae	*Paspalum dilatatum**	Paspalum					✓
Poaceae	*Paspalum distichum*	Water Couch				✓	
Poaceae	*Paspalum urvillei**	Vasey Grass					✓
Poaceae	*Rhynchelytrum repens**	Red Natal Grass	✓	✓			✓
Poaceae	*Sorghum halepense*	Johnson Grass		✓		✓	✓
Poaceae	*Themeda australis*	Kangaroo Grass	✓	✓	✓		
Polygonaceae	*Rumex crispus**	Curled Dock				✓	✓
Rhamnaceae	*Alphitonia excelsa*	Red Ash	✓				
Santalaceae	*Exocarpus cupressiformis*	Cherry Ballart	✓	✓	✓		
Sapindaceae	*Dodonaea triquetra*	Common Hop Bush	✓	✓	✓		
Schizaeaceae	*Cheilanthes sieberi*	Mulga Fern	✓		✓		
Solanaceae	*Solanum americanum*	Glossy Nightshade				✓	✓
Solanaceae	*Solanum mauritianum**	Wild Tobacco Tree					✓
Verbenaceae	*Lantana camara**	Lantana		✓		✓	✓
Verbenaceae	*Verbena bonariensis**	Purple Top	✓				✓
Xanthorrhoeaceae	*Xanthorrhoe* sp.	Grass Tree	✓		✓		

* Introduced Plant Species

1 Grey Box/Tallowwood Very Tall Open Forest

2 Tallowwood/White Mahogany Tall Open Forest

3 Narrow-leaved Red Gum/White Mahogany Very Tall Open Forest

4 Weeping Lilly Pilly/Weeping Bottlebrush Low Closed Forest

5 Castor Oil Plant/Wild Tobacco Tree Very Tall Open Shrubland

APPENDIX C
THREATENED SPECIES HABITAT PREFERENCES, KNOWN DISTRIBUTION AND LIKELIHOOD OF OCCURRENCE IN THE STUDY AREA

Table C1: Threatened species habitat preferences, known distribution and likelihood of occurrence in the study area

Threatened Species	Preferred Habitat	Known Distribution	Reference	Likelihood of Occurrence
Emu (Eastern Population)	Forests and woodlands in north eastern NSW.	Restricted to the NSW North Coast Bioregion and Port Stephens LGA.		Unlikely – no suitable habitat
Glossy Black-cockatoo	Lower rainfall dry sclerophyll forest on flat ground containing *Allocasuarina torulosa*, *A. verticillata* or *A. littoralis*.	From central Queensland to Victoria.	State Forests of NSW (1995); Pizzey & Knight (1997)	High – recorded during the field survey. Use of the subject sites is expected to be low due to the paucity of available food.
Powerful Owl	Wet and dry sclerophyll forests, preferably tall, dense eucalypt forest with a dense understorey, on hills and mountains. The species also occurs in densely forested gullies and on coastal slopes.	From the mid coast of Queensland to the south-eastern corner of South Australia.	Pizzey & Knight (1997); Kavanagh & Peake (1993); Lindsey (1992)	Moderate – habitat is suitable but food availability if expected to be low.
Masked Owl	Dry sclerophyll forests and woodlands with a low, sparse understorey layer. Prefers to forage in open or partly cleared country.	Widespread but sparse in coastal mainland Australia.	Kavanagh & Peake (1993); Debus & Rose (1994)	Moderate – limited extent of suitable foraging habitat on site.
Spotted-tailed Quoll	Wet and dry sclerophyll forest and rainforest.	From south-east Queensland to eastern Victoria.	Edgar & Belcher (1995)	Low-moderate – habitat quality is low and geographic location of habitat is likely to further reduce use.
Brush-tailed Phascogale	Occurs in dry sclerophyll forest, with a sparse groundcover of herbaceous plants, grass, scleromorphic shrubs or leaf litter. Also recorded in cool temperate rainforest and wet sclerophyll forest.	From Hervey Bay (Qld) to Port Stephens (NSW)	Gilmore & Parnaby (1994); Soderquist (1995)	Low-moderate – habitat quality is low and geographic location of habitat is likely to further reduce use.
Squirrel Glider	Dry sclerophyll forest and woodland on dry upper slopes and ridges.	From west of Cairns (Qld) to Victoria.	Suckling (1995); State Forests of NSW (1995)	Low-Moderate – limited habitat resources on site, but habitat may form part of a family groups home range.
Rufous Bettong	Dry sclerophyll forests and woodlands with a grassy understorey.	From north Queensland to Sydney.	Strahan (1995)	Low-Moderate – marginal quality habitat.

Threatened Species	Preferred Habitat	Known Distribution	Reference	Likelihood of Occurrence
Grey-headed Flying-fox	Variety of habitats including rainforest, mangroves, paperbark swamps, wet and dry sclerophyll forests and cultivated areas.	East coast of Australia from Rockhampton (Qld) to western Victoria.	Churchill (1998)	High – suitable foraging resources on site.
Eastern Freetail Bat	A variety of forest types ranging from rainforest to dry sclerophyll forest and woodland.	From south of Sydney to south-eastern Queensland.	Churchill (1998)	High – known to forage along the Nymboida River and Orara Rivers.
Greater Broad-nosed Bat	Woodland, wet and dry sclerophyll forest and rainforest at altitudes less than 500 metres.	From northern Queensland to southern NSW.	Churchill (1998)	High – known to forage along the Nymboida River and Orara Rivers.
Hoary Bat	Open forests and woodlands, vine thickets, coastal scrubs, grassland and floodplains. Roost in tree hollows and rock crevices.	Distributed across northern Australia and down the east coast to northern NSW.	Churchill (1998)	High – known to forage along the Nymboida River and Orara Rivers.
Large-footed Myotis	Forests and woodlands close to water. Forages over water, catching insects and fish. Roosts in tree hollows, caves, tunnels and under bridges. Males may form harems.	Primarily within 100km of the coast in eastern Australia. Distribution across northern Australia, down the east coast into eastern South Australia. Two species occur in NSW.	Churchill (1998)	High – known to forage along the Nymboida River and Orara Rivers.
White-crowned Snake	Nocturnal. During the day it shelters beneath leaf litter, fallen timber etc. Wet sclerophyll forests and rainforest. Common in urban areas of Brisbane.	Coastal and near-coastal areas from noth of Capricorn to northeastern NSW.	Cogger (2000) Wilson & Swan (2003).	Low-Moderate – recorded previously near the Mann River. Habitat adjacent to river is marginal.
Eastern Cod	Clear flowing streams, with a rocky or boulder substratum and an abundance of snags.	Restricted to the Clarence Catchment. Known populations in the Mann, Nymboida and Orara Rivers. Stock released into the Richmond River.	NSW Fisheries (2002a); McDowell (1996).	High – Known to occur in the Nymboida/Mann River system. Distribution extends to about the study area.
Silver Perch	Fast flowing streams with rapids.	Native to the Murray Darling Basin, but released into coastal catchments as a sport fish.	NSW Fisheries (2002b)	High – Known to occur in the Mann River.

APPENDIX D
EIGHT PART TEST OF SIGNIFICANCE

(a) in the case of a threatened species, whether the lifecycle of the species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction;

Masked Owl

Masked owls are known to utilise a broad range of habitats, although they are most often recorded in open forest and woodland with a sparse understorey and adjacent open areas (Hollands 1991; Debus & Rose 1994). Essential habitat features include the presence of suitable roosting and nesting hollows (Higgins 1999), and an abundant supply of ground-dwelling or scansorial mammals (Debus & Rose 1994; Kavanagh 1996). Masked owls are known to forage and roost within previously disturbed habitat (Hollands 1991; Kavanagh 1996). Most foraging occurs within open forest or along roads and tracks. The frequency of road kills indicate that birds often forage along roadsides or use roads to move between foraging sites (Debus & Rose 1994). Road-killed birds have been recorded adjacent to the Pacific Highway (ERM 1999). Masked owls have a large home range, which may be in the order of 1000 ha, and individuals may range over several square kilometres (Higgins 1999).

DOF and Disturbed Land provide potential foraging habitat for masked owls. DOF is likely to provide a limited foraging resource as small mammals are expected to occur in low densities. In contrast, Disturbed Land is expected to have higher densities of small mammals, and may therefore represent part of the foraging habitat of one or a pair of masked owls. The proposal would remove less than 1.5 ha of Disturbed Land. The impact of removing this habitat on masked owls is regarded as minor given the size of an individual's home range and the availability of similar habitat in the locality.

Powerful Owl

Powerful owls are most commonly recorded from dry open forests along the coast and ranges, with records up to 1500m ASL (Debus & Chafer 1994; Higgins 1999). Powerful owls often roost during the day in closed forest, although large hollows are used during the breeding season (Higgins 1999). Both roost and nest sites are used regularly. This species has a large home range, which varies from 300 ha to 1500 ha depending on habitat quality (Higgins 1999). Birds typically nest in large vertical hollows (reference?).

Powerful owls are likely to forage within the DOF habitat, although use of this habitat is expected to be low given its location on the edge of a large area of similar vegetation. The removal of less than 2ha of DOF habitat that may occur on the edge of an individual's home range is not regarded as significant. This proposal would not remove important foraging (i.e. location with high abundance of prey), roosting, or nesting habitat for powerful owls, nor would it increase the risk of road strike. It is therefore concluded that the proposal would not increase impacts on the local powerful owl population above that which it currently experiences.

Glossy Black Cockatoo

The primary habitat requirements for glossy black-cockatoos include a good supply of *Allocasuarina* fruit and large hollows for nesting (Higgins 1999; Pepper *et al.* 2000). Nest hollows range in size, although Garnett *et al.* (1999) recorded an average nest hollow height

of 30cm and an average width of 19cm. Preferred habitat is often dry open forest or woodland.

No known foraging, nesting or roosting habitat occurs in the study area. One of the primary feed trees for glossy black-cockatoos, *Allocasuarina torulosa*, was recorded throughout the study area, although no evidence of foraging was recorded. Forest oaks within the subject site were typically small in size and there was a limited fruit resource available during the field survey. Based on the food resource available it is anticipated that use of the subject site by glossy black cockatoos would be limited. Habitat in the study area is suitable for roosting, although the likelihood that birds roost in the area is limited by the availability of food as birds typically roost in close proximity to feeding sites (Higgins 1999). None of the hollows identified on-site are suitable for nesting. Furthermore, birds often prefer to nest in close proximity to good quality foraging habitat (Higgins 1999).

The current proposal would remove a small number of potential feed trees. The number of trees removed is regarded as minor in a local context and based on the results of the field survey is unlikely to represent a current foraging resource. The importance of these trees may increase as they mature, and as a consequence it is recommended that forest oaks should be retained wherever possible. The retention of forest oaks where possible would minimise short and long-term impacts on the local glossy black cockatoo population and ensure that the proposal would not affect the viability of the local population.

Spotted-tailed Quoll

Spotted-tailed quolls occupy a range of different habitats, although they are most commonly recorded from wet and dry sclerophyll forests, including where this habitat fringes grazing land. This species occurs at low densities and has a large home-range (SFNSW 1995). The study area may form part of a home range for one or more quolls, although this likelihood is reduced by the geographic location of the subject sites on the edge of forested vegetation and in an area where movement is restricted by the steepness of the batter slopes. The study area is unlikely to provide important foraging or shelter habitat for quolls. The removal of less than 2ha of DOF habitat would not have a significant detrimental impact on the viability of the local spotted-tailed quoll population.

Brush-tailed Phascogale

The brush-tailed phascogale is a largely arboreal species that generally prefers dry open sclerophyll forests and woodlands with an open ground layer and a moderate density of trees and shrubs in the midstratum (NPWS 1999; Soderquist 1995). The species is dependent on tree hollows for breeding and shelter, generally preferring hollows that are 25-40mm wide (Ayers *et al.* 1996). At least some old growth forest is required within an individual's home range. Estimates of home range vary. Some estimates suggest that males may require an area of up to 100 ha and females 40-60 ha (SFNSW 1995; NPWS 1999), whilst others have recorded average home ranges of 5ha for females in good quality roadside habitat in Victoria (Van der Ree *et al.* 2001). There is clearly the need for further work before conclusions can be made regarding the home range size of phascogales in northern NSW.

Suitable shelter and foraging habitat for phascogales occurs in the study area. However, the extent to which this habitat is used is likely to be limited due to its geographic location. The

removal of less than 2ha of suitable habitat over an extended area is unlikely to have a substantial impact on an individual's home range. It is possible that the proposal could result in the removal of small areas of habitat from several home ranges. The proposal would remove several suitable (small) tree hollows, although similar sized hollows occur in the adjacent habitat. It is likely that phascogales utilise more than one hollow within a home range as shown elsewhere (Van der Ree *et al.* 2001). Under a worst case scenario the proposal could remove a den site. Even if occupied such an impact is unlikely to be significant given the extent of suitable habitat in the locality. Minimising the number of hollow-bearing trees removed by the proposal would reduce the risk of impacts on phascogales. The small area of habitat affected by the proposal, the location of this habitat and the retention of HBT where possible would ensure that the proposal does not affect the viability of the local phascogale population.

Rufous Bettong

Rufous bettongs utilise dry forest with an open grassy understorey (Strahan 1995). Studies in northern NSW have recorded rufous bettongs at densities of 0.4 individuals/ha and home ranges of approximately 20 ha (Seebeck et al. 1989). Suitable foraging habitat for rufous bettong occurs within the DOF habitat. Given the geographic location of this habitat (at the forest edge) it is unlikely to represent core habitat within a home range. Similar quality habitat is expected to be widespread in the nearby State Forest and National Park Estate. The proposal would not increase the barrier effect of the road. Bettongs are unlikely to traverse the steep batters and more suitable crossing points occur to the north and south of the subject sites. Given the above it is considered unlikely that the removal of less than 2ha of DOF habitat would have a significant impact on the viability of the local rufous bettong population.

Squirrel Glider

Squirrel gliders inhabit dry sclerophyll forests and woodland, usually containing abundant hollow-bearing trees and a mix of eucalypts, acacias and banksias (NPWS 1999). North of Sydney the species also inhabits damp coastal eucalypt/banksia forest and woodland (Menkhorst & Knight 2001). Squirrel Gliders nest in family groups in a bowl-shaped, leaf-lined nest in a tree hollow (Suckling 1995). A family group of gliders utilise several hollows within a home range.

The study area contains a variety of myrtaceous tree species that would provide a nectar and exudate resource for squirrel gliders. Potential shelter sites in the form of small hollows occur throughout the study area and in the adjacent habitat. Due to the steepness of the terrain it is unlikely that squirrel gliders would utilise either site as a movement corridor. The proposal could remove a den site used by gliders and it would remove less than 2ha of foraging habitat. Given the linear extent of habitat removal it is unlikely that a substantial proportion of habitat would be removed from the home range of one family group, although the exact alignment of home ranges in relation to the road is undetermined. Under a worst-case scenario several family groups could experience low-level impacts due to habitat removal. This assumes that several family groups utilise the available habitat, which is unlikely. Similar quality habitat is widespread in the locality and the area of habitat affected by this proposal is unlikely to disrupt the viability of a local population of squirrel glider.

Grey-headed Flying fox

The grey-headed flying-fox feeds on a wide variety of fruiting and flowering plants including the fruits of native figs and palms, and the blossoms of eucalypts, angophoras, tea-trees and banksias (Tidemann 1995). The species roosts in camps, which are commonly formed in gullies, typically not far from water and usually in vegetation with a dense canopy (Tidemann 1995). Camps are important places for mating, birthing, rearing of young and as day-to-day refuges from predators (Tidemann 1995).

No flying-fox camps occur in the study area. The proposal would remove less than 2ha of potential foraging habitat for grey-headed flying foxes. This is regarded as a very small portion of the potential food resources in the locality. Considering the high mobility of the species and the extensive areas of alternative foraging habitat in the vicinity, the extent of proposed habitat removal is unlikely to impact on the viability of a local population of the species.

Insectivorous Bats

The threatened insectivorous bats utilise a variety of different habitats in coastal eastern Australia, although all species utilise dry open forest and have been recorded foraging around waterbodies (Churchill 1998). All species are known to roost in tree hollows, although hoary bat and large-footed myotis also utilise caves, mines tunnels, and bridges (Allison 1995; Allison & Hoye 1995; Hoye & Richards, 1995). In northern NSW greater broad-nosed bats have been recorded roosting in stags and eastern freetail bats have been recorded using small branch hollows (Rohweder & Goldingay 1998b). Large-footed myotis is perhaps the most specialised of species as it relies upon water for foraging (Churchill 1998).

It is anticipated that all four species could roost in tree hollows in the DOF and riparian habitats, and hoary bats and large-footed myotis may use rock crevices on the batter slope. Insectivorous bats are also likely to forage over much of the study area, although foraging would be most concentrated in the vicinity of aquatic habitats and DOF. The removal of <2ha of DOF would reduce the available foraging habitat for insectivorous bats. Given the mobility of bats the small area of habitat affected is considered minor in the local context.

The proposal poses a greater risk of impact to a roost site, although no roosts would be affected in the riparian habitat. Fissures in the batter slope represent sub-optimal roosting habitat for both myotis and hoary bat. The unstable nature of the rock face reduces the likelihood that bats roost in this area and the selective removal of small areas of unstable rock from the batter slope is unlikely to destroy an important roost site.

The proposal would remove several HBT and numerous small hollows that represent potential roosting habitat. Similar sized hollows occur in the adjacent habitat and are expected to be common within the locality. Retaining HBT, where possible, would reduce the likelihood that a bat roost would be destroyed. The retention of hollows, coupled with the small area of habitat affected and the known occurrence of suitable HBT outside the area of impact would ensure that the proposal does not have a detrimental impact on the viability of any insectivorous bat populations.

White-crowned Snake

White-crowned snakes are uncommon in northern NSW, with a stronghold in the middle Clarence Valley (NPWS 2002). This species has been recorded in grazing land on the edge of the Mann River, upstream of the study area (Rohweder & Goldingay 1998). White-crowned snakes prefer DOF and woodlands with a well-developed litter layer and an abundant supply of small lizards, which are the dominant prey item. DOF habitat on-site has a poorly developed litter layer and most likely low lizard abundance. Likewise the degraded nature of Disturbed Land means that snakes would most likely occur in low densities in this habitat and the adjacent Riparian habitat. If present in the study area the density of white-crowned snakes is expected to be low and as a consequence the removal of less than 2ha of DOF and 1.5ha of Disturbed Land would at worst affect a very small number of individuals. The level of impact is unlikely to affect the viability of the local white-crowned snake population.

Freshwater Fish

Two threatened species of freshwater fish, eastern cod and silver perch, have been recorded from the Mann/Nymboida River system (ERM 1999a). Eastern cod prefer clear flowing streams with large rocky pools and an abundance of large rocks or boulders on the substratum, and snags (NSW Fisheries 2002a). Boulders and snags provide a variety of habitats required by the various life stages of cod hatchlings. The current known distribution of eastern cod extends downstream in the Mann River to the vicinity of Mulligans Bluff (NSW Fisheries 2002a). Silver perch is native to the Murray/Darling River system and populations in the Mann/Nymboida River system have released from hatchery stock. Current evidence suggests that stocking has not resulted in the establishment of breeding populations (NSW Fisheries 2002b). Silver perch seem to prefer fast flowing clear waters where there are numerous rapids (NSW Fisheries 2002b).

Several factors are known to threaten native populations of eastern cod and silver perch. Impacts of greatest relevance to this proposal include the possible pollution of aquatic habitat from sediment, oils and fuel and the disturbance of aquatic habitat from the traverse of heavy machinery. Traversing the Mann River with heavy machinery is not recommended due to the risk of detrimental impacts and subsequently is not considered further in this assessment.

The risk of sediment pollution of the Mann River is present, however, it is suggested that this risk can be substantially reduced by following best practice erosion control procedures, ensuring that no machinery traverses the riparian habitat, undertaking the work during the dry season and revegetating erosion prone areas after the completion of works. The implementation of these measures would substantially reduce the risk of pollution to the Mann River thereby negating the risk of impacts on the viability of local populations of eastern cod and silver perch.

(b) in the case of an endangered population, whether the lifecycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised;

Two populations of squirrel gliders have been listed on schedule one of the TSC Act as endangered populations. However, neither of these populations occurs in the study area.

(c) in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed;

Specific details on the area of habitat directly affected by this proposal are unknown, although it is expected that habitat removal at all locations combined would equate to less than 4ha. The removal of less than 4ha of DOF and Disturbed Land is not regarded as significant at a local or regional context given that there are extensive areas of similar quality habitat within the nearby State Forest and National Park estate. In addition the disturbed land habitat is of low conservation value.

The aquatic and riparian habitats within the study area are restricted to the Nymboida/Mann River system. Even under a worst-case scenario (i.e. disturbance of riparian habitat and pollution of the river) it is unlikely that a project of the proposed scale would affect a significant area of habitat in a regional context.

(d) whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community;

The proposed works are unlikely to isolate habitat or increase the barrier effect already created by the Gwydir Highway. Apart from highly mobile birds and bats, fauna are unlikely to use the subject sites as crossing points. Furthermore, no habitat would be removed from the eastern side of the road at Cangai Bluff and only Disturbed Land would be impacted at Mulligans Bluff. The subject sites are located on the edge of an extensive tract of native vegetation. The location of these sites in the landscape further reduces the likelihood that the proposal would isolate habitat.

(e) whether critical habitat will be affected;

At the time of report production, no relevant areas of critical habitat occur within the study area.

(f) whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or similar protected areas) in the region;

The adequacy of the existing protected area network to ensure the long-term viability of fauna is the subject of considerable debate. It has been argued that our isolated and fragmented reserve system is inadequate to satisfy the requirements of many species in the long-term. Whilst this seems to be the case for some large and mobile species it may not be true for all species. Many of the species known or predicted to occur in the study area have been recorded from several conservation reserves in the bioregion, whilst others appear more common outside of reserves or have important populations outside reserves.

Potential habitat for spotted-tailed quolls, brush-tailed phascogales, squirrel gliders and insectivorous bats is widespread in conservation reserves in the survey region. Whilst there is some information on population densities of gliders and quolls there is limited information on densities of insectivorous bats and phascogales, which makes it difficult to draw conclusions

regarding the representation of habitat in conservation reserves. The variable breeding success displayed by phascogales raises concerns about their adequacy of representation in conservation reserves.

Rufous bettongs are known from several conservation reserves, although these populations are particularly affected by predation from foxes. Unless there is ongoing and targeted fox control over large areas then the adequacy of reserved populations could be questioned. The NSW NPWS is currently undertaking fox control in some National Parks known to be used by bettongs.

Suitable habitat for masked and powerful owls is well represented in conservation reserves throughout the survey region, however given the apparent rarity of these species and their large home ranges it seems unlikely that populations are adequately represented in regional conservation reserves. The lack of information on the location of nest and roost sites also raises concerns regarding their adequacy of representation in conservation reserves.

The scarcity of records of white-crowned snakes makes it impossible to draw conclusions on whether populations are adequately represented in conservation reserves. However, only small parts of the middle Clarence Valley are protected by conservation reserves, which suggests that populations are unlikely to be adequately represented.

Habitat for eastern cod and silver perch is not adequately represented in regional conservation reserves. Although large sections of the Nymboida River flows through conservation reserves the river still experiences a wide range of impacts from other activities in the catchment.

(g) whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process;

The removal of potential habitat for any threatened species should be viewed cautiously as habitat removal is one of the key factors threatening the viability of many vertebrate populations. In view of this the "Clearing of Native Vegetation" has been listed on Schedule 3 of the TSC Act as a Key Threatening Process (KTP). In the present case the area of habitat to be cleared is minimal (i.e. <2 ha of DOF) in a local context and this habitat has a history of disturbance, and its removal is unlikely to be viewed by the scientific community as constituting a threatening process. The removal of several HBT is of greater concern, although adopting a selective approach to tree removal can reduce the number of trees affected. The removal of tree hollows would cause a slight increase in the risk of competition with feral honeybees by reducing the available hollow resource.

The proposed slope stabilisation works would occur over a small area and impacts would be concentrated in previously disturbed habitat. As a consequence the proposal is unlikely to cause any long-term disturbance to threatened species habitat. Furthermore, the proposed works would not increase the occurrence of fire or risk of local extinction in the locality. Therefore, the proposed works are unlikely to be recognised as a threatening process for any of the subject species.

(h) whether any threatened species, population or ecological community is at the limit of its known distribution;

The study area is situated near the limits of distribution for hoary wattled bat, white-crowned snake and eastern cod. The study area is situated near the southern limit of the known distribution for hoary wattled bat (Churchill 1998). White-crowned snakes extend south to about Coffs Harbour and west to about Legume (NPWS 2002). The study area is situated near the southwestern limit of the known distribution of the white-crowned snake. The current known extent of distribution of the eastern cod occurs in the Mann River at about Mulligans Bluff (NSW Fisheries 2002), although the species is known from the Orara River (ERM 1999a). The study area is situated at the limits of the known distribution for eastern cod. The study area is not situated at the limits of the known distribution for any of the remaining species (Marchant & Higgins 1993; Strahan 1995; Higgins 1999).

CONCLUSION

The proposal would not have a significant impact on threatened species, endangered populations or endangered ecological communities. The proposal would remove several hollows and a small number of hollow bearing trees and poses a risk of pollution to aquatic habitats in the Mann River. Impacts on threatened species can be minimised by following the proposed mitigation measures. Important issues considered in drawing conclusions on the magnitude of impacts include:

- The small area of habitat affected by the proposal, which is less than 2 ha of DOF and 1.5 ha of Disturbed Land.
- The large extent of similar habitat in the immediate vicinity to the study area, including the presence of hollows in habitat immediately adjacent to the subject sites.
- The degraded nature of habitat affected by the proposal.
- The absence of impacts on fauna movement corridors or dispersal vectors for plants.
- The absence of impacts that would isolate or further fragment habitat.
- The ability to mitigate impacts on aquatic habitats.

APPENDIX E
EPBC ACT ASSESSMENT

Vulnerable Species - Grey-headed Flying-fox

"An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:"

Lead to a long-term decrease in the size of an important population of a species

Considering the high mobility of the species and large extent of suitable foraging habitat in the locality, the small area of habitat affected (i.e. < 2ha) by the proposed works is unlikely to impact on the long-term breeding success or population size of the local population of grey-headed flying-fox.

Reduce the area of occupancy of an important population

The relatively small extent of habitat removal required for the proposed works represents an extremely small reduction in the potential area of occupancy of the species, and is unlikely to have a significant impact on the species.

Fragment an existing important population into two or more populations

The grey-headed flying fox is a highly mobile species, the movements of which would not be hindered by the extent of habitat removal required for the proposed works.

Adversely affect habitat critical to the survival of a species

The total area to be disturbed by the proposed works represents a small area of potential foraging habitat for the species, and no camps occur in the study area. Considering the large extent of suitable foraging habitat in the locality and the high mobility of the species, the small area of potential foraging resources within the study area is unlikely to represent critical habitat for the species.

Disrupt the breeding cycle of an important population

Habitat within the study area does not represent an important "camp site" for the species. The extent of foraging habitat removal would not be of such a magnitude as to impact on the breeding success of the species.

Modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Considering the high mobility of the species and large extent of similar and suitable foraging habitat in the locality, the small proportion of habitat removal required for the proposed works is unlikely to impact on the long-term breeding success or population size of the local population of grey-headed flying-fox.

Result in invasive species that are harmful to a vulnerable species

The extent of habitat removal would not increase the potential occurrence of the black flying fox, which is known to hybridise with the grey-headed flying fox.

The grey-headed flying fox is not known to be vulnerable to introduced predators such as the fox or cat. Nevertheless, the extent of clearing for the proposed works is unlikely to increase the accessibility of these species into the study area.

Interfere substantially with the recovery of the species

The proposed works would not impact on any significant roosting or breeding sites of the species, and is expected to have minimal impact on potential foraging resources of the species. Furthermore, the proposed works are not expected to:

- increase competition for resources by other species;
- encourage hybridisation with the black flying-fox;
- increase rates of predation on the species; or
- form any new physical or psychological barriers that could inhibit movement by the species between areas of suitable habitat.

Therefore, the proposed works unlikely to interfere substantially with the recovery of the grey-headed flying-fox.

Endangered Species – Eastern Cod

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

Lead to a long-term decrease in the size of a population

The rigorous application of standard best practice erosion control procedures would ensure that the proposal does not cause a long-term decrease in the size of a population. As a consequence impacts on this species are considered unlikely.

Reduce the area of occupancy of the species

Impacts on eastern cod habitat are expected to be minimal and unlikely to exceed the existing levels of pollution that already affect cod habitat in the Mann River. Given the above considerations it is concluded that the proposal is unlikely to reduce the area of occupancy of eastern cod.

Fragment an existing population into two or more populations

Any impacts on aquatic habitat would be of short duration and minor extent and are therefore unlikely to fragment populations of eastern cod.

Adversely affect habitat critical to the survival of a species

Habitat within the Nymboida and Mann Rivers is critical to the survival of eastern cod, however this proposal would not adversely affect this habitat to the extent that it becomes unsuitable for cod.

Disrupt the breeding cycle of a population

As noted above the proposed works would have a minor impact on aquatic habitat. Consequently detrimental impacts on the breeding cycle of the subject species are highly unlikely.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As noted above the scale of the proposed works are of insufficient magnitude to affect the viability of populations of eastern cod. Impacts on cod habitat would be mitigated.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat.

No invasive species would be introduced into the study area that may be harmful to the subject species. Mitigation measures are proposed to ensure that weeds are not distributed throughout the study area.

Interfere with the recovery of the species

At worst the proposed works would have a minor short-term impact on eastern cod. The impact would not threaten the viability of any populations of this species or lead to long-term deleterious impacts. The proposal would not interfere with the recovery of eastern cod.

Endangered Species – Spotted-tailed Quoll

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

Lead to a long-term decrease in the size of a population

The proposal would remove < 2ha of suitable habitat from the edge of an extensive tract of DOF habitat for spotted-tailed quolls. It is highly unlikely that the removal of this habitat would have a detrimental effect on a single individual or a population

Reduce the area of occupancy of the species

The proposal would remove <2ha of suitable habitat for quolls from the edge of an extensive tract of suitable habitat. The proposal would not further inhibit the movement of quolls between habitats. Given the above considerations it is concluded that the proposal is unlikely to reduce the area of occupancy of the spotted-tailed quoll.

Fragment an existing population into two or more populations

The proposed works would not increase the barrier effect of the Gwydir Highway and quolls would be able to continue crossing the highway in the study area should they choose to do so.

Adversely affect habitat critical to the survival of a species

Potential quoll habitat affected by the proposal is of low quality, being previously disturbed and occurring above steep cliffs on the edge of forested land. This habitat is not regarded as critical to the survival of quolls.

Disrupt the breeding cycle of a population

As noted above the proposed works would have a minor impact on a very small area of sub-optimal quoll habitat. Detrimental impacts on the breeding cycle of the subject species are highly unlikely.

Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

As noted above the scale of the proposed works are of insufficient magnitude to affect the viability of populations of spotted-tailed quolls. The proposal would affect less than 2ha of potential quoll habitat.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species habitat.

No invasive species would be introduced into the study area that may be harmful to the subject species. Mitigation measures are proposed to ensure that weeds are not distributed throughout the study area.

Interfere with the recovery of the species

At worst the proposed works would have a minor short-term impact on spotted-tailed quolls. The impact would not threaten the viability of any populations of this species or lead to long-term deleterious impacts. The proposal would not interfere with the recovery of the species.

Conclusion

The study area provides known habitat for eastern cod and potential habitat for grey-headed flying fox and spotted-tailed quolls. Based on the above assessment it is concluded that the extent of habitat removal and disturbance required for the proposed works would be unlikely to have a significant impact on these species due to:

- the small extent of habitat disturbance and removal;
- the short-term nature of any impacts on aquatic habitat;
- the ability to mitigate impacts on aquatic habitat;
- the availability of similar quality habitat in the locality;

- the geographic location of the subject sites on the edge of an extensive tract of native vegetation; and
- the high mobility of the grey-headed flying fox.

Therefore the proposed works are expected to have minimal impact on threatened species, and would not require referral to the Department of Environment and Heritage.

Appendix E

Geotechnical Investigation Report

#7552.1205.02/02

SH12 - GWYDIR HIGHWAY. GEOTECHNICAL INVESTIGATION AT CANGAI BLUFF FOR POSSIBLE REMEDIAL MEASURES.

Report G3472

18 July 2003

SH12 – GWYDIR HIGHWAY. GEOTECHNICAL INVESTIGATION AT CANGAI BLUFF FOR POSSIBLE REMEDIAL MEASURES.

INTRODUCTION

This report presents the results of an investigation of Cangai Bluff on the Gwydir Highway. The intention of the investigation was to provide information for the remediation of the cuts on the westbound side of the Highway and for the possible widening of the fill on the eastbound side.

The work was requested by Mr Peter Millar of Project Management Services, Northern Region. It follows recommendations given in Report G3359/4 dated 13 February 2002.

GEOLOGY

Reference to the 1:250 000 Metallogenic Series Sheet for Grafton - Maclean shows the site to be underlain by the Gundahl Complex of early Carboniferous age. The rocks of the complex comprise principally bedded metasediments, chert, greenstone and massive lithic wacke in a sheared argillaceous matrix. The investigation confirmed the presence of high strength metasedimentary rocks.

FIELDWORK

The fieldwork was in two parts. The cuts were photographed. They were then inspected and the photos were annotated with the proposed remedial measures.

Two boreholes were drilled on the eastbound side. Coordinates and levels of these boreholes are given in Table 1. Insufficient survey information is available to provide a location plan. The drilling was done by Craig Pullman, Site Investigation Pty Ltd using a truck mounted Pioneer P160 drilling rig. Borehole 2 was started using a continuous flight auger and continued with a rock roller. Rock was cored using NMLC equipment. Borehole 1 was cored from the surface.

Table 1. Coordinates and Levels of Boreholes.

BH No	Eastings	Northings	R L
1	1004.5	4972.2	97.7
2	1016.5	4902.8	92.1

RESULTS

The annotated photographs are given in Appendix A. Five 'processes' have been defined on them.

1. Outlined in red are areas to be scaled of loose material. Most of these areas are on the top of the cuts.
2. Outlined in orange are areas where loose rocks or debris piles are to be removed.
3. On one of the photographs, two rock bolts are shown in yellow.
4. Trees to be removed are indicated with green crosses.
5. The location of a strong rock fence is shown in purple.

Further discussion of these features is given below.

Borehole 1 encountered generally low strength rock from the surface. No high strength rock was encountered in the 3m drilling depth. Borehole 2 encountered 1.2m of fill and colluvium. Between this depth and 4m, the material encountered could have been bouldery colluvium or insitu extremely low strength extremely to highly weathered rock. Below 4m moderately to highly weathered rock of low to medium strength was encountered.

Details of the materials encountered in the boreholes are given on the borehole log sheets. These, together with photographs of the core, an explanatory sheet and results of the point load strength tests are given in Appendix B. It is noted that the rock is referred to as a basalt on the point load test results sheets. The rock should have been described as a silicious argillite.

DISCUSSION

Cut

The photographs are presented from the southern end of the cuts towards the northern end. In general principal, all loose material should be scaled from the face. Loose blocks of rock should be removed and trees removed from the faces of the cuts. This is necessary because the tree roots get into the joints in the rock and as they grow, blocks of rock are forced out of the face of the cut and eventually fall. Trees that are growing in the natural gullies that divide up the cuts should be left to help minimise erosion from the waters that flow in the gullies during rainfall events. Grass trees occur in these gullies and should not be removed.

Two rock bolts are shown on the sixth photograph. They should be 2m in length and installed perpendicular to the rock face that is being restrained. They should be fully grouted, a faceplate installed and the nut tightened to a small nominal tension of about 10 kN.

The strong rockfall fence (UC columns with cable supported wire mesh, with 1.8m effective height.) close to the eastern end of the cuts is designed to capture the larger blocks of rock shown on the third photograph. It is thought that these rocks will be difficult to remove except for the loosest ones, which should be removed in the scaling process. A standard 1.5m high rockfall fence should be installed the full length of the cuts except where the strong fence has been erected.

Fill

Boreholes 1 and 2 were drilled to provide information for a possible retaining wall that would allow the road to be widened. The results are indicative only. They suggest that the rock lacks strength and in view of the steepness of the slope, bored piles of substantial embedment are likely to be needed. The length of retaining wall envisaged is presently unknown. For a short length of retaining wall, the difficulty and cost of construction may be acceptable. For a greater length, consideration could be given to steepening the base of the cut slope and providing support to the cut area with rock bolts, soil nails or gabion wall as appropriate.

Manager Geotechnical Investigation
18 July 2003

Reviewed by

18/7/03

Manager Geotechnical Engineering

APPENDIX A

ANNOTATED PHOTOGRAPHS

Site Inspection 29 - 08 - 05



Figure 15 – Facing east along Milperra Road



Figure 16 – Facing north along Henry Lawson Drive

Site Inspection 29 - 08 - 05



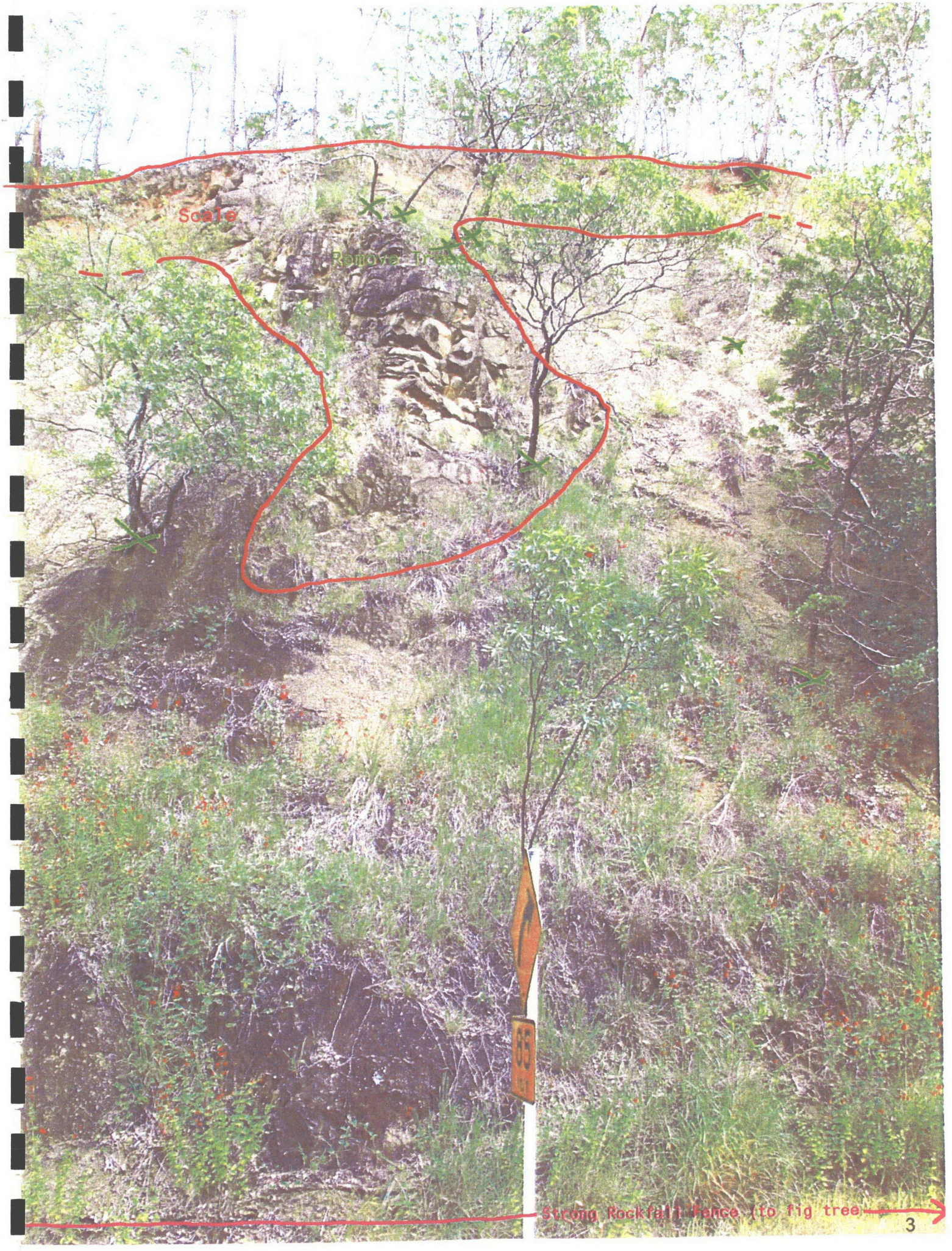
Figure 17 – Facing north along Henry Lawson Drive



Figure 18 – Facing north along Henry Lawson Drive


Remove Tree


Scale
Remove Loose Rocks
Remove Trees
Strong Rockfall Fence


Scale
Remove Trees
Strong Rockfall Fence (to fig tree
3


Scale
Remove Trees


Scale
Remove if loose
Remove Trees


Scale
Remove Trees
Rock Bolts


Scale
Scale
Remove Trees to
here only


Scale
Remove Trees


Scale
Remove Trees

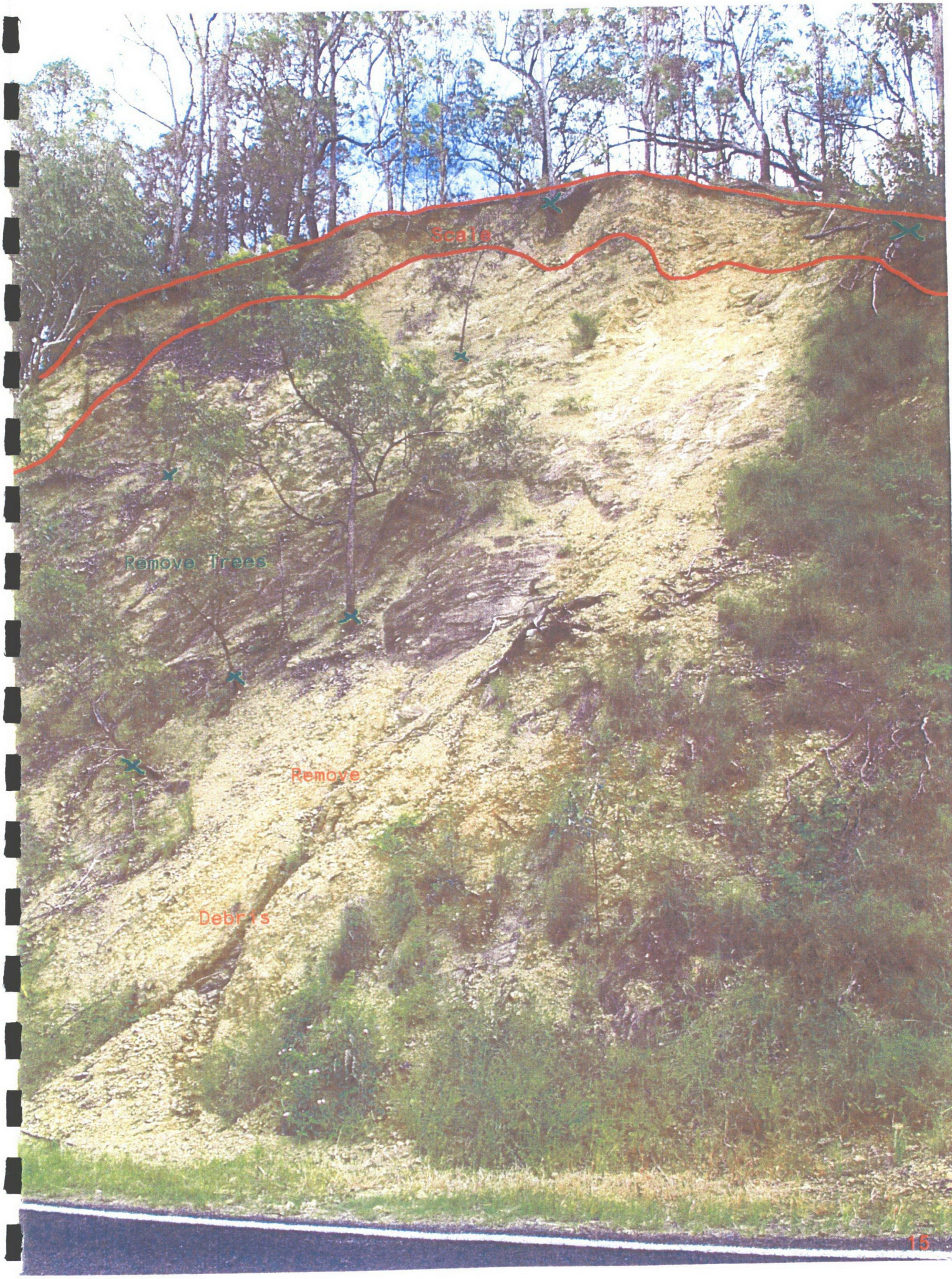

Scale
Remove
Loose
Debris
Remove Trees
Indicated


Scale
Remove
Loose
Debris


Scale
Remove
Trees
Shown


Scale
Remove
Trees

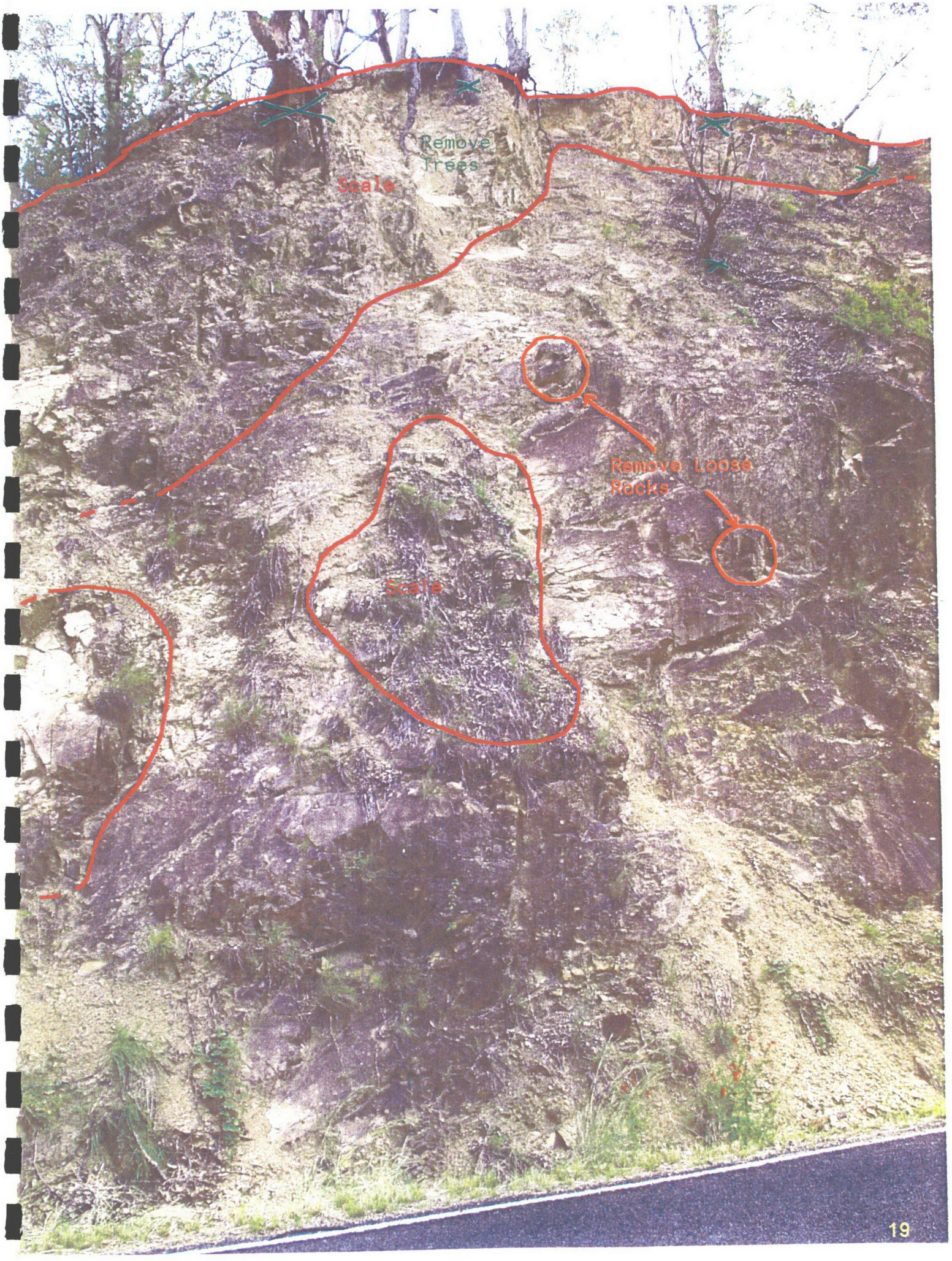

Scale
Remove
Trees


Scale
Remove Trees
Remove
Debris


Scale


Keep Trees in Gully

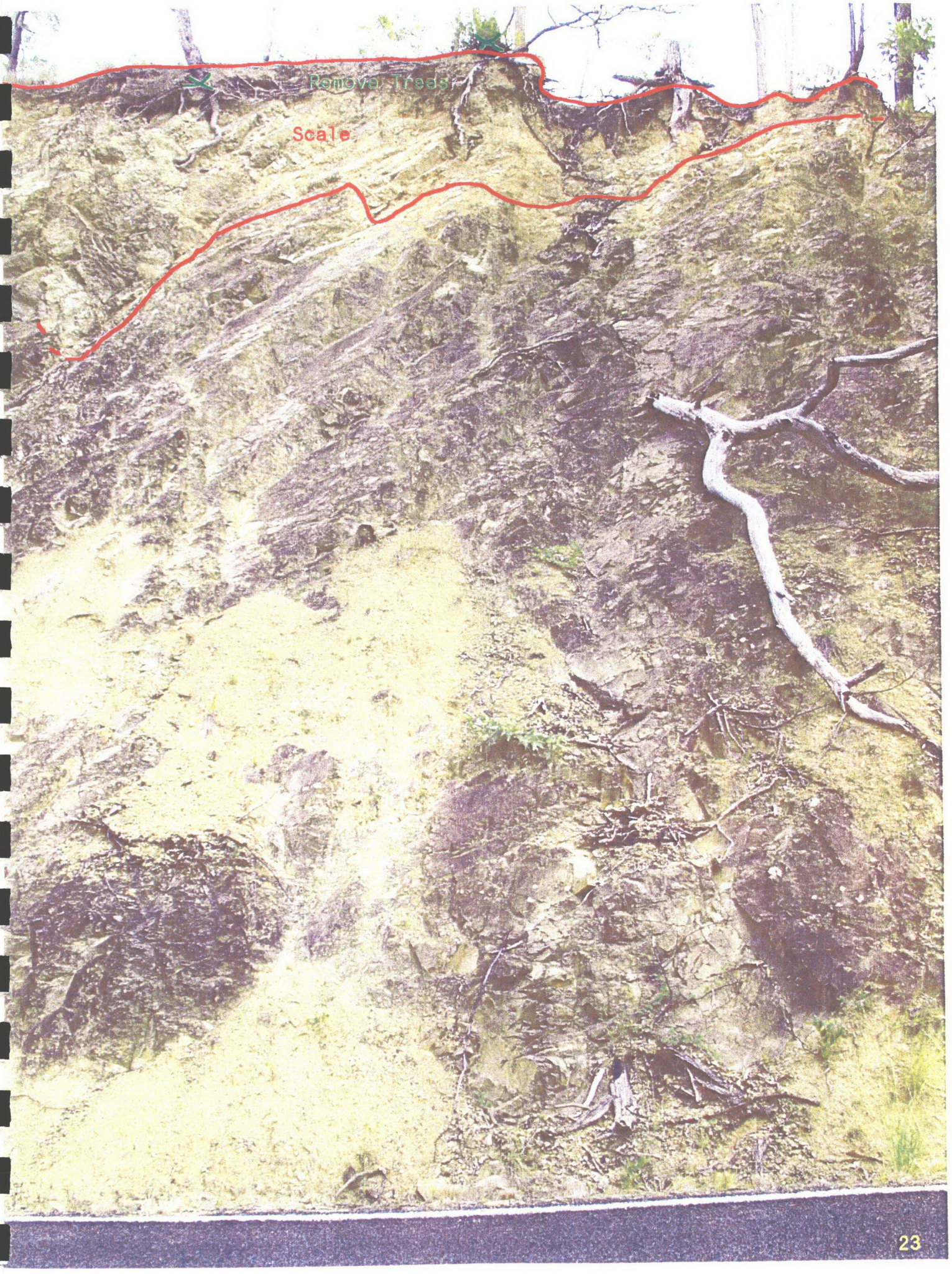

Remove Trees
Scale
Scale


Remove Trees
Scale
Remove Loose Rocks
Scale


Scale
Remove Trees
Remove Loose Rocks
Scale
20


Scale
Remove Trees


Scale
Remove Trees

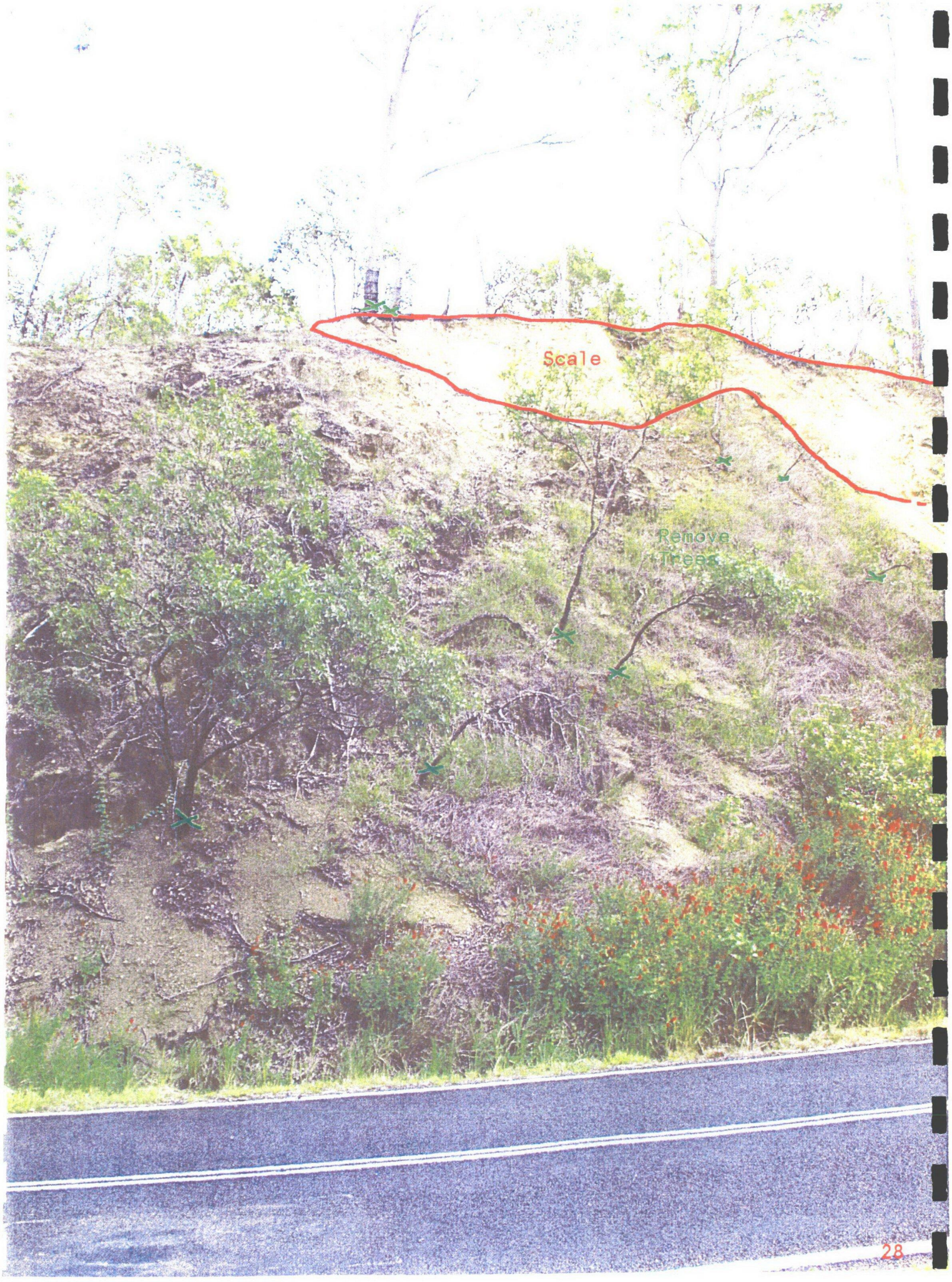

Remove Trees
Scale


scale
Remove Trees


Scale
Remove
Trees


Scale
Remove Trees
Remove loose material
Scale


emove Loose
aterial
Scale


Scale
Remove
Trees

APPENDIX B

BOREHOLE LOGS, CORE PHOTOGRAPHS AND POINT LOAD TEST RESULTS

EXPLANATORY NOTES - DRILL & EXCAVATION LOGS

GENERAL

Information obtained from site investigations is recorded on log sheets. The "Cored Drill Hole Log" presents data from an operation where a core barrel has been used to recover material - commonly rock. The "Non-Core Drill Hole - Geological Log" presents data from an operation where coring has not been used and information is based on a combination of regular sampling and insitu testing. The material penetrated in non-core drilling is commonly soil but may include rock. The "Excavation - Geological Log" presents data and drawings from exposures of soil and rock resulting from excavtion of pits, trenches, etc.

The heading of the log sheets contains information on Project Identification, Hole or Pit Identification, Location and Elevation. The main section of the logs contains information on methods and conditions, material substance description and structure presented as a series of columns in relation to depth below the ground surface which is plotted on the left side of the log sheet. The common depth scale is 8m per drill log sheet and about 3-5m for excavation logs sheets.

As far as is practicable the data contained on the log sheets is factual. Some interpretation is inevitable in the identification of material boundaries in areas of partial sampling, the location of areas of core loss, description and classification of material, estimation of strength and identification of drilling induced fractures. Material description and classifications are based on SAA Site Investigation Code AS 1726 - 1993 with some modifications as defined below.

These notes contain an explanation of the terms and abbreviations commonly used on the log sheets.

DRILLING

Drilling & Casing

AS	Auger Screwing
AD/V	Auger Drilling with V-Bit
AD/T	Auger Drilling with TC Bit
WB	Wash-bore drilling
RR	Rock Roller
NMLC	NMLC core barrel
NQ	NQ core barrel
HMLC	HMLC core barrel
HQ	HQ core barrel

Drilling Fluid/Water

The drilling fluid used is identified and loss of return to the surface estimated as a percentage.

Drilling Penetration/Drill Depth

Core lifts are identified by a line and depth with core loss per run as a percentage. Ease of penetration in non-core drilling is abbreviated as follows:

VE	Very Easy
E	Easy
F	Firm
H	Hard
VH	Very Hard

Groundwater Levels

Date of measurement is shown.

▼ Standing water level measured in completed borehole

▽ Level taken during or immediately after drilling

Samples/Tests

D	Disturbed
U	Undisturbed
C	Core Sample
SPT	Standard Penetration Test
N	Result of SPT (*sample taken)
VS	Vane Shear Test
IMP	Borehole Impression Device
PBT	Plate Bearing Test
PZ	Piezometer Installation
HP	Hand Penetrometer Test

EXCAVATION LOGS

Explanatory notes are provided at the bottom of drill log sheets. Information about the origin, geology and pedology may be entered in the "Structure and other Observations" column. The depth of the base of excavation (for the logged section) at the appropriate depth in the "Material Description" column. Refusal of excavation plant is noted should it occur. A sketch of the exposure may be added.

MATERIAL DESCRIPTION - SOIL

Classification Symbol - In accordance with the Unified Classification System (AS 1726-1993, Appendix A, Table A1)

Material Description - In accordance with AS 1726-1993, Appendix A2.3

Moisture Condition

D	Dry, looks and feels dry
M	Moist, No free water on remoulding
W	Wet, free water on remoulding

Consistency - In accordance with AS 1726-1993, Appendix A2.5

VS	Very Soft	< 25kPa
S	Soft	25 - 50kPa
F	Firm	50 - 100kPa
St	Stiff	100 - 200kPa
VSt	Very Stiff	200 - 400kPa
H	Hard	≥ 400kPa

Strength figures quoted are the approximate range of Unconfined Compressive Strength for each class.

Density Index. (%) is estimated or is based on SPT results. Approximate N Value correlation is shown in right column.

VL	Very Loose	< 15%	0 - 4
L	Loose	15 - 35%	4 - 10
MD	Medium Dense	35 - 65%	10 - 30
D	Dense	65 - 85%	30 - 50
VD	Very Dense	> 85%	> 50

CORED DRILL HOLE LOG

HOLE NO : 1
PROJECT : GWYDIR HIGHWAY
FILE / JOB NO : G3471
LOCATION : CANGAI BLUFF
SHEET : 1 of 1

POSITION :	SURFACE ELEVATION :	ANGLE FROM HORIZONTAL :	90°
RIG TYPE : P 160	MOUNTING : TRUCK	CONTRACTOR : PULLMAN DRILLING	DRILLER : H. KENNEDY
CASING DIAMETER : NW	BARREL (Length) : 1.86m	BIT :	BIT CONDITION : FAIR
DATE STARTED : 3/4/03	DATE COMPLETED :	DATE LOGGED : 3/4/03	LOGGED BY : T. R. B CHECKED BY : [signature]

DRILLING | MATERIAL | FRACTURES

PROGRESS: DRILLING & CASING — NMLC CORING; WATER — 0% LOSS

DRILL DEPTH (CORE LOSS /RUN %): 0% (0.50), 0% (0.75), 0% (1.60), 0% (2.10), 0% (3.10)

SAMPLES & FIELD TESTS

DEPTH(m): 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure
(texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

ARGILLITE :
GREY & PALE BROWN & ORANGE.
SWIRLED APPEARANCE. FINE GRAINED.
SOME ROOT FRAGMENTS IN SHALLOW DEFECTS.

END OF BOREHOLE 1 AT 3.10m

WEATHERING: HW

EST STRENGTH I_s(50)MPa: EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH

NATURAL FRACTURE SPACING(mm): 20, 40, 100, 300, 1000

VISUAL

ADDITIONAL DATA
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

- HIGHLY FRACTURED ZONE 160mm
- JT 45° CN PR RF
- JT 45° CN PR RF
- JT 50° CN PR RF
- FZ 100mm - LIKELY DUE TO HANDLING
- JT 60° KT CLAY PR RF
- HB
- HB
- FZ - DUE TO HANDLING
- JT 45° KT GRAVELLY CLAY IR RF
- FZ - DUE TO HANDLING 60mm
- JT 0° CN CU RF
- NUMEROUS CLOSED JTs
- JT 60° CN IR RF
- JT 60° CN PR RF
- JT 60° CN PR RF
- JT 60° CN PR RF
- JT 60° CN PR RF
- FZ - DUE TO HANDLING 50mm
- NUMEROUS TIGHLY CLOSED JTs SOME EVIDENCE OF TRACE CLAY INFILL
- JT 60° INFILLED WITH CRUSHED BASALT
- JT 60° CN PR RF
- HBs - 100mm
- JT 45° KT PR RF - CLOSED
- JT 45° CN IR RF
- HB
- JT 45° KT PR RF
- HB
- SLIGHT FRACTURING DUE TO HANDLING

NOTE :
HB = HANDLING BREAK
DB = DRILLING BREAK

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND TRAFFIC AUTHORITY, NSW

File: Cangai_1.dwl


G3471 Box 1/1
G3471
BH1
START
0.0m
1.0m
2.0m
30m
END BH1@31m

NON-CORE DRILL HOLE-GEOLOGICAL LOG

HOLE NO : 2

PROJECT : GWYDIR HIGHWAY
LOCATION : CANGAI BLUFF
FILE / JOB NO : G3471
SHEET : 1 of 2

POSITION : SURFACE ELEVATION : ANGLE FROM HORIZONTAL : 90°

RIG TYPE : P 160 MOUNTING : TRUCK CONTRACTOR : PULLMAN DRILLING DRILLER : H. KENNEDY

DATE STARTED : 3/4/03 DATE COMPLETED : DATE LOGGED : 3/4/03 LOGGED BY : T. R. B. CHECKED BY :

DRILLING & CASING	DRILLING FLUID TYPE & LOSS	DRILLING PENETRATION	GROUND WATER LEVELS	SAMPLES, TEST, ETC	DEPTH(m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary & Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVELY DENSITY	STRUCTURE & Other Observations
AUGER T. C. BIT	NIL	M			0.0			0.02m ASPHALT. SANDY SILTY GRAVEL : YELLOW. FINE TO COARSE, ANGULAR & SUB-ANGULAR GRAVEL. FINE TO COARSE GRAINED SAND.	D		FILL / COLLUVIUM
		L		1.00 SPT 6/90mm N*>6 1.45	1.0						
ROCK ROLLER - NW CASING	WATER - 0% LOSS				2.0			END OF NON-CORE DRILLING AT 1.20m SEE CORED DRILL LOG SHEET FOR DETAILS START OF NON-CORE DRILLING AT 2.65m			
ROCK ROLLER - NW CASING	POLYMER - 0% LOSS	M			3.0			GRAVELLY CLAY : PALE BROWN. LOW TO MEDIUM PLASTICITY. FINE TO MEDIUM ANGULAR TO SUB-ANGULAR GRAVEL.		F	INFERRED POSSIBLY WEATHERED ARGILLITE
					4.0			END OF NON-CORE DRILLING AT 4.00m SEE CORED DRILL LOG SHEET FOR DETAILS			
					5.0						
					6.0						
					7.0						
					8.0						

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND TRAFFIC AUTHORITY, NSW

File: Cangai_2.dwl

CORED DRILL HOLE LOG

HOLE NO : 2

PROJECT : GWYDIR HIGHWAY
LOCATION : CANGAI BLUFF

FILE / JOB NO : G3471
SHEET : 2 of 2

POSITION : | SURFACE ELEVATION : | ANGLE FROM HORIZONTAL : 90°

RIG TYPE : P 160 | MOUNTING : TRUCK | CONTRACTOR : PULLMAN DRILLING | DRILLER : H. KENNEDY

CASING DIAMETER : NW | BARREL (Length) : 1.86m | BIT : | BIT CONDITION : FAIR

DATE STARTED : 3/4/03 | DATE COMPLETED : | DATE LOGGED : 3/4/03 | LOGGED BY : T. R. B | CHECKED BY :

DRILLING

PROGRESS: DRILLING & CASING; WATER

(CORE LOSS /RUN %) — DRILL DEPTH

SAMPLES & FIELD TESTS

DEPTH(m)

MATERIAL

GRAPHIC LOG

DESCRIPTION
ROCK TYPE : Colour, Grain size, Structure
(texture, fabric, mineral composition, hardness alteration, cementation, etc as applicable)

WEATHERING

EST STRENGTH $I_s(50)$MPa: EL .03 | VL .03-.1 | L .1-.3 | M .3-1 | H 1-3 | VH 3-10 | EH

FRACTURES

NATURAL FRACTURE SPACING(mm): 20 | 40 | 100 | 300 | 1000

VISUAL

ADDITIONAL DATA
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

---

1.40 — SEE NON-CORE DRILL LOG SHEET FOR DETAILS

START CORING AT 1.40m

NOTE :
HB = HANDLING BREAK
DB = DRILLING BREAK

NMLC CORING - NW CASING; WATER / POLYMER APPROX. 10% LOSS

0% (1.40 – 2.00)

2.00 — GRAVELLY CLAY : BROWN. LOW TO MEDIUM PLASTICITY. FINE TO COARSE ANGULAR GRAVEL

ARGILLITE : GREY & BROWN. FINE TO MEDIUM GRAINED. MASSIVE.

- JT 30° KT CLAY IR RF
- FZ 100mm
- FZ CLAY 160mm

28% (2.20 – 2.55) — CORE LOSS 0.07m (2.13m - 2.20m)

- FZ 150mm

0% (2.55 – 2.65) — ARGILLITE AS ABOVE.

- JT 0° CN IR RF
- JT 0° CN IR RF
- JT 60° KT CLAY IR RF

2.65 0%

END CORING AT 2.65m

SEE NON-CORE DRILL LOG SHEET FOR DETAILS

START CORING AT 4.00m

4.00

NMLC CORING - NW CASING; WATER / POLYMER APPROX. 20% LOSS

0% (4.00 – 4.65)

Is(50) d=0.74 a=0.67 MPa

4.65 — SILICIFIED ARGILLITE : GREY & PALE BROWN. FINE GRAINED. FLOW BANDED. SOME MEDIUM GRAINED REGIONS, GENERALLY BORDERED BY IRON STAINING. SWIRLED APPEARANCE.

MW / HW

- JT 0° CN PR RF - POSSIBLY DB
- FZ 60mm
- JT 0° CN IR RF
- JT 40° CN PR RF
- JT 0° CN IR RF
- JT 70° CN PR RF
- JT 50° CN PR RF
- JT 10° Fe CLAY CU 2mm APERTURE SOME EVIDENCE OF SHEARING

4.70 — PALE BROWN. MEDIUM GRAINED

- FZ 30mm - LIKELY HBs
- FZ 50mm
- SZ 10mm
- JT 85° CN PR CLOSED
- FZ 50mm
- JT 90° KT CLAY IR 2-4mm APERTURE
- JT 40° KT CLAY IR RF
- JT 40° CN IR RF
- JT 20° CN PR RF
- SZ 20mm
- JT 60° CN PR RF
- JT 60° Fe SILTY CLAY IR 0-10mm APERTURE
- JT 30° CN IR RF
- JT 30° CN IR RF
- JT 60° CN PR RF
- JT 40° CN IR RF
- FZ 50mm
- JT 45° CN PR RF

0% (4.65 – 5.70)

5.00

- 4 x JTs 60° CN PR RF
- SZ 40mm 60°

0% (5.70 – 6.00)

0% (6.00 – 6.35)

- NUMEROUS OPEN & CLOSED JTs
- FZ 50mm
- JT 60° CN PR RF
- JT 60° CN PR RF
- JT 60° CN IR RF
- JT 10° CN CU RF
- JT 75° CN PR RF
- NUMEROUS HBs
- JT 30° CN PR RF
- JT 20° CN PR RF

6.35

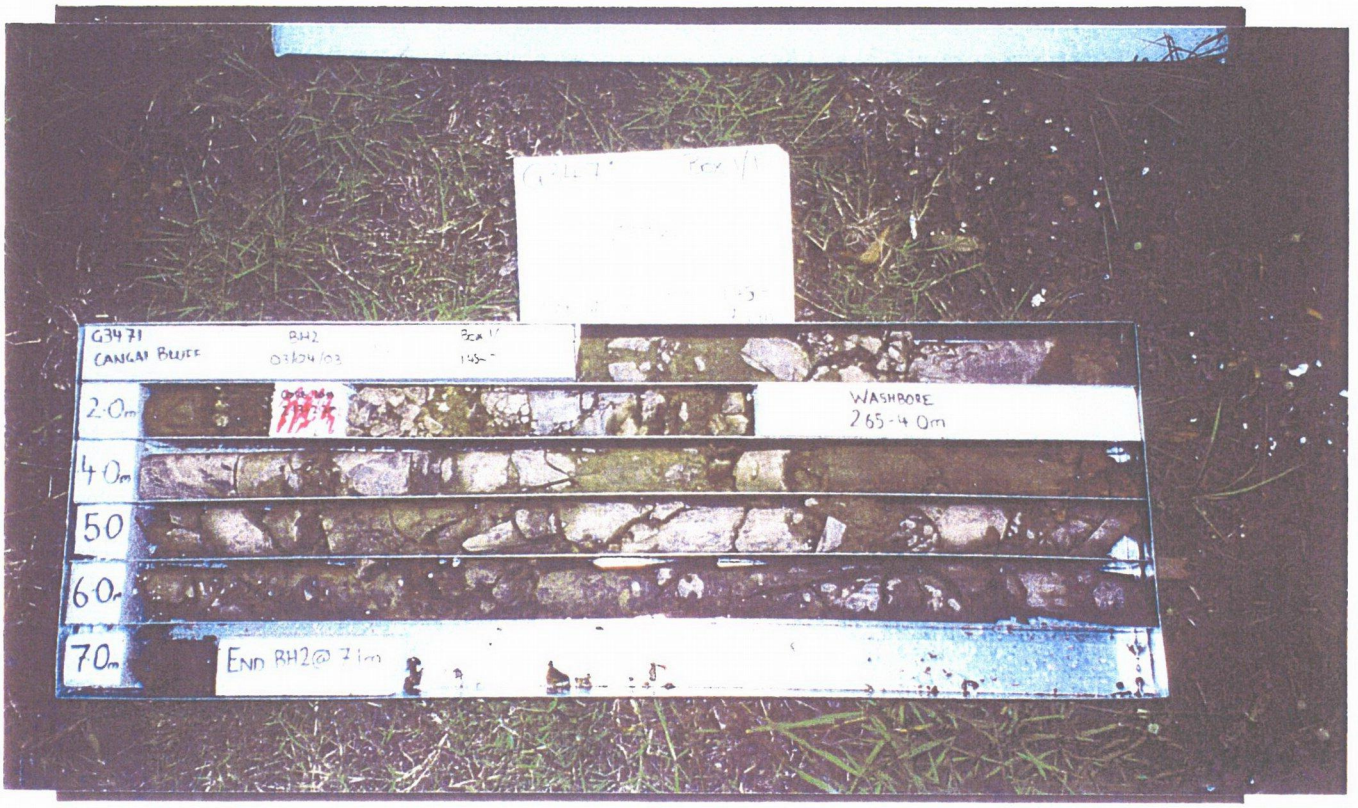
7.10

END OF BOREHOLE 2 AT 7.10m

See Explanatory Notes for details of abbreviations & basis of descriptions.

ROADS AND TRAFFIC AUTHORITY, NSW

File: Cangai2c.dwl


G3471
CANGAI BLUFF
BH2
03/04/03
WASHBORE
265-4.0m
2.0m
4.0m
50
6.0m
70m
END BH2@ 7.1m

Golder Associates

POINT LOAD STRENGTH INDEX

Project No. 03622008

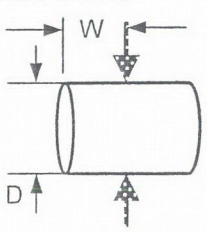
Client: RTA
Project: Logging
Location: Cangai Bluff

Date: 7-Apr-03
Tested by: TRB
Data checked: 10/4/03

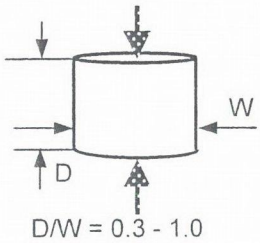
Test Machine: GSA | Test Locality: FIELD | Core Size: 50 mm

Bore/TP	Depth (m)	Rock Type	Moisture Condition	Test Type	W (mm)	D (mm)	Load kN (P)	Failure Type	Point Load Strength Index $Is_{(50)}$ (MPa)	Strength Classification
BH1	1.20	Basalt	M	D	-	50.0	1.0	1	0.39	M
	1.20	Basalt	M	A	-	50.0	N/A	No Useable Sample		
	2.70	Basalt	M	D	-	50.0	0.8	1	0.32	M
	2.70	Basalt	M	A	42.0	50.0	0.5	3	0.19	L
BH2	4.00	Basalt	M	D	-	50.0	1.0	1	0.40	M
	4.00	Basalt	M	A	-	50.0	N/A	No Useable Sample		
	6.90	Basalt	M	D	-	50.0	0.8	1	0.32	M
	6.90	Basalt	M	D	56.0	50.0	0.60	3	0.24	L

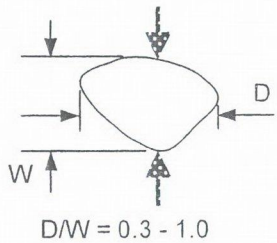
TEST TYPE :



W/D > 0.5
DIAMETRAL (D)



D/W = 0.3 - 1.0
AXIAL (A)



D/W = 0.3 - 1.0
IRREGULAR LUMP (I)

MOISTURE CONDITION :
Field (F), Saturated (S), Dry (D)

FAILURE TYPE :
1. Fracture through fabric of specimen oblique to bedding, not influenced by weak planes.
2. Fracture along bedding.
3. Fracture influenced by pre-existing joint plane (J), microfracture (M), vein (V), chemical alteration (C).
4. Chip or partial fracture.

NOTES For specimens tested parallel to plane of weakness $D_e^2 = D^2$
For specimens tested perpendicular to plane of weakness $D_e^2 = 4WD/\pi$

SH12 - GWYDIR HIGHWAY. INITIAL GEOTECHNICAL INVESTIGATION AT MULLIGANS BLUFF FOR POSSIBLE REMEDIAL MEASURES ON THE MAIN BLUFF.

ADDENDUM TO REPORT G3471.

Report No: G3471A

24 July 2003



SH12 – GWYDIR HIGHWAY. INITIAL GEOTECHNICAL INVESTIGATION AT MULLIGANS BLUFF FOR POSSIBLE REMEDIAL MEASURES ON THE MAIN BLUFF. ADDENDUM TO REPORT G3471.

INTRODUCTION

This report is an addendum to Report G3471 dated 18 July 2003. It contains annotated photographs of the bluff with suggested locations for draped mesh netting and associated rockfall fences, together with some features that may be of interest that were made evident by the photography.

THE PHOTOGRAPHS

The Mullians Bluff area has been photographed in such a way as to allow stereographic viewing of the pictures. This has allowed the area to be studied and selected photographs, which cover the whole area of interest, have been annotated. These photographs are presented in Appendix B. (Appendix A is in the main report.) The numbering of the included photographs follows the numbering of the original photography.

Shown in red on the photographs are the locations of proposed draped mesh netting. Shown in purple is the location of proposed rockfall fencing that covers for the gaps in the draped mesh netting. Shown in Yellow are some features noticed on the photographs that may be pertinent to the overall stability of the area. It should be noted that all these elements have been defined without confirmation of their boundaries at the site.

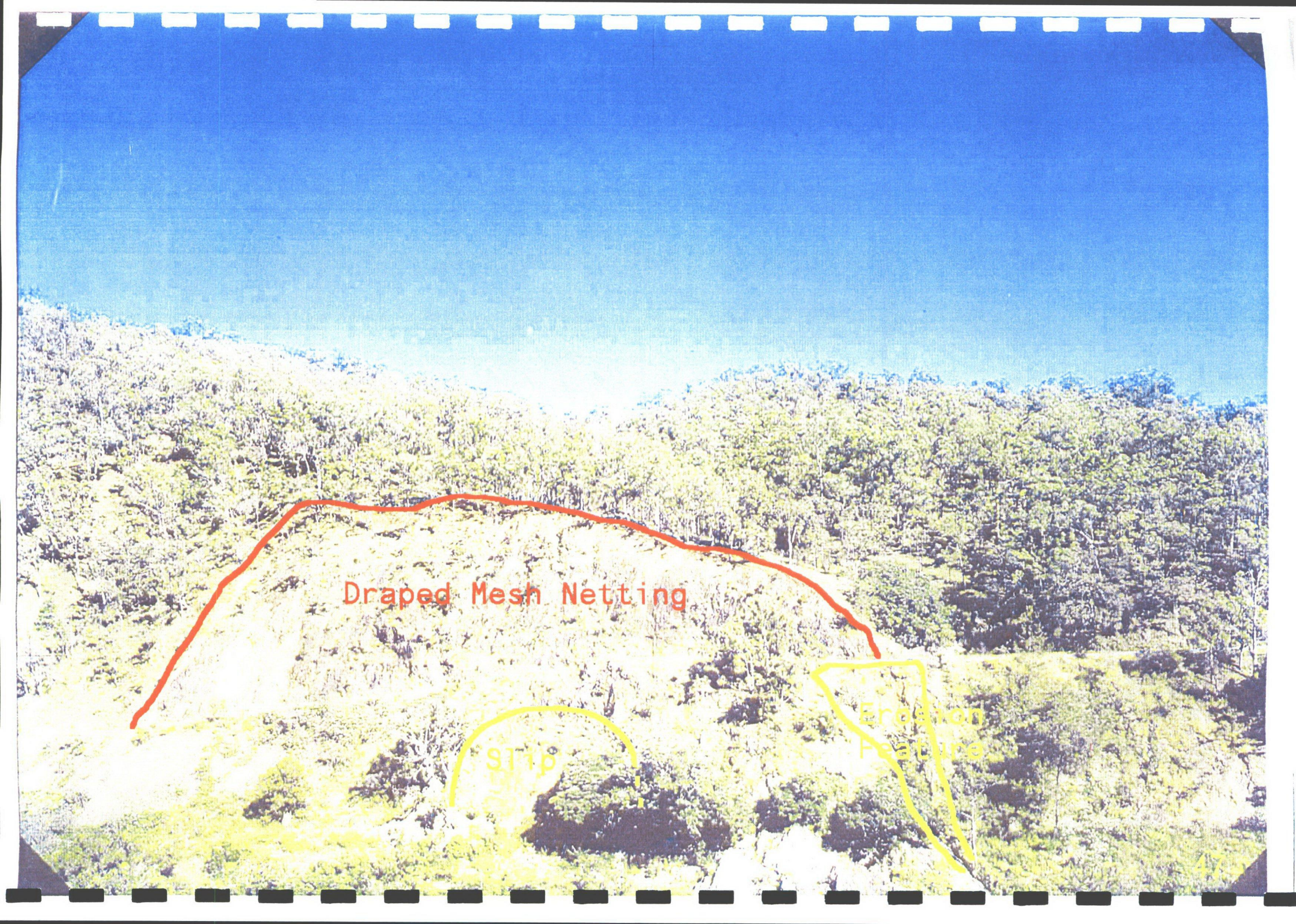
- Photo 47 shows a substantial area of draped mesh netting. It also shows, downslope from the road, a scar of an old slip and an erosion feature. It is suggested that these two features be assessed for possible future impact on the road.
- Photo 50 shows two areas of draped mesh netting together with a rockfall fence between them. It also shows the location of a recent washout which is the subject of Report G3471/1 and designs for remedial measures.
- Photo 53 shows a draped mesh area and the end of a rockfall fence.
- Photo 55 shows a rockfall fence and the end of a draped mesh area.

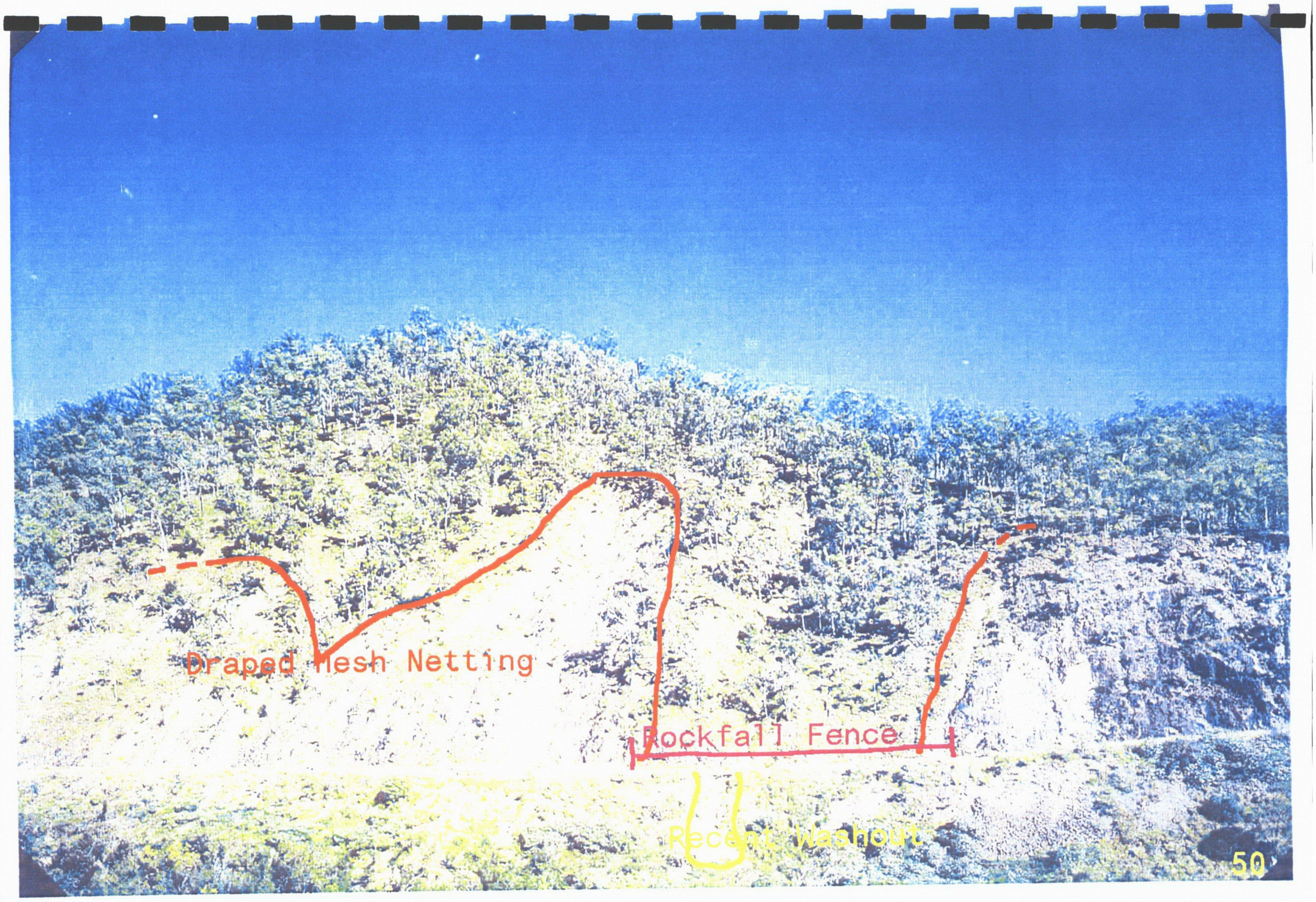


Manager Geotechnical Investigation
24 July 2003

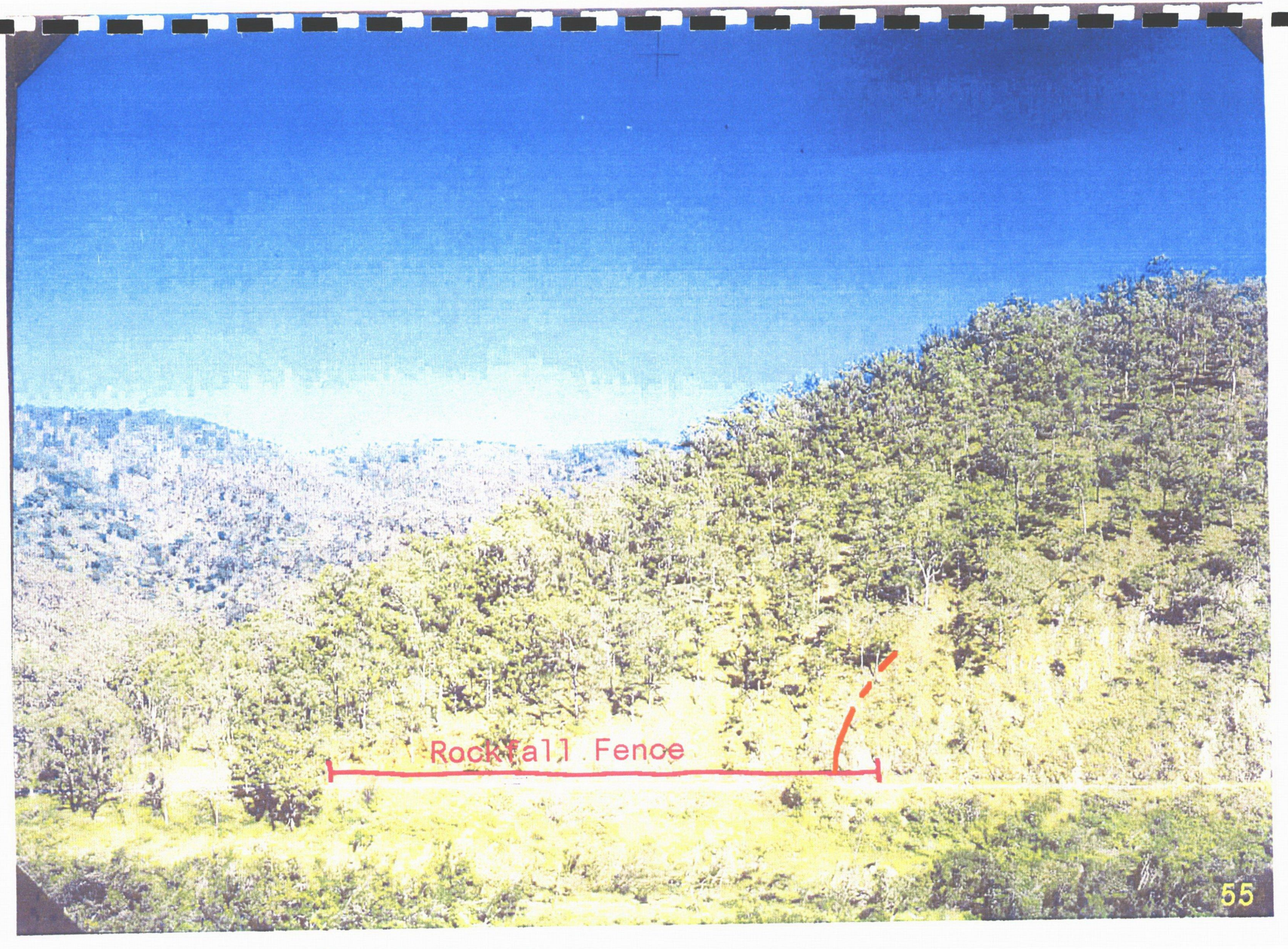
APPENDIX B

ANNOTATED PHOTOGRAPHS


Draped Mesh Netting
Strip
Erosion
Pasture


Draped Mesh Netting
Rockfall Fence
Recent Washout
50


Draped Mesh Netting


Rockfall Fence
55

Appendix F

Heritage Assessment

Heritage Assessment

Dry stone retaining walls on the Gwydir Highway, Mulligans Bluff and Cangai Bluff,

west of Grafton, NSW



Prepared for RTA Northern Region Client Services

RTA

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July 2004

Document Controls

Business Unit	Environmental Technology Branch, RTA Operations		
Project No.			
Document description	Heritage Assessment – Dry stone retaining walls on the Gwydir Highway at Mulligans Bluff and Cangai Bluff, west of Grafton, NSW		
	Name	**Signed**	**Date**
Approving Manager	Lisa Brown	4M2102	3 February 2006

Person managing this document	**Person(s) writing this document**
Ian Berger	Ian Berger
Location	**File**
G:\environ\assessments\projects\0304\Gwydir Highway\ Mulligans Bluff Heritage\ Mulligans Bluff ha.doc	

Client Reference	**Status**	**Date**
Peter Millar	Final	3 February 2006

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Prepared by Environmental Technology Branch, RTA Operations

Contents

1 Introduction & Background to the Proposal 1

2 History and significance of the retaining walls 2

2.1 History of the Cangai area 2
2.2 First route of the Gwydir Highway 3
2.3 The new route of the Gwydir Highway between Glen Innes and Grafton 4
2.4 Construction and opening of the new route 5
2.5 Description of the retaining walls 7

3 Heritage assessment 112

3.1 Outline of the assessment process 12
3.2 Basis for assessment 12
3.3 Assessment of significance of the retaining walls 13
3.3 Statement of cultural significance 14
3.4 Heritage Listings 15

4 Management Recommendations 15

5 References 16

1 Introduction & Background to the Proposal

The NSW Roads and Traffic Authority (RTA) propose to carry out slope stabilisation works at Mulligans Bluff and Cangai Bluff on the Gwydir Highway, west of Jackadgery. Mulligans and Cangai Bluff as part of the Gwydir Highway have a history of extensive rock falls, which generally coincide with heavy rainfall events. These have previously resulted in closure of the Gwydir Highway on numerous occasions. The Assessed Risk Level (ARL) of both highway sections is rated ARL 2. ARL 2 is the second highest level of risk (out of 5 levels) and generally regarded as tolerable in the short to medium term. The purpose of the proposed slope stabilisation measures is to increase the ARL of both sites to three or above in order to reduce the risk to road users and property.

Several sections of dry stone retaining walls are located at Mulligans Bluff and Cangai Bluff on the downhill slope east of the Highway. The location of the retaining walls is shown in **Figure 1**. As these walls are in excess of 50 years old, they are classified as "relics" under the provisions of the NSW *Heritage Act* 1977. As the retaining walls have not been assessed at this time an investigation was conducted in order to determine their significance, and then to determine the probable impact of the proposed pavement rehabilitation works would have on them.

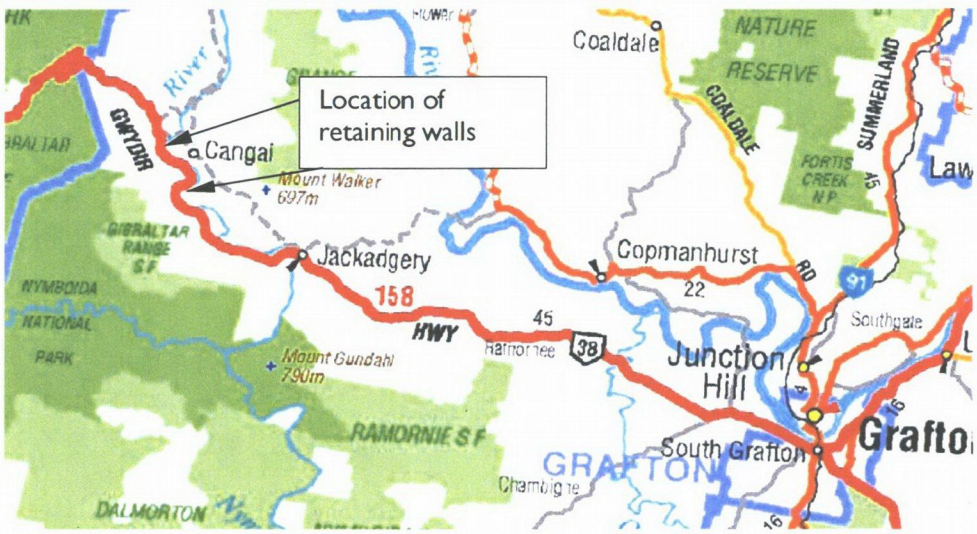

Figure 1: Location of retaining walls (Source: AMG 55 1:25 000. Map extract courtesy of Surveyor General's Department).

2 History and significance of the retaining walls

2.1 History of the Cangai area

The Indigenous people traditionally occupying the Clarence River Valley are the Bundjalung, their land extending North to Baryulgil, Casino and Evans Head. A smaller group the Yaegl occupied the coastal area where Iluka, Yamba and Maclean now exist, and Southwest of this was Gumba Ynggir land. Early explorers report a high density of Aboriginal occupation of the Northern Rivers especially close to the Coast where they could exploit a rich marine environment in addition to the animals and fruits found in the brushes and grassy plains. Details of the mythological landscape of this environment have been lost as a result of European settlement, however the Grafton region contains many indigenous sites on rock walls and ledges lining creeks, rivers and valleys dated up to 6500 years old (HODUAP, 1996:59).

As it nears the sea, the Clarence River widens and stretches out into bays and inlets, its mouth so large that in 1799 Mathew Flinders after spending the night there named it 'Shoal Bay'. (*Clarence River Historical Society*, 1992: 1) Escaped convict Richard Craig reported a big River and a plenitude of valuable timber in the early 1830s, but the area was not further explored until the late 1830s. In 1839 a Sydney merchant Thomas Small and Henry Gillett organised an expedition inspired by Craig's sighting of 'The Big River', on board the schooner 'Susan', it was the first European vessel to enter the River. Small took up a large parcel of land on Woodford Island to run cattle. Although the river was thought to have been first navigated by Captain Butcher, also in 1839 in the William IV steamer, Captain S.A Perry, deputy Surveyor General named the largest River in the North so far discovered the 'Clarence', (HODUAP 1996:64).

Occupation of the area followed immediately and settlers arrived to take advantage of the Rivers' rich alluvial soils and stands of cedar. The forest country around Grafton was deemed suitable for grazing cattle and primitive stations were established in the 1840s. Conflict with the local Bundjalung people inevitably followed settlement. Aboriginal people local to pastoral stations were employed to form a casual labour force, however armed conflict, massacres and disease hastened the decline in the population. Despite this, in the late nineteenth century a substantial population was being 'managed' by the Government and nine reserves had been established. Seeds, tools and rations were provided and Aboriginal men were encouraged to work as stockmen or in fishing and farming (HODUAP, 1996:64).

Cedar getters set up their camps in the late 1830s on the banks of either side of the Clarence at Grafton, which was known as 'The Settlement' from earliest times. The red cedar tree (*Toona australis*) was sought after due to its soft easily worked timber and attractive finish resembling mahogany. The colonists of Sydney and Melbourne had by now decided cedar was the most desirable timber for their building, joinery and furniture both in the colony and for export to England. The manner in which cedar was cut and transported to market heavily influenced the siting of the camps. Cedar was a light timber that could be floated downriver. Cutters working in the rugged upper reaches of the rivers stacked the logs of cedar near the riverbanks. When seasonal floods or high water permitted, the logs were floated downstream. Cedar camps often formed at the places where the logs were caught and where the dealers came to buy the logs for shipment downriver and on to Sydney. To undertake the shipping of cedar logs to Sydney, many quite substantial vessels came up the northern rivers. Initially they were often met with little in

the way of facilities such as docks and repair works but these were gradually developed. The difficulties of navigation on the rivers, still bar bound and with submerged logs, unknown rocks and other debris, coupled with the difficulty of steering sailing vessels upriver with little room for manoeuvre, meant that steam tugboats were vital aids.

By 1836 a considerable trade in cedar had developed in the Clarence River area, but the activities of the cedar getters were confined principally to the lower reaches of the river and they did not penetrate, to any extent, the country that was later to be served by the Gwydir Highway. However, settlement of the country around Grafton was largely due to the operations of the cedar getters. Penetration of the country lying between the New England tablelands and the coast was first made in 1838.

From the 1860s, mining for gold and other minerals became an important industry in the Clarence River Valley with tin, wolfram, mercury, gold and copper being mined in payable quantities. In 1901, large deposits of copper ore were discovered at Cangai near the route of the existing Gwydir Highway. In 1904 a company was formed to work the ore-body and smelting began at the mine in 1906. The oxidised ores were very rich in copper and for several years shipments were sent to Europe for treatment. The outbreak of war in 1914 prevented a regular market for the ore and operations ceased. The smelters at Cangai were fired with timber obtained from the neighbouring hills and the cleared areas on the hillsides are the results of the operations of the timber getters.

2.2 The First Route of the Gwydir Highway

The country between Glen Innes and Grafton- some of the roughest in the State- falls with an abrupt escarpment generally about 915 metres high from the tableland to the ranges adjoining the coastal plain. Major waterways flowing from the tableland have carved deep, winding valleys through the escarpment, leaving high, residual spurs. On the direct line between Glen Innes and Grafton, a particularly rugged strip of hill country about 45 kilometres wide separates the main areas of tableland and foothill country. Neither the ridges nor valleys through this strip are favourable to road location, as the ridges are broken by deep saddles, and steep to precipitous slopes fall directly into the stream bed in many places.

The original route of the Gwydir Highway that was bypassed by the new route was first proclaimed a Main Road in 1876. In the earlier days, this road carried the bulk of the traffic to and from the coast, consisting of timber and tin towards the coast and general store goods in the opposite direction. In 1928, this road was classified as State Highway No.12 – Gwydir Highway. Its name was derived from the Gwydir River which had been named by the explorer Allan Cunningham in 1827, in honour of the Right Honourable Lord Gwydir, the deputy Great Chamberlain of England.

The old Highway route between Glen Innes and Grafton descends from the tableland to the Mann River Valley and crosses a low saddle to reach the Little River which it follows for 43 kilometres between steep mountain sides to the Nymboida River. The foothill country east of the Nymboida River is then traversed to south Grafton. The descent of about 670 metres into the Mann River Valley is spread over a distance of 11 kilometres and is made in three stages. The alignment on the descent is tortuous, particularly on the steep intermediate stage known as "The Big Hill". On "The Big Hill", the road falls a little more than 100 metres in 4 kilometres and follows a zigzag

course with hairpin turns in order to make sufficient distance for the grade. Parts of the road along the Little River are in narrow rock cutting on steep side slopes. At one location, a very steep rock bluff alongside the Little River is negotiated by means of a short tunnel.

2.3 The New Route Of the Gwydir Highway between Glen Innes and Grafton

In 1935, investigations were commenced with a view to providing a road more suitable for motor traffic. It was found that local improvements and widening on the existing road would involve extremely heavy expense without providing a satisfactory road on some sections. No suitable location was found in the vicinity of the existing route and attention was directed to a locality to the north, near Jackadgery, where major streams converge to a single watercourse (the Mann River) and the tableland projects easterly along Cangai Spur to meet the easier foothill country. An attempted ascent to Cangai spur was abandoned on account of difficulties encountered on the escarpment and at a saddle in the spur that is broken by granite cliffs.

Investigations then carried out near Dandahra Creek, a tributary of the Mann River further downstream, indicated more suitable conditions for an ascent and at that stage, in 1937, aerial photographs were taken to cover the escarpment in The Big hill and Dandahra creek areas. These aerial photographs were the first used by the Department of Main Roads for road location purposes in New South Wales. The photographs failed to reveal any new possibilities in The Big hill area and further investigations for the descent were then centred on the Dandahra creek area.

The main difficulty that was encountered was to find a continuous strip of suitable country on the escarpment about 16 kilometres long to support a decent of approximately 900 metres from the tableland. Suitable country was available on the easier slopes near the crests of watersheds, but the lower slopes were generally too steep and broken by deep gullies to support a road. The most favourable feature to support about half of the descent was the main spur between Combadjha Creek and Dandahra Creek, which fell in stages towards a saddle known as Gundah Gap. A line was located near the crest of this spur and continued for the remaining descent beyond Gundah gap, before following minor spurs to the foot. The lower part of this line had to be abandoned when tests were made later on account of the doubtful stability of a short length. A line following a spur known as McKee's Spur rising from Camp Creek replaced the abandoned section.

The new route from Glen Innes to Grafton follows the Old Gwydir Highway route over rolling to hilly tableland country to a point 34 kilometres east of Glen Innes. The deviation then passes for about 40 kilometres through eucalyptus forests and undulating tableland country in the vicinity of Gibraltar Range, on an elevation corresponding approximately to that of Glen Innes, about 1060 metres. The descent of about 914 metres from the tableland is then made on a length of about 18 kilometres on an average grade of about 5.3% with maximum grades of 7%. This descent is mainly through dense rainforest interspersed with hardwood timber on side slopes which, although steep, are considerably easier and less broken than the average slopes of the escarpment. From the foot, the route follows up the Mann River Valley on undulating grades, with occasional heavy cuts, to cross the Mann River at Jackadgery. From Jackadgery to the Old Gwydir Highway route near South Grafton, the general route of a local access road is followed through the foothills.

2.4 Construction and Opening of the New Route

In 1939, when there was a need to provide works for the relief of unemployment, construction of the new road was put in hand from centres established at Gibraltar Range and at Jackadgery. By October, 1942 wartime activities made it necessary to suspend operations. At the end of 1946, work was resumed on a normal basis, but was suspended about a year later when it became necessary to divert men and plant to construct forestry roads in the upper Hastings River area, considered urgent and essential to facilitate timber production for housing purposes. Financial difficulties resulting from rising costs, and the urgency of works elsewhere, rendered it impractical to resume operations until January 1955, when road construction was again put in hand on the Gibraltar Range area, and bridge construction and minor earthworks were put in hand in the Mann River Valley.

The construction of the new route was carried out by the Department of Main Roads, partly by day labour and partly by contract. The most difficult lengths were on the ascent of the Gibraltar Range and at Mulligans and Cangai Bluffs where the road runs alongside the Mann River (**Figure 2**).

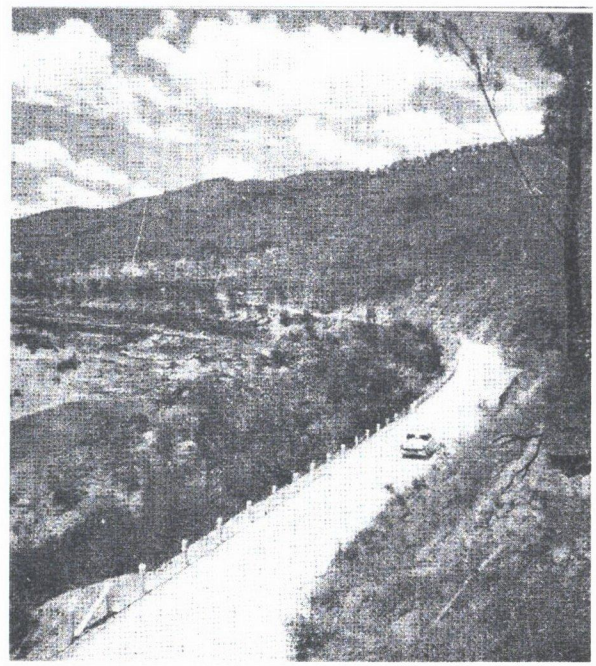

Figure 2: View of the newly opened section of the Gwydir Highway skirting the Mann River at Mulligans Bluff in 1961.

The new route of the Gwydir Highway between Glen Innes and Grafton was opened to traffic bey the Honourable R.J. Heffron, M.L.A., Premier of New South Wales on December 9, 1960, at a ceremony arranged by the Department of Main Roads.

The new road has provided better general intercommunication between the inland and coastal areas. It is, in effect, a deviation of the old route of the Gwydir highway, about 117 kilometres long, leaving the existing Highway route 34 kilometres from Glen Innes and rejoining it 6 kilometres from South Grafton. **Figure 3** indicates the old and new routes of the highway.

The distance between Glen Innes and Grafton via the new route is about 157 kilometres compared with 173 kilometres on the old route and travelling time by car has been reduced from 3.75 hours to about 2.25 hours.

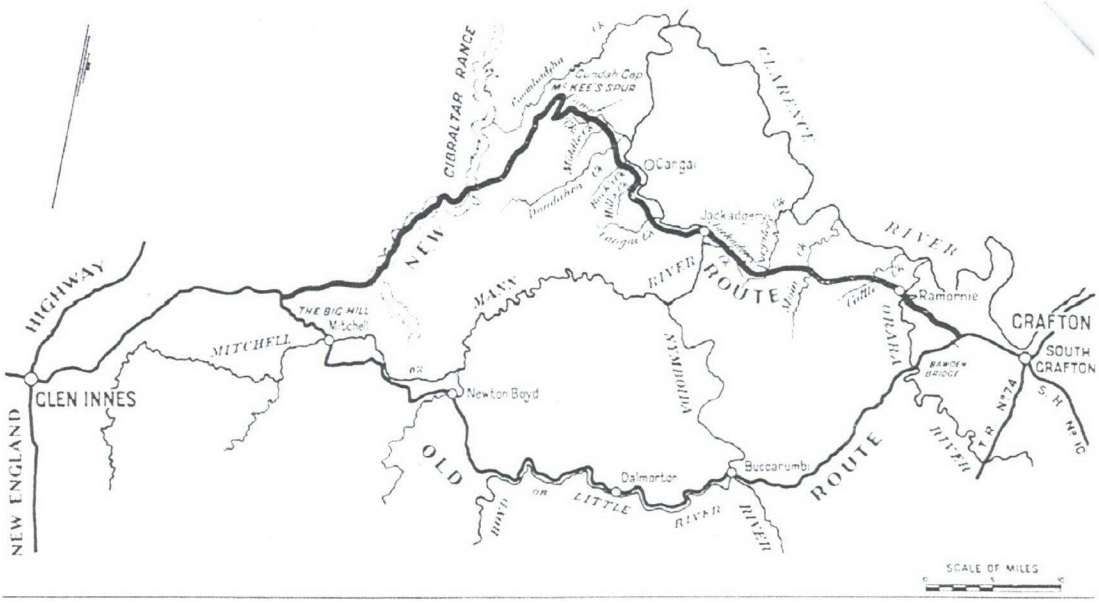

Figure 3: Map detailing the old and new routes of the Gwydir Highway between Grafton and Glen Innes (DMR, 1961:75).

2.5 Description of the two retaining walls

On the sloping ground in the localities of Mulligans Bluff and Cangai Bluff manageable gradients were achieved by cutting the natural surfaces down to the level of the road, and filling the lower sides to the required height. The embanking of the steep slopes at each of these sites was accompanied by the construction of dry stone retaining walls. The operations would have been simultaneous so that the embankment was kept filled to the height of the retaining wall.

The material used for the pavement was a silicified shale and greywacke obtained from the heavy cuttings at Mulligans and Cangai Bluffs and at Jackadgery Gap. The cutting and loading of the material necessitated drilling and blasting and the use of a front-end loader. The material was hauled by contract lorries and tipped on to the road where initial spreading was done by a tractor-dozer. This machine assisted in breaking down the harder lumps of the material. Heavy-duty graders did the final spreading and compaction was achieved through the use of vibratory rollers (*Main Roads*, 1961:79).

2.5.1 Mulligans Bluff retaining wall

The current route of the Gwydir Highway runs northwest to southeast through this locality. The steep slope of the ground can be discerned from the view shown in **Figure 4**. The retaining walls are not continuous and are largely overgrown by overhanging grass and weed. Grass is also visible growing between the blocks. While the steep and overgrown nature of the slope proved an obstacle to recording the full extent of the retaining walls, they were of homogenous composition throughout the study area. One of the northernmost of the walls is the most readily accessible and is approximately 8 metres in length and extends out from the roadway to the south. Apart from this initial deviation the other sections of the embankment run largely parallel with the present road (**Figure 5**).

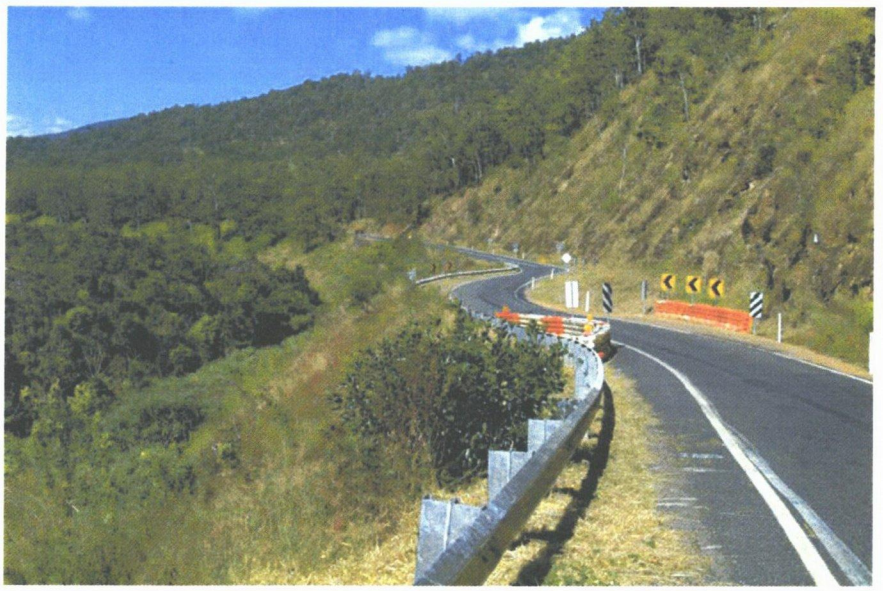

Figure 4: View of the study area at Mulligans Bluff looking southeast.



Figure 5: View of the second most northern section of the wall detailing its proximity to the guardrails.

The section of the wall is shown in profile in **Figure 6**. In accordance with the typology of stonework established by Karskens during her analysis of the Great North Road, this section of wall would best be described as:

Type 2a: The stones have been roughly shaped with a hammer and there are only vague attempts at coursing and jointing (Karskens, 1988:36).

The wall is no greater than 1.8 metres in height and locally sourced shale has been used in its construction (**Figure 7**). Those sections viewed appeared top be in good condition.

The engineers who built the walls evidently understood the importance of keeping water off the road by the construction of a proper drainage system. Side drains would originally have lined the entire road on both sides in the case of flat land, and on the uphill side only when the road was built on a slope. An additional drainage method built into the road were regularly spaced ribbed steel pipe culverts linked to cement-lined channels to carry the water out of the side drains. One of the largest of these culverts is detailed in **Figure 8**.



Figure 6: Section of the northern retaining wall detailing the irregular coursing of the stonework. The overgrown state of the surrounding vegetation is clearly evident.



Figure 7: View of the local material used in the construction of the retaining walls.

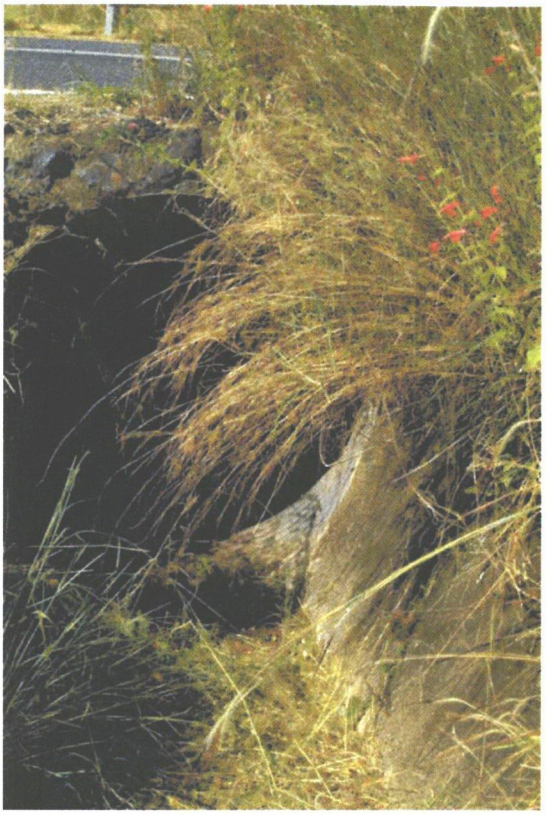

Figure 8: Detail of one of the ribbed steel pipe culverts in place within the study area.

2.5.2 Cangai Bluff retaining wall

The current route of the Gwydir Highway runs northwest to southeast through this locality, which is more gently sloping than at Mulligans Bluff (**Figure 9**). The retaining walls are correspondingly more intermittent and are able to be viewed more readily.



Figure 9: View of the study area at Cangai Bluff looking northwest.

The most representative section of wall at Cangai Bluff is shown in **Figure 10**. The clear similarities apparent in the walls at Cangai, and those previously identified at Mulligans Bluff, would suggest that the same road crews who were working to a standard design constructed them all.



Figure 10: View of the tallest retaining wall at Cangai Bluff.

Drainage was achieved through the provision of regularly spaced precast concrete culverts with angled wingwalls that were very common during the period of construction (**figure 11**).



Figure 11: Detail of the precast concrete culverts in use in the study area.

3 Heritage assessment

3.1 Outline of the assessment process

An assessment of significance seeks to determine and establish the importance or value that a place, site or item may have to the community at large. The concept of cultural significance is intrinsically connected to the physical fabric of the item or place, its location, setting and relationship with other items in its surrounds. The assessment of cultural significance is ideally a holistic approach that draws upon the response these factors evoke from the community. These standardised aspects of significance assessments are generally applied to sites, places or items that have tangible historic structures or relics visible at the site and where there is general understanding of the extent of the historic resources.

Archaeological sites require a different approach to significance assessment because the extent of the heritage resource and the degree to which it can contribute to our understanding of history is not fully known at the outset. It is the significance of the potential of the site to reveal information about the past that needs to be assessed when establishing the cultural significance of archaeological deposits. Similarly, it is the significance of the type of information that can be revealed by the archaeological material, especially where the information is not available through any other source and the contribution it can make to our understanding of a place, which may also be of cultural heritage significance.

3.2 Basis for assessment

The *Australia ICOMOS charter for the conservation of places of cultural significance* (the Burra Charter) was formulated in 1979 and most recently revised in 1999 and is the standard adopted by most heritage practitioners in Australia. The Charter divides significance into various groups or categories for the purpose of assessment. They are: Aesthetic, Historical, Scientific/Technical, Social and Other.

In addition, the State Heritage Register, which was established by the amendments to the NSW Heritage Act in 1998, has a separate set of significance assessment criteria. To be assessed for listing on the State Heritage Register an item will need to meet one or more of the following criteria (HO/DUAP,1996b):

A) an item is important in the course, or pattern, of NSW's cultural or natural history

B) an item has strong or special association with the life or works of a person, or group of persons of importance in NSW's cultural or natural history

C) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW

D) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons

E) an item has the potential to yield information that will contribute to an understanding of NSW's cultural and natural history

F) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history

G) an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places; or cultural or natural environments

A central feature of the amendments to the Act is the clarification and strengthening of responsibility for the management of heritage items at the Local and State level. Subsequently, items can be assessed as having Local or State Significance. An item cannot be excluded from the Register on the grounds that items with similar characteristics have already been listed. These criteria can also be applied to items that do not qualify for a state significance ranking.

These categories are useful in considering a wide range of heritage items and can be applied to sites with items of standing heritage as well as areas with the potential to contain archaeological deposits.

Currently there are no set criteria for the assessment of National levels of significance beyond an extension of the principles and criteria of the Burra Charter. Therefore, levels of National significance cannot be established in a formalised framework for wider comparison. However, some points about national levels of significance are made below where relevant criteria from the Burra Charter provide a viable framework and where a national corpus of comparative site information exists.

3.3 Assessment of significance of the retaining walls

Criterion A (Historic): an item is important in the course, or pattern, of NSW's cultural or natural history.

The road represents the expansion of the NSW road network and the updating of an earlier link in that network. Construction of the road and retaining walls was intermittent between 1939 and 1955 as wartime activities made it necessary to suspend operations in October 1942. Given the difficulties associated with determining when the work was completed in the area and the relatively standardized construction methods used, the retaining walls have been assessed as being of **no** significance under this criterion.

Criterion B (Social): an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history.

The construction of the retaining walls does not have any special association with the life or works of a person, or group of persons, of importance in the local area's cultural or natural history. The retaining walls have been assessed as being of **no** significance under this criterion.

Criterion C (Technical/Aesthetic/Creative): an item is important in demonstrating aesthetic characteristics and/or a high degree of technical achievement in NSW.

The walls demonstrate a relatively low degree of technical achievement as the dry stone blocks are only roughly faced and there is a lack of consistent coursing. The retaining walls have been assessed as being of **no** significance by this criterion.

Criterion D (Social): an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons.

The isolated location of the retaining walls and their near inaccessible nature have ensured that their existence is not widely known to the people of Cangai. The walls have been assessed as having **no** significance in regards to fulfilling this criterion.

Criterion E (Scientific/Technical): an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history

The retaining walls have no technological value as they were of a simple design that enabled their construction by unskilled day labourers working as part of an unemployment relief scheme. The incorporation of prestressed pipe culverts into design further simplified the work through doing away with the need for masonry arches or other complicated structures. The walls have been assessed as having **no** significance in regards to fulfilling this criterion.

Criterion F (Rarity): an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history

The retaining walls at Cangai and Mulligans Bluff represent not uncommon examples of road engineering from the mid 1900s that can be found along the new course of the Gwydir Highway between Grafton and Glen Innes. The walls have been assessed as having **no** significance in regards to fulfilling this criterion.

Criterion G (Representative): an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural history.

In general, the integrity of their design enables the walls to demonstrate the defining aspects of this type of construction. The retaining walls are largely indistinct due to the overgrowth of vegetation and the steep incline and poor accessibility limits the availability of the walls for further study. The walls have been assessed as having **no** significance in regards to fulfilling this criterion.

3.4 Statement of cultural significance

The retaining walls at Cangai and Mulligans Bluff represent not uncommon examples of road engineering from the mid 1900s that can be found along the new course of the Gwydir Highway between Grafton and Glen Innes. The walls demonstrate a relatively low degree of technical achievement as the dry stone blocks are only roughly faced and there is a lack of consistent coursing. While construction of the walls and associated road may have commenced as early as 1939 it is unlikely that they were completed until after 1955. The walls have been assessed as having **no** heritage significance.

3.5 Heritage Listings

Australian Heritage Commission Register of the National Estate	Not listed
NSW Heritage Office State Heritage Register	Not listed
Clarence Valley Local Environmental Plan	Not listed
North Coast Regional Environmental Plan (Heritage) 1988	Not listed
NSW National Trust Register	Not listed
RTA s.170 Heritage and Conservation Register	Not listed

Table1: Listings with statutory and non-statutory authorities.

4 Management Recommendations

Given that the retaining walls at Mulligans Bluff and Cangai Bluff have been assessed as being of **no** heritage significance, any proposed alterations to these elements would not require the preparation of a Statement of Heritage Impact to assess the works.

5 References

Secondary Sources

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