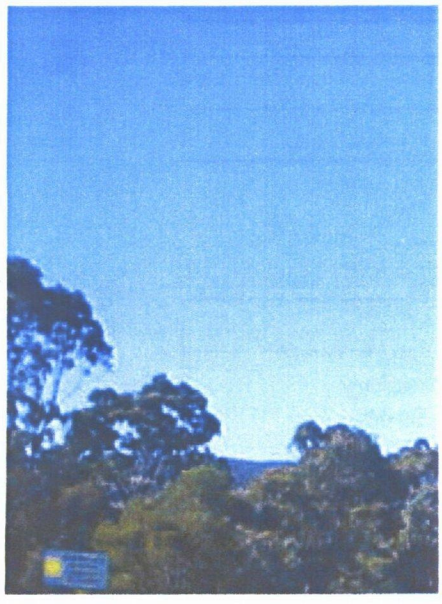
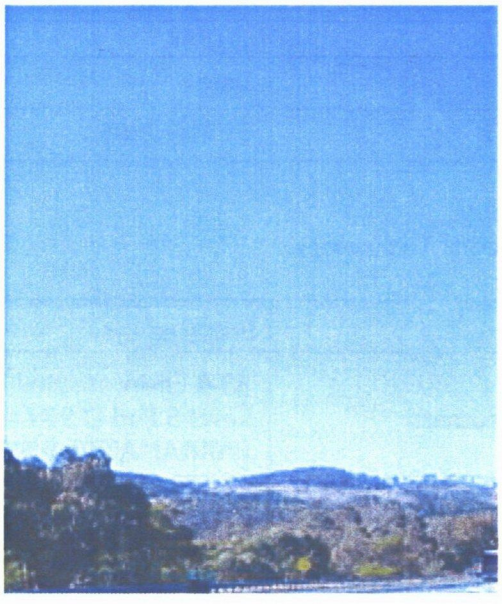
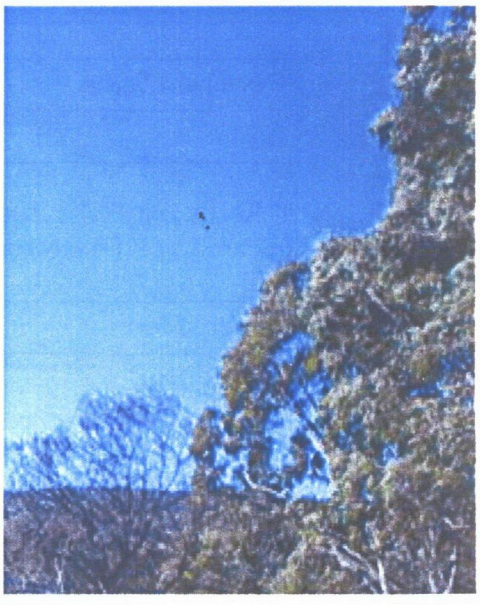
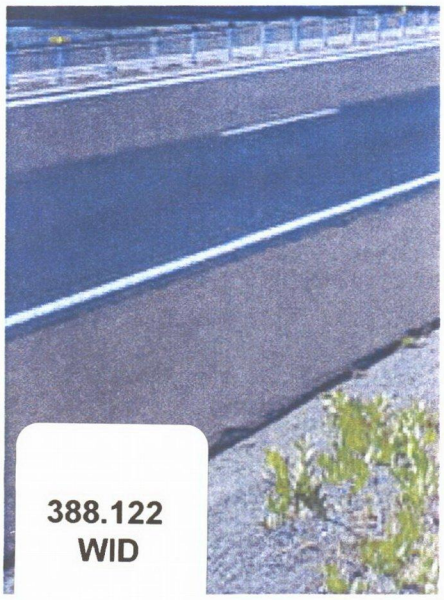
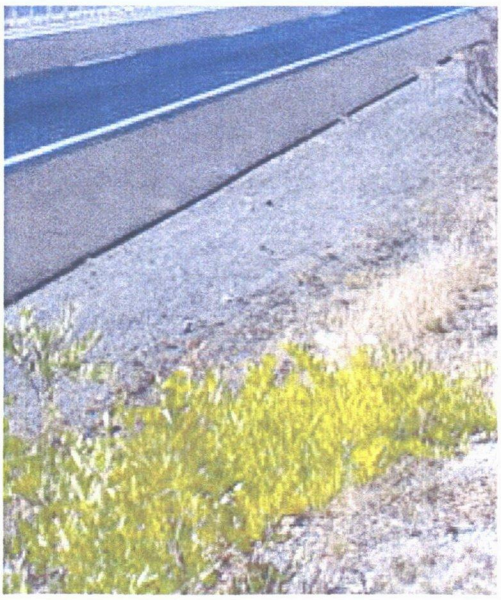
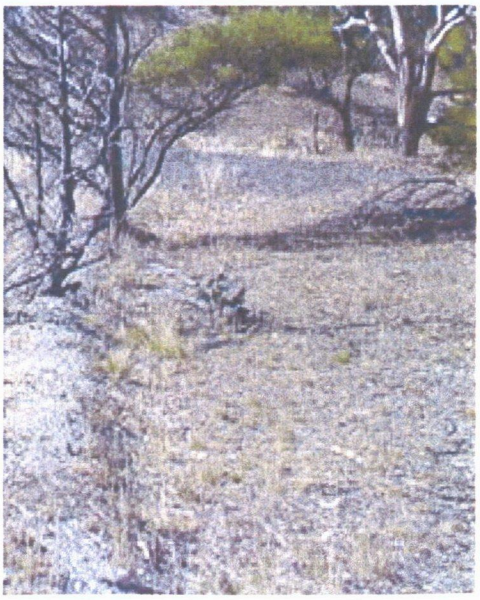
Widening & Intersection Improvements on the Hume Highway at Towrang & Carrick Roads

Review of Environmental Factors

RTA ENVIRONMENTAL TECHNOLOGY BRANCH

MAY 2005

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APPENDICES

1 Introduction and Methodology

1.1 Name of Proposed Activity

Widening and Intersection Improvements on the Hume Highway at Towrang and Carrick Roads.

1.2 Local Government Area

Goulburn Mulwaree Council.

1.3 RTA Region

Southern Region.

1.4 Introduction

The NSW Roads and Traffic Authority (RTA) proposes to improve the existing intersections of the Hume Highway (SH2) at Towrang and Carrick Roads, approximately 10 kilometres (km) north of Goulburn. The intersection upgrades involve widening the Highway to accommodate a wider median.

This Proforma 2 Review of Environmental Factors (REF) has been prepared by RTA Environmental Technology on behalf of RTA Southern 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 2 REF as presented in the RTA's *Environmental Impact Assessment Policy, Guidelines and Procedures, Version 4 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).
- 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 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 site visits on 13 July 2004 and 18 August 2004 to gain an overview of the Proposal and to discuss any issues relevant to the completion of the REF.

3. Consultation was undertaken with the following agencies and RTA personnel:
   - NSW Department of Primary Industries (DPI) (Fisheries);
   - NSW Department of Environment and Conservation (DEC);
   - NSW Department of Infrastructure, Planning and Natural Resources (DIPNR);
   - Towrang Stockade Reserve Trust;
   - Sydney Catchment Authority;
   - RTA's Aboriginal Programs Consultant, Southern Region; and
   - RTA's Regional Environmental Adviser, Southern 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 Inventory;
   - RTA Heritage and Conservation Register (s.170);
   - Local Council Heritage Lists (Local Environmental Pan);
   - National Native Title Claims Tribunal;
   - DEC Aboriginal Heritage Information Management System (AHIMS);
   - DEC Wildlife Atlas threatened flora and fauna records;
   - The Commonwealth Department of the Environment and Heritage (DEH) (EPBC Act) Database; and
   - NSW Fisheries FISH FILES Databases.

5. As part of the environmental assessment undertaken for this REF, an Ecological Assessment, Indigenous Heritage Assessment and Non-Indigenous Heritage Assessment (i.e. a Statement of Heritage Impact) were undertaken to identify the potential impacts associated with the Proposal and to provide environmental impact safeguards. Details

and findings from these assessments are further discussed in Section 8 of this REF and a copy of each study is included in the appendices to this REF.

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

2 Proposal Description

2.1 Location

The Proposal is located on the Hume Highway, approximately 10km north of Goulburn. The Proposal, which includes improving the intersections with Towrang and Carrick Roads, extends for a distance of approximately 1.3km on the Highway, from 300m west of Towrang Road to 200m east of Carrick Road (refer to Figure 1.1).

On a regional scale, the Proposal is located within the Goulburn Mulwaree LGA, which is an amalgamation of the Goulburn and Mulwaree Councils. Prior to the amalgamation of the Councils, the Proposal site would have been located within the Mulwaree Shire.

2.2 General Description of Proposal Site and Surroundings

The proposed intersection upgrades on the Hume Highway are located approximately 10km north of Goulburn (Refer to Figure 1.1). The 'Proposal site' is defined as the area of land in which all construction works would be undertaken, and the land on which the compound and stockpile sites would be situated. The 'study area' is defined as the Proposal site and land approximately 50m to the north and south of the Proposal site. Refer to **Appendix A** for photographs of the study area and to **Appendix B** for a concept plan that highlights the construction footprint boundaries.

The existing Highway within the study area consists of a four-lane divided carriageway with a narrow median (less than 2m) containing a wire rope barrier. The width of the median within the study area is the narrowest along the entire length of the Hume Highway. The median is absent at the intersections with Towrang and Carrick Roads to enable vehicular access to and from these roads. Safety barriers are present along parts of the northern and southern boundaries of the Highway.

The Derrick Victoria Cross (VC) rest area is located on the southern side of the Highway. A left hand turn lane allows southbound motorists to enter the rest area from the Highway, and upon exiting the rest area, motorists can turn left onto the Highway using a short acceleration lane (refer to **Appendix A**).

Rural land which has been previously used for agricultural purposes occurs on either side of the Highway, which has resulted in the removal of most stands of native vegetation from the study area. Small patches of open woodland occur in the area, as well as small isolated stands of native trees, however the majority of the land is open pasture. Land on either side of the Highway supports items and places of indigenous and non-indigenous heritage value, including a scatter and culverts.

Towrang Creek passes through the centre of the site and crosses the Highway via a three-pipe culvert. This ephemeral creek flows in a northerly direction and joins Deep Creek and then joins the Wollondilly River approximately 300m to the north of the Proposal site. Towrang Creek is deeply incised and shows signs of erosion.

The nearest residences are located approximately 300m north of the Proposal site. These residences are located off Towrang Road, to the north of the Wollondilly River. There are no other residences or businesses in the vicinity of the Proposal site.

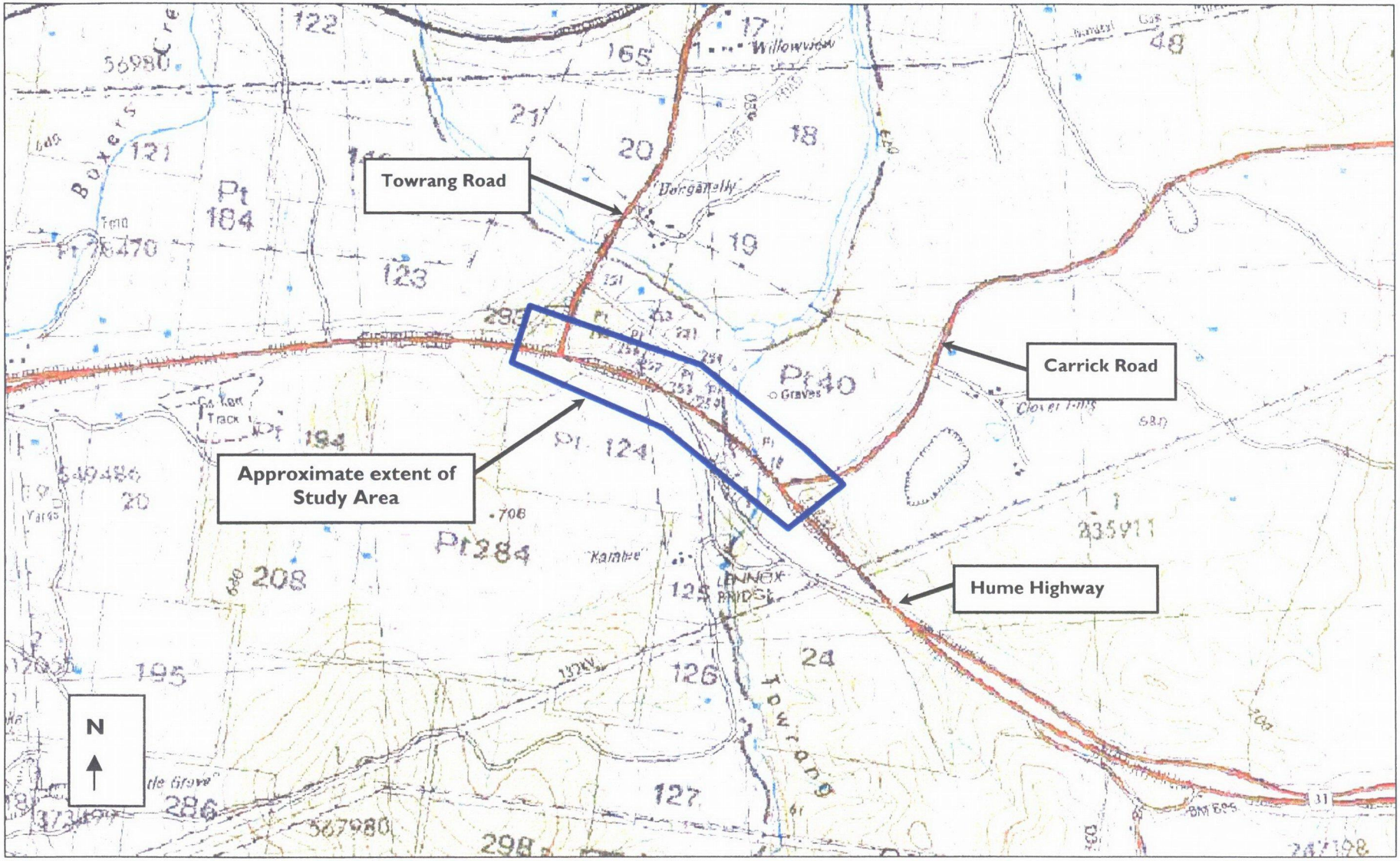

Figure 1.1: Location of the study area (Not to scale)

2.3 General Description of the Proposal

The Proposal involves upgrading the Towrang Road and Carrick Road intersections with the Hume Highway, which are located approximately 10km north of Goulburn. The primary aim of the Proposal is to improve the safety of motorists travelling between Towrang and Carrick Roads and the Hume Highway. The Proposal would involve widening the median between the intersections and applying 'seagull' treatments at the intersections.

2.4 Cost and Source of Funds

The Proposal would cost approximately $5.3m ($out-turn) and funding allocation would be sourced from Federal funding under the *Australian Land Transport Development Act 1988*.

2.5 Timing

It is anticipated that works would commence in March 2006 and be completed in December 2006 given ideal working conditions. The proposed construction activities are likely to be undertaken over a 6 to 9 month period. The entire Proposal, taking into consideration staging, traffic control and other such activities, would be likely to take 18 months.

3 Statutory Position

3.1 Local Environmental Plan

Development on land within the Goulburn Mulwaree Local Government Area (LGA) is controlled by Goulburn Mulwaree Council under the *Mulwaree Local Environmental Plan (LEP) 1995.* The Proposal site is located with Zone No 1 (a) (General Rural), and the Proposal is not prohibited within this zone.

The objectives of this zone are to promote the proper management and utilisation of resources by:

a) *promoting, enhancing and conserving:*

   I. *agricultural land, particularly prime crop and pasture land, in a manner which sustains its efficient and effective agricultural production potential,*

   II. *soil stability by controlling and locating development in accordance with soil capability, as identified by the Department of Conservation and Land Management,*

   III. *forests of existing and potential commercial value for timber production,*

   IV. *valuable deposits of minerals, coal, petroleum, and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits,*

   V. *trees and other vegetation in sensitive areas and in any place where the conservation of the vegetation is significant to the protection of scenic amenity or natural wildlife habitat or is likely to control or contribute to the control of land degradation,*

   VI. *water resources and water catchment areas for use in the public interest,*

   VII. *localities of significance for nature conservation, including localities with rare plants, wetlands, permanent watercourses and significant wildlife habitat, and*

   VIII. *places and buildings of archaeological or heritage significance, including aboriginal relics and places,*

b) *minimising the costs to the community of:*

   I. *fragmented and isolated development of rural land, and*

   II. *providing, extending and maintaining public amenities and services, and*

c) *providing land for future urban development, for rural residential development and for development for other non-agricultural purposes, in accordance with the need for that development, and subject to the capability of the land and its importance in terms of the other objectives of this zone* (Mulwaree Shire Council 1995).

Roadwork activities within Zone 1(a) General Rural of the Mulwaree LEP would be permissible with development consent from the Goulburn Mulwaree Council. However, SEPP 4 applies to this Proposal as the works are for the purposes of a classified road (SH2, Hume Highway), and the requirement for consent is thereby removed. For further information regarding SEPP 4, please refer to Section 3.3 of this REF.

3.2 Regional Environmental Plans

No regional environmental plans apply to the study area.

3.3 State Environmental Planning Policies

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 No. 4 applies to the Proposal, as the proposed works are for the purposes of a classified road as defined by the *Roads Act 1993.* Therefore, the RTA would not require consent from Goulburn Mulwaree Council prior to undertaking the proposed works.

SEPP 44 – Koala Habitat Protection

The Mulwaree LGA is listed on Schedule 1 of SEPP No. 44 (Koala Habitat Protection) as a LGA 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 matters 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 ecological study undertaken for this Proposal (refer to Section 8.6) identified Grey Gum (*Eucalyptus puncata*) as occurring within the study area, a species which is listed on Schedule 2 of SEPP 44 as a Feed Tree Species. This species occurs as the least dominant of four dominant eucalypt species on the northern side of the Highway, and constitutes close to 15% of the number of trees present in the area. Consequently, the study area may support 'potential Koala habitat'.

'Core Koala habitat' is land which has been classed as 'potential koala habitat', and which supports a resident population of Koalas, evidenced by breeding females, recent sightings and historical records. No Koalas were recorded within the study area, nor was there any indirect evidence of Koalas (e.g. scats, scratchings, fur tufts). There are no records of the Koala occurring within 10km of the study area on the DEC Atlas of NSW Wildlife, and the species is not listed as likely to occur in the study area on the EPBC Act online database.

From the database search and field investigations, there does not appear to be a resident population of Koalas within the study area. Therefore, the study area does not support 'core koala habitat'.

SEPP 58 – Protecting Sydney's Water Supply

The study area lies within land to which SEPP 58 applies. The primary aim of SEPP 58 is to ensure that "*development in the hydrological catchment from which Sydney draws its drinking water supply does not have a detrimental impact on water quality*".

"Road works" as defined by the *Roads Act 1993*, that are proposed within the hydrological catchment, require development consent from the relevant local Council. The exception to that general requirement is "maintenance and repair" of road works (Note: maintenance and repair are terms not defined by SEPP 58).

The RTA Environment Branch advised in February 2005 that as the proposed intersection upgrades (ie. this Proposal) are not 'major works', local Council consent under SEPP 58 would not be required.

With regard to Clause 10 matters under SEPP 58:

- The Proposal is expected to have a neutral effect on the water quality of the Wollondilly River hydrological catchment;
- Water quality management practices proposed to be carried out as part of the Proposal are expected to be sustainable over the long term; and
- The Proposal is expected to be compatible with environmental objectives and water quality standards for the Wollondilly River hydrological catchment[1] (SCA 2004).

Impacts on water quality within the Wollondilly River and/or Lake Burragorang would not be expected, providing safeguards specified in Section 9 of this REF are implemented.

The "*Sustaining the Catchments Regional Environmental Plan* (REP)" is due for release in early 2005. This REP is anticipated to remove the requirement for development consent from local Council for works not considered to be "maintenance and repair" under SEPP 58.

3.4 Confirmation of Part 4 or Part 5 Position

All relevant statutory planning instruments have been examined for the Proposal. It is confirmed that local Council consent under SEPP 58 is not required, and SEPP 4 operates to remove the development consent requirements, thereby permitting assessment of the Proposal under Part 5 of the EP&A Act.

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[1] a. Clean, healthy, productive surface and groundwater

b. Productive and protective vegetation and soil achieving an ecological balance

c. A stable and aesthetically pleasing landscape that sustains social and economic land management

d. An aware and responsible community whose actions sustain and improve the quality of life in the catchment

4 Consultation

4.1 Community Involvement

The improvements to the Towrang Road and Carrick Road intersections have been in development since 1998. As part of the development of the Proposal, consultation with the former Mulwaree Council and the community was undertaken in 2003. This is discussed further in Section 6.2. As initial consultation has already been undertaken with Mulwaree Council, no further consultation with Council has been undertaken during the preparation of this REF, on request of the Project Manager.

It is anticipated that the REF would be placed on public exhibition and the comments raised by the community would be taken into consideration.

4.2 Government Agency and Stakeholder Consultation

Relevant government agencies were contacted and provided with the opportunity to comment on the Proposal. Written correspondence including a copy of the concept plan was sent to the government agencies on 24 September 2004, and a response was requested by 18 October 2004. Copies of the letters received are included as **Appendix C**.

Table 4.1 lists government agencies that were invited to comment on the Proposal for the purposes of this REF. All responses have been summarised and where applicable addressed within the REF.

Table 4.1: Summary of issues raised and RTA's response.

Government Agency Comments	Section in REF where addressed
DEC (Conservation Programs & Planning Branch)	
A verbal response to the consultation letter was received on 30 September 2004. DEC (Conservation Programs & Planning Branch) has the following comments to make with regards to the Proposal:	
• DEC's Environmental Assessment Guidelines for flora, fauna and cultural heritage, should be followed where appropriate.	8.6, 8.7, 8.8, App E, F, G
• The potential occurrence of White Box – Yellow Box – Blakely's Red Gum Woodland within the study area should be considered.	8.6, App E
DEC (Environment Protection & Regulation Division)	
A written response to the consultation letter was received on 14 October 2004. DEC (Environment Protection & Regulation Division) has the following comments to make with regards to the Proposal:	
• The proposed works will not be a scheduled development under the *Protection of the Environment Operations Act 1997* and as such, will not require an Environment Protection Licence from DEC.	Noted. 3.5

• The DEC's Attachment "Issues to be considered in the preparation of a Review of Environmental Factors" should be noted and followed where appropriate. The issues include:	
➢ Scope of Works	2 and 7
➢ Water	8.4
➢ Air	8.5
➢ Noise	8.9
➢ Waste	8.12
➢ Pollution Control	8.4, 8.5, 8.10, 8.12
DIPNR	
A written response to the consultation letter was received on 29 November 2004. DIPNR has the following comments with regards to the Proposal:	
• Given the likely excavations in or within 40m of Towrang Creek and the Wollondilly River, the RTA is however exempt from the provisions of the *Rivers and Foreshores Improvement Act 1948* for the need to acquire a part 3A Permit for such works.	Noted
• Construction activities have the potential to cause erosion and sediment transport into Towrang Creek and the Wollondilly River and the REF will need to acknowledge these risks and articulate a well-defined erosion and sediment control strategy to be designed and implemented during and following the project construction phase.	8.2, 8.4
• DIPNR would be pleased to provide comment on the final REF documentation.	Noted
DPI (NSW Fisheries)	
A written response to the consultation letter was received on 13 October 2004. DPI states that the principal area of concern would be the potential impacts on Towrang Creek, and would like to see the following issues addressed in the REF:	
• Nature and extent of buffer zones to be put in place to protect Towrang Creek from construction activity during the proposed works.	8.4
• Sediment and erosion control methodology to be implemented at the proposed site during construction.	8.2, 8.4
• Extent of any riparian vegetation removal to be undertaken in order to cross Towrang Creek.	8.6, App E
• Details on any proposed culvert work. Any proposed creek crossing works should be undertaken in accordance with the NSW Fisheries *Fishnote Policy and Guidelines for Fish Friendly Waterway Crossings* and *Why Do Fish Need to Cross the Road? – Fish Passage Requirements for Waterway Crossings.*	7, 8.4, 8.6
RTA is to notify DPI of any works that it proposes to undertake that will involve dredging and reclamation activities.	Noted
RTA is to provide DPI with details on the proposed design/s of the road crossing of Towrang Creek and the aquatic habitat conditions in the vicinity of the proposed works.	8.6

Sydney Catchment Authority	
A written response to the consultation letter was received on 30 October 2004. SCA has the following comments in regards to the Proposal:	
• The proposed works are located in the hydrological catchment of the dams managed by the SCA. In particular the works are located in the Wollondilly River subcatchment.	3.3, 8.4
• The proposed works have the potential to impact on water quality in the catchment during the construction and operation stages. RTA should consider water quality issues in the design, construction and operational stages of the project.	8.4
• SEPP 58 applies to the site. SEPP 58 states that road work on classified roads requires development consent from the local council other than road work comprising repair or maintenance. The SCA recommends that RTA confirm with the local council as to whether they consider a development application is required.	3.3
• Irrespective of whether the Proposal is assessed under Part 4 or 5 of the EP&A Act, there is a need for decision making authorities to consider clause 10 of SEPP 58. Each part of clause 10 should be addressed in the REF.	3.3
• The SCA encourages the RTA to investigate opportunities to improve the management of stormwater from adjacent sections of the highway in conjunction with the works required for the Proposal.	Noted
• The SCA would like the opportunity to comment on draft soil and water management plans.	Noted
• No approvals are required from the SCA for the Proposal. Note however that if a development application is required the council will need to notify the SCA of the application and provide the Authority with 21 days to provide comments.	3.3
Towrang Stockade Reserve Trust	
A letter dated 3 February 2005 was received in relation to the Proposal. The Trust has the following comments in regards to the Proposal:	
• The presence of a stockade area adjacent to the Highway and the proposed road works.	8.7
• The Trust currently has access from the Highway via an easement through the property of Mr Andrew Studdert and hence to various historical sites. The Trust has had a stile over the existing RTA boundary fence to allow pedestrian access for many years. This stile has recently been removed due to safety concerns. The Trust requests that provision be made for continued access to this historical area in any future development and would like to be kept advised.	7.5.3, 8.11

Note: App = Appendix/Appendices

5 Strategic Stage

5.1 Background

The Hume Highway between Sydney and Melbourne forms part of the National Highway network. It is a major interstate corridor, carrying 20 million tonnes of road freight every year (RTA 2003). Approximately 10 million people use the Highway every year (RTA 2003). Most of the Hume Highway, including all of the 294km in Victoria, is built as a four-lane divided Highway. About 100km of the Hume Highway in New South Wales (NSW) is not divided, including much of an 88km section south of the Sturt Highway junction to Albury (DoTARS 2004).

Daily traffic levels vary considerably, from around 80,000 vehicles per day (vpd) near "The Crossroads", south of Sydney, to a low of about 4700 vpd between Tarcutta and Holbrook in southern NSW, before rising again around Albury. Traffic levels on the Hume Highway in Victoria average 20,000 vpd, but 66,000 vpd north of Melbourne. Commercial and heavy transport vehicles comprise between 16 to 40 percent of the traffic stream, depending on the location.

The section of the Hume Highway between Carrick Hill and Boxers Hill (near Boxers Creek) is the only section of the carriageway between Mittagong and Goulburn with a narrow median; a painted median (2m wide) and a wire rope barrier separates the northbound and southbound carriageways. Both the Carrick Road and Towrang Road intersections, the subjects of this Proposal, are located within this section.

The local community have raised safety concerns primarily relating to turning right onto the Highway from Towrang and Carrick Roads (speed of traffic, reduced sight distance, narrow median in which to wait, and no acceleration lane) and turning left off the Highway into these roads (short deceleration lanes). In August 2003, the options considered for improving this section of Highway were displayed at the (then) Mulwaree Council chamber at Goulburn (refer to Section 6.2), and a preferred option for the upgrade of the two intersections was selected taking into consideration the community's responses.

5.2 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. In the RTA's Corporate Plan *Journey Ahead 2003-2008*, improving road safety is the number one priority.

The Proposal incorporates the initiatives of the NSW Government's integrated transport plan, *Action for Transport 2010* and its companion document *Road Safety 2010* by:

- Meeting the needs of the growing and changing population;
- Making freight more competitive;
- Keeping the road network in good order;
- Getting the best out of the road network; and
- Preventing accidents and saving lives.

The Proposal also supports the following objectives for the National Highway (DoTARS website 2004):

- Facilitating overseas and interstate trade and commerce;
- Allowing safe and reliable access by a significant proportion of Australians to the services provided by major population centres;
- Minimising the cost of the National Highway to the Australian community;
- Supporting regional development; and
- Contributing to ecologically sustainable development.

The Federal Government has committed $5.5 million for the intersection upgrades at Towrang and Carrick Roads (DoTARS website 2004), and an additional $205 million for duplication of the Highway and for other safety works on this road. The Proposal falls within the scope of the intersection upgrades and additional road safety works.

5.3 Need for the Proposal

The Hume Highway is part of a major interstate corridor, which provides a vital link to regional freight networks (RTA 2003). There are safety issues associated with the section of the Highway within the study area, which are:

- The section of the Hume Highway within the Proposal site is the only section of the Highway between Mittagong and Goulburn with a very narrow median. This poses safety concerns for vehicles travelling at high speeds, especially heavy vehicles, which make up approximately 25% of the traffic stream. The potential for cross centre accidents is higher as a result of the narrow median.
- Vehicles turning right out of Towrang and Carrick Roads onto the southbound carriageway face restricted sight distance, a lack of acceleration lanes and a narrow median in which to wait. This poses safety concerns as vehicles try to enter the Highway on which vehicles are travelling at 110kph. The community, in previous community consultation undertaken, has raised this as a safety issue.
- Vehicles turning left into Towrang and Carrick Roads have short deceleration lanes. This has the potential for collisions to occur between vehicles turning left and vehicles travelling behind them. This was also raised as a community concern.

The proposed Towrang Road and Carrick Road intersection upgrades and widening of the median within the study area would improve the safety of motorists using this area. The Proposal would reduce delays for traffic wishing to turn right onto the Highway from Towrang and Carrick Roads and improve safety for motorists turning from the Highway into these roads. By undertaking the proposed works, it would allow the RTA to meet its strategic objectives outlined in Section 6.1 above.

6 Concept Stage

6.1 Proposal Objectives

The objectives of the Proposal are:

- To improve travel conditions along the Hume Highway within the study area;
- To improve the design of the Towrang and Carrick Road intersections in order to increase the safety of motorists moving between the Highway and these roads; and
- To increase the median width along the Hume Highway within the study area in order to increase motorists' safety and to make the road design more consistent with other sections of the Hume Highway.

6.2 Options Considered

Early in the Proposal development process in 1999, several options were considered for the safety improvements at Towrang and Carrick Roads:

1. U-turn facilities at Tiyces Lane and Boxers Creek Road, and close the median at Towrang and Carrick Roads;
2. 'Seagull' treatment at the Towrang Road intersection with no improvements to the Carrick Road intersection;
3. Close Towrang Road and connect with Carrick Road via a new local road without any change to the Carrick Road intersection;
4. Close Towrang Road and connect with Carrick Road via a new local road and 'seagull' treatment at the Carrick Road intersection;
5. Prohibit right turn out of Towrang Road, connect to Carrick Road with an extra lane on the Highway and U-Turn in Carrick Road, and 'seagull' treatments at the Carrick Road intersection;
6. 'Seagull' treatments at Towrang Road and Carrick Road junctions, and wider median separation over the full length between Towrang and Carrick Roads; and
7. Ultimate 4.6km deviation of the Highway.

Option 1 was not favoured due to the extra travel distance involved as a result of closing medians, and physical restrictions in locating an alternative to Tiyces Lane which has limited sight distance.

Option 7 was not favoured because of high strategic estimate at around $45-50 million.

The other options were discussed with Mulwaree Shire Council and further reviewed. Subsequently, three options were identified for community consultation as follows:

- Option 4;
- Option 5; and
- Option 6.

The three options were displayed at the (then) Mulwaree Shire Council office at Goulburn from 28 July to 15 August 2003 and an information session was held at Towrang on 9 August 2003. Community feedback from the display and information session was presented to the DOTARs on 21 November 2003 (refer to **Appendix C**).

6.3 Preferred Option

Option 6 was selected as the preferred option based on the community responses and road safety issues. However, Option 6 has been modified slightly to better suit the objectives of the Proposal.

The modifications include retaining the existing wire rope barrier for added road safety, and reviewing the proposed width of the median as the development of the concept design progresses. A comparison of accidents before and after the wire rope barrier was put in place (RTA 2004) suggests that whilst the wire rope barrier has not reduced the number of crashes, it has stabilised the severity of crashes, and for this reason the wire rope barrier would be retained where sight distances are not affected.

7 Design Considerations

7.1 Existing Road

The Hume Highway within the study area consists of a four-lane divided carriageway. The northbound and southbound carriageways are separated by a narrow 2m wide painted median with a wire rope safety barrier. The median width within the study area is the narrowest along the length of the Highway between Mittagong and Goulburn, and is absent at the intersections with Towrang and Carrick Roads to enable vehicular access to and from these roads. Safety barriers are present along parts of the northern and southern boundaries of the Highway. The speed limit within the study area is 110kph.

Towrang and Carrick Roads join the northbound carriageway of the Highway. The Towrang Road intersection is located in the southern part of the study area and the Carrick Road intersection located in the northern part of the study area (refer to Figure 1.1). One right-hand turn lane is present on the southbound lane near each of the two intersections, allowing traffic to turn right off the Highway into Towrang and Carrick Roads. A short deceleration lane on the southbound carriageway allows traffic to turn left into the Derrick VC rest area, and an acceleration lane to re-enter the Highway from the rest area.

Towrang Creek passes under the Highway via a three-pipe culvert, roughly through the centre of the Proposal site. Another culvert occurs near the Towrang Road intersection. This culvert is referred to as Culvert No. 4 in the SOHI (refer to Section 8.7 and **Appendix F**).

A number of directional signs and safety signs are present along the northern and southern edges of the Highway. These include signs marking Towrang Creek, Carrick and Towrang Roads, the rest area, and a 'Give Way' sign for vehicles exiting the rest area. Safety barriers are present along the entire length of the northern side of the Highway within the Proposal site, but only near the three-pipe culvert on the southern side. Overhead powerlines (parallel to the road) and telecommunication cables (parallel to and across the road) occur within the study area.

7.2 Existing and Forecast Traffic

The AADT on the Hume Highway at the nearest location to the Proposal site (ie. at Marulan) is approximately 28,000 for the year 2003. Based on recent increases in traffic numbers, the AADT for 2004 would be approximately 29,500. Heavy vehicles make up approximately 20-25% of all traffic movements.

For the period October 1998 to September 2003, there were 29 accidents on the northbound carriageway, with 11 accidents resulting in injury. By comparison, there were only five accidents on the southbound carriageway over this period, with two accidents resulting in injury.

7.3 Urban and Regional Design

The urban and landscape design vision of the Proposal is to provide a safe and efficient Highway that builds on the existing road character. This would be achieved by:

- Retaining the character of the study area as a Highway and major transport corridor;
- Removing only those areas of vegetation that have to be removed for the Proposal;
- Undertaking landscaping works after the completion of construction activities; and
- Design and posted speed to remain at 110kph.

Urban design would be considered in more detail as part of the detailed design of the Proposal.

7.4 Design Parameters

7.4.1 Features

The following design parameters would apply to the Proposal:

- The design and posted speed along the Hume Highway would be 110kph;
- For the majority of the study area, the northbound and southbound carriageways would have two lanes each;
- On approach to the Towrang Road and Carrick Road intersections, the northbound carriageway would have an additional lane, allowing vehicles to decelerate safely while turning into the two roads, and to accelerate safely while re-entering the southbound carriageway from these roads;
- On approach to the Towrang Road and Carrick Road intersections, a deceleration lane would be provided on the southbound carriageway adjacent to the median, allowing vehicles to slow down safely in order to turn right into Towrang and Carrick Roads;
- Protected right turns would be provided for vehicles entering the southbound carriageway from Towrang and Carrick Roads. An acceleration lane would be provided to allow vehicles to safely speed up and then merge with traffic on the Highway;
- Each of the lanes would be 3.5m wide;
- The road shoulders would be 3m wide;
- The median would be 10m wide;
- The pavement would be flexible with a design life of 30 years;
- The stormwater drainage system would be transverse to 100 years ARI, and pavement to five years ARI; and
- Widening of the Highway would be undertaken predominantly on the northern side of the Highway.

7.4.2 Constraints

Design constraints associated with the Proposal include:

- Towrang Creek, which crosses the Hume Highway within the study area;
- Culverts of heritage value located within the Proposal site and study area;

- The remains of a weir of heritage value, located in Towrang Creek to the north of the Highway;
- The Derrick VC rest area located to the south of the Highway; and
- Telecommunication cables located on either side of the Highway.

7.5 Construction Activities

7.5.1 Work Methodology

The proposed works would be undertaken by a Contractor selected after a competitive tendering process, and would include the following activities:

- Installation of temporary erosion, sedimentation and drainage controls;
- Establishment of a stockpile and compound site;
- Removal of vegetation;
- Relocation and/or adjustment of all affected utilities, services and signage to suit construction programme requirements;
- Median topsoil stripped and stockpiled on-site by bulldozers, graders, loaders and trucks;
- Surface preparation by graders and other equipment;
- Compaction of the resultant surface using compaction equipment;
- Recycling of suitable excavated material and incorporation of unsuitable material in earthworks within the median;
- Import of select material for earthworks;
- Compaction by rollers and equipment with trimming by graders;
- Construction of roadside batters;
- Construction of gravel pavement;
- Construction of roadside kerbs;
- Application of asphaltic concrete wearing surface by pavers and rollers;
- Landscaping of exposed areas;
- Installation of line marking, lighting, sign structures and sign posting;
- Installation of safety barriers; and
- Site clean up and disposal of all surplus waste materials.

Road widening works at creek

The length of the existing three-cell culvert at Towrang Creek would be extended to accommodate the road widening works. Appropriate erosion and sedimentation controls would be implemented during the road widening works in the vicinity of Towrang Creek.

7.5.2 Construction Equipment

The Proposal would require the use of the following plant and equipment:

- Front end loaders;
- Excavation plant;
- Back hoes;
- Trenching machines;
- Chain saws;
- Jack hammers;
- Dump trucks;
- Bulldozers;
- Graders;
- Stump grinder;
- Vibrating rollers;
- Concrete agitator trucks;
- Concrete and asphaltic paving machines;
- Water tankers;
- Road sweeper;
- Line marking vehicles;
- Light commercial and passenger vehicles;
- Low loader transporters;
- Milling machine; and
- Trucks transporting excavated material from the site or within the site and to deliver material onto the site.

7.5.3 Access

Access to the Derrick VC rest area would be maintained during the construction and operational stages of the Proposal. Providing pedestrian access into the Towrang Stockade located to the north of the Proposal site would be considered.

7.5.4 Source of Material

The Proposal would involve excavation works (approximately 6980m^3), and this material would be reused and applied as fill material within the Proposal site.

Additional fill material (approximately 26,600m^3) would be required for the Proposal. The fill material would be either imported from a nearby local quarry (eg. Divalls), or from another suitable source. The fill provider would be required to hold all relevant environmental and planning approvals.

Please note that this REF does not cover any quarrying activities to obtain fill, or associated activities such as crushing or grinding. A separate environmental assessment may be required for the sourcing of fill. In addition, should the Proposal at any time obtain, process or store for sale or reuse extractive material of more than 30,000m^3, a licence under Schedule 1 of the PoEO Act may need to be sought from DEC for Extractive Industry.

7.5.5 Additional Truck Movements

It is anticipated that at the height of the construction up to 50 additional heavy vehicle movements would be experienced per day, although typically an average of 20 extra movements per day would be expected.

The highest number of truck movements is likely to be for the importation of gravel.

7.5.6 Workforce and Working Hours

The workforce would comprise approximately 20 personnel.

It is anticipated that construction activities would be undertaken during standard working hours adopted by the RTA as detailed below:

Monday-Friday:	7.00am to 6.00pm
Saturday:	8.00am to 1.00pm
Sunday and Public Holidays:	No work

No night work is proposed as part of this Proposal. Should work be required outside of the standard working hours, the procedure contained in the RTA's *Environmental Noise Management Manual* (2001), *"Practice Note vii – Roadworks Outside of Normal Working Hours*" would be followed.

7.6 Stockpile and Compound Sites

A temporary compound site would be located on the northern side of the Highway within the road reserve. The site would be located immediately to the east of the Hume Highway/ Towrang Road intersection. This area has previously been disturbed and forms part of the old Highway alignment. The following would apply to the proposed stockpile and compound site:

- The site would not extend to the culvert marked "Number 4" in the SOHI;
- The compound and stockpile sites would be located in areas previously disturbed that do not require the clearing of native vegetation, and in areas considered to be of low conservation value for flora, fauna and indigenous or non-indigenous heritage;
- No vegetation clearing would be undertaken for the establishment and use of the compound and stockpile site. Should the clearing of vegetation be required, the RTA's Regional Environmental Adviser, Southern Region, would be contacted and consulted to determine the need for further assessment;
- The compound site would be security fenced and would include amenities sheds, portable toilets, plant and equipment storage areas, and bunded areas for the storage of petroleum, distillate and other chemicals;
- The compound and stockpile site would not be located within 50m of Towrang Creek or any other drainage line;
- The compound and stockpile site would be located on level, hard ground wherever possible, and would not be located on slopes steeper than 1:10;
- The compound site would be suitably located and protected to minimise the impact of any spillage of fuels or chemicals or contamination on or around the Proposal site;
- The compound site would be appropriately signed and fenced;
- Waste bins with secure lids would be provided at the compound site;
- Rubbish would be removed from the compound site on a regular basis;
- Plant and vehicles would not be parked within the dripline of any trees;

- Fuels and chemicals would be stored in bunded areas within the compound site so that spillage can be contained effectively. Any drums containing fuel and chemicals would be bunded to contain 120% of the volume of the drum;
- Stockpiles would be maintained at least 5m from trees; and
- Should the compound site be located outside of the road reserve, the RTA would undertake an appropriate level of consultation with the land owner prior to the commencement of any works.

All stockpiles would be managed according to the RTA's *Stockpile Site Management Procedures* 2001. The location of any stockpile and compound site would be subject to approval by the RTA in consultation with the RTA's Regional Environmental Adviser, Southern Region.

7.7 Utilities

The Proposal may require the relocation and/or replacement of telecommunications utilities present within the Proposal site. At the time of writing this REF, the exact details of the relocation and/or replacement of telecommunications utilities is not known. The Proposal is not expected to have any impact on a gas pipeline located nearby the Proposal site.

7.8 Property Acquisition

The partial acquisition of land would be required on the northbound side of the Highway. Negotiations with landholders would be undertaken prior to the commencement of works. All property valuations and acquisitions would be carried out in accordance with the RTA *Land Acquisition Policy* and the *Land Acquisition (Just Terms Compensation) Act 1991*.

8 Environmental Assessment

8.1 General

This section of the REF provides a detailed discussion of the potential environmental impacts associated with the Proposal, and provides site-specific environmental safeguards to ameliorate the identified potential impacts.

The environmental safeguards predominantly outline additional site-specific requirements which are not covered by the RTA's *QA Specification G36 (Environmental Protection - Management System), QA Specification G38 (Soil and Water Management - Soil and Water Management Plan*), and *QA Specification G40 (Clearing and Grubbing)* for inclusion into the Contractor's Environmental Management Plan (CEMP). These environmental safeguards would be implemented prior to construction, during construction, and post-construction. The RTA's Regional Environmental Adviser, Southern Region, would review the CEMP prior to the commencement of works.

8.2 Landform, Geology and Soils

Existing Situation

Landform

The study area is located within a region that is characterised by undulating to rolling low hills. The lowest point of the Highway within the study area is where Towrang Creek crosses the Highway. Land on the northern side of the Highway slopes steeply near the road and then falls more gently towards the creek. Most of the land to the south of the Highway slopes steeply towards the Derrick VC rest area, and the remaining land either slopes gently away from the Highway or forms a steep batter created during the construction of the Highway.

Geology

The geology associated with the Midgee Soil Landscape (see below) is Ordovician and Silurian sediments (Hird 1991). Rocks include silty sandstone, siltstone, greywacke, phyllite, shale, slate and quartzite. The soil parent material is made up of in situ and alluvial-colluvial material derived from the parent rock (Hird 1991).

Soils

Soils to the north and south of the Highway in the study area are of the Midgee Soil Landscape (Hird 1991). Commonly occurring soils include Yellow Earths and Yellow Podzolic Soils, with the Yellow Earths occurring predominantly on higher ground than the Yellow Podzolic Soils (Hird 1991). These soils are moderately to well drained and are susceptible to erosion. Other soils that occur within this soil landscape include Red Podzolic Soils, Lithosols, Soloths and Red Earths (Hird 1991). Within this soil landscape evidence of salinity is generally absent, and gullying of drainage lines occurs (Hird 1991). Within the study area, Towrang Creek is deeply incised and displays some erosion.

Potential Impacts

The Proposal would involve earthworks associated with the widening of the Highway and upgrading of the two intersections, including works within Towrang Creek on the

northbound side of the Highway. Risks associated with the Proposal in relation to landforms, geology and soils are mainly associated with soil erosion as a result of soil disturbance and exposure.

The soils present in the study area are highly erodible and there is potential for erosion to occur during the construction stage of the Proposal. Soils within the study area have the potential to be degraded and eroded through the exposure of surface areas, vegetation removal, erosion of stockpiles and from the compaction of soils from heavy machinery. Earthworks undertaken in the vicinity of Towrang Creek have the potential to erode the creek banks, and there is potential for sedimentation to occur within the creek, particularly after a rain event.

Site Specific Safeguards

- A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP, prior to the commencement of construction. The SWMP would address the environmental safeguards detailed in the RTA's QA Specifications G36 and G38.
- Prior to the commencement of works, access routes and construction boundaries would be established. Access tracks to the compound site and the construction areas, including near Towrang Creek, would be staked, fenced and outlined on detailed designs. All plant and vehicle access would be restricted to the specified access routes and would not utilize any surrounding or adjacent surface areas. All staff would be advised of the access and route requirements.
- Prior to the commencement of works, appropriate erosion and sedimentation controls would be installed. All erosion and sedimentation controls and bank stabilization methods would be selected to minimize impacts on the hydrology and geomorphology of Towrang Creek.
- Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. This would include:
  - Clearing sediment from behind barriers on a regular basis;
  - Ensuring all controls are working effectively at all times;
  - Checking that all sediment control structures are properly installed and have not been displaced or damaged (especially after rain); and
  - Checking that the sediment control structures are functioning.
- Vegetation clearing would be undertaken in stages, to minimize the area of exposed soil. Cleared areas which may remain exposed for a length of time would be stabilized appropriately;
- The stripping of topsoil and the stockpiling of surplus materials would not be undertaken during periods of heavy rainfall.
- Topsoil would be retained and used in landscaping works.
- Earth batters would be stabilized by hydromulching with a sterile cover crop and local native seeds.
- Methods for bank stabilization and scour protection would include soft engineering options. All scour protection options would be designed in consultation with DIPNR and the RTA's Regional Environmental Adviser, Southern Region, during

the detailed design stage and implemented where applicable prior to construction, during construction and post construction.

- Imported fill required for the Proposal would be sourced from a proprietor(s) holding all relevant environmental and planning approvals.
- Hard stand material or rumble grids would be used, where applicable, to prevent the tracking of soil and mud onto pavement surfaces.
- Any material transported onto pavement surfaces would be swept and removed and disposed of at the end of each working day.
- All stockpiles would be designed, established and operated and decommissioned in accordance with the RTA's *Stockpile Management Procedures 2001*. In addition, all stockpiles would be located 50m away from the high bank of Towrang Creek or any other creeks, rivers or drainage lines.
- Should any spillage occur on soils during the construction stage, the Regional Environmental Adviser, Southern Region, would be contacted immediately, and contaminants would be immediately contained, removed, treated (if necessary) and disposed of to the satisfaction of the DEC.

8.3 Climate

Existing Situation

Climate statistics were obtained from a meteorological station at Goulburn, approximately 10km to the south of the study area. This station is the closest meteorological station to the study area and the data from this station are representative of the climatic conditions experienced at the study area.

The average annual precipitation recorded at Goulburn is 655.2mm. Generally, the area experiences higher rainfalls in late spring and summer, and lower rainfalls in late autumn and early winter, with November being the wettest month and July being the driest month (Bureau of Meteorology website).

The area experiences mild summers and cold winters. The average daily temperature ranges from a maximum of 27.4°C in summer and 11.5°C in winter, and a minimum of 13.5°C in summer to 1.3°C in winter (Bureau of Meteorology website). The study area is likely to experience frosts approximately 24 days per year (Goulburn Mulwaree Council website).

The annual average humidity reading collected at 9 am from the Goulburn station is 79 percent, and at 3 pm the annual average is 55 percent. The month with the highest humidity on average is June with a 9 am average of 88 percent, and the lowest are December and January with a 3 pm average of 45 percent (Bureau of Meteorology website).

Potential Impacts

The Proposal lies within an area where rainfall occurs mainly in late spring and summer. Should construction activities be undertaken during this time, heavy rainfall may hamper works required for the Proposal and may increase surface runoff and increase the risk of erosion and sedimentation. Fog also has the potential to affect disrupt the construction works due to poor visibility within the Proposal site.

The soils of the study area are known to have high erodibility, therefore construction activities would need to take into account the climatic conditions for the area, particularly times of increased rainfall, and works would be programmed accordingly.

Overall, the Proposal is not expected to have an impact upon climate, on a local or regional scale.

Site Specific Safeguards

The majority of climatic issues relevant to construction processes and timing have been covered in Sections 8.2 (Landform, Geology and Soils) and Section 8.4 (Hydrology and Water Quality) of this REF. Additional environmental safeguards for climate include:

- Timing of works and decisions regarding erosion and sedimentation controls would take into consideration climatic conditions, including rainfall and fog.
- Works would not be undertaken during periods of heavy rainfall or when creek or river waters rise considerably.
- Sufficient time would be allowed to vacate and clean up the Proposal site, prior to the commencement of heavy rainfall or anticipated rise in water levels.

8.4 Hydrology and Water Quality

Existing Situation

Hydrology

The Proposal site is located within the Hawkesbury-Nepean catchment. One drainage line, Towrang Creek, crosses the Highway from the southern to the northern side via a three-pipe culvert roughly in the centre of the Proposal site (refer to Figure 1.1). Towrang Creek is deeply incised and has been affected by erosion, and this is particularly evident on the northern side of the Highway (refer to photos in **Appendix A**). Towrang Creek joins Deep Creek to the north of the Highway and flows into the Wollondilly River approximately 300m north of the Proposal site. The Wollondilly River flows for approximately 70km before joining Lake Burragorang, Sydney's main water supply. The Proposal is not located within flood prone land or within the catchment of any Ramsar wetland.

During ecological investigations in September 2004, Towrang Creek had very low water levels, with a few stagnant pools. The majority of the creek bed is covered with grasses, and stands of reeds are present along some edges of the creek.

Within the Proposal site, stormwater flows off the Highway as sheet flow and enters Towrang Creek. The access road leading to the Derrick VC rest area is the only area within the Proposal site with formalised drainage in the form of table drains.

Water Quality

Taking into account that Towrang Creek has ephemeral surface water flow, water quality during flow periods would be impacted by sediment transport and agricultural runoff (ie. fertilisers, pesticides). Surface water quality can be expected to be moderate during low flow events (ie. Moderate turbidity, nutrient and organochlorine loads), and poor during flood events (ie. High turbidity, nutrient and organochlorine loads).

Water quality monitoring is undertaken at the Wollondilly River at Murrays Flat (Site E409), located to the north east and downstream of the Proposal site. Results for 2002-2003 (SCA 2003) showed 50-100% non-compliance with the guideline values for pH, dissolved oxygen, total nitrogen and total phosphorus for 2002-2003. Other water quality parameters, such as turbidity and conductivity, were within the guideline range during the sampling events.

Potential Impacts

Hydrology

Towrang Creek is an ephemeral creek. Should the creek contain flowing water at the time of the construction activities, the flow within the creek may be temporarily affected while works are undertaken near the creek. However, if the creek continues to support only stagnant pools of water, as it currently does, there would not be any disruption to the flow of water in the creek.

The widening of the Highway would require the extension of the existing three-pipe culvert, and would also require the filling of a portion of Towrang Creek on the northern side of the Highway to accommodate the widened Highway. Hydrological studies have not been undertaken, and consequently a detailed assessment of the potential hydrological impacts is not possible at this time.

The existing pattern of drainage on the Highway is not expected to change. However, there is expected to be a marginal increase in road pavement runoff and a minor increase in open area runoff as a result of creating a wider road (i.e. increased impervious surface area) within the study area.

Water Quality

During the construction stage, activities being undertaken near and within Towrang Creek have the potential to impact on the water quality of the creek. Potential impacts on the water quality within the study area include increased turbidity, sedimentation, localised and downstream contamination, and potential changes in the chemical and physical parameters of the water. During construction, the undertaking of line marking, asphalting, culvert works, and the potential accidental spillage of fuels and chemicals would potentially cause the dispersal of pollutants into waterways.

During operation, the major contributors to pollution from runoff are likely to be metals (from tyre wear, motor oils, grease and fuel) and gross pollutants (litter, debris and organic matter), however, the contribution is not expected to be very different to the existing situation. Due to a small increase in the impermeable surface area created by the Proposal, the volume and pollutants associated with stormwater runoff from the Proposal site is expected to marginally increase. During operation, the potential impact on the water quality within Towrang Creek and further downstream is expected to be minor.

Site Specific Safeguards

- Should it be necessary to extract water from any waterways, a permit would be sought from DIPNR in accordance with the *Water Act 1912*, or future requirements under the *Water Management Act 2000*. The RTA's Regional Environmental Adviser, Southern Region would be advised and consulted as to the location of access and methodology in which water would be retrieved.

- During the detailed design stage, further consultation with NSW Fisheries would be required regarding the proposed works within Towrang Creek.
- Prior to the establishment of the stockpile and compound sites, temporary stormwater and water quality control devices and sediment controls would be implemented, where applicable.
- The compound site would not be located within 50m of Towrang Creek or any natural or built drainage lines or areas prone to flash flooding.
- All fuel, chemicals and liquids would be stored at least 50m away from any waterways. All fuels, chemicals and liquids would be securely stored within a bunded area of an impervious surface.
- All plant, vehicles and equipment required for the Proposal would be refuelled off site or within the compound site, within a bunded area that has an impervious surface and is located away from drainage lines.
- Vehicle washdowns would be undertaken within a designated bunded area with an impervious surface, or undertaken off site.
- If concrete agitator trucks are to be washed out on site, an impermeable bunded area would be constructed to contain wash out water, and the concrete residue would be allowed to settle. Concrete residues would be incorporated into the road formation (if suitable), or disposed of at a licensed waste facility. If clean, the water from the bunded area would be used for watering of the road formation, or used to irrigate the median vegetation.
- An incident emergency spill plan would be developed and incorporated into the CEMP. This would include measures to avoid spillages of fuels, chemicals and fluids into the creek. An emergency spill kit would be kept on site at all times;
- Should any spillage occur during the construction activity the Regional Environmental Adviser, Southern Region, would be contacted immediately, and contaminants would be immediately contained, removed, treated (if necessary) and disposed of to the satisfaction of the DEC.
- No polluted or sediment-laden stormwater runoff from the Proposal site would be allowed to enter directly into Towrang Creek.
- No wastewater would be disposed of onsite unless it has been treated to the requirements of the DEC.

8.5 Air Quality

Existing Situation

Air quality in the vicinity of the Proposal site is expected to be good owing to the rural and undeveloped nature of the surrounding area. Farming land surrounding the Proposal site is limited to livestock grazing. Emissions from motor vehicles would be one of the main sources of air pollution within the study area. There are no other major sources of air pollution, with the absence of manufacturing and other industry near the Proposal site. The operation of farm machinery and quarrying operations can be expected to contribute minor air pollutants to the local air quality. The DEC does not undertake air quality monitoring in the vicinity of the Proposal site (DEC 2004).

Potential Impacts

During the construction stage, clearing, excavation works, stockpiling activities and translocation of fill have the potential to generate high levels of dust. Dust also has the potential to be generated from exposed surfaces, particularly during windy conditions. Potential short-term impacts associated with increased dust levels include a reduction in air quality and decreased visibility for motorists using this section of the Highway and people using the Derrick VC rest area. Local air quality also has the potential to decrease in the short-term due to increased vehicle emissions associated with the use of plant and construction equipment.

The potential impacts on air quality described above would be localised and short-term, and would be minimised with the implementation of the site specific safeguards listed below. It is unlikely that the Proposal would lead to any long-term increases in air pollution or pose a long-term risk to local air quality.

Site Specific Safeguards

- All unsealed trafficable areas, stockpiles and exposed soils would be kept damp during working hours to minimize wind blown or traffic generated dust emissions.
- Vehicles and equipment used on-site would be maintained in good working order and switched off when not operating to minimise exhaust emissions, and to ensure the emissions comply with regulations under the PoEO Act.
- Truck movements would be controlled on site and restricted to designated roadways.
- Any materials transported in trucks would be appropriately covered to reduce dust generation.
- Construction activities that are likely to generate high dust levels would be avoided during high wind periods and stockpiles and exposed areas would be covered or watered.
- No burning of any timber or other combustible materials would occur.
- Rehabilitation of disturbed surfaces would be undertaken as soon as possible.

8.6 Biodiversity

Hayes Environmental Consultants were contracted in November 2004 to undertake an Ecological Assessment of the study area (refer to **Appendix E** for a copy of this assessment). The following sections discuss the results of the flora and fauna investigations.

The study area for the Ecological Assessment extends for 1.3km along the Hume Highway, from 300m west of Towrang Road to 200m east of Carrick Road, and up to 50m north and south of the proposed development footprint. It covers an area of approximately 13ha. The study area was surveyed and is described in four sections, A to D, with A at the eastern end near Carrick Road and D at the western end near Towrang Road.

The methodology adopted for the Ecological Assessment is described in the report attached as **Appendix E**.

Existing Situation

Flora

The majority of the study area is cleared or partially cleared, and has been previously disturbed. Vegetation that is present is generally in poor condition, with numerous exotic species dominating parts of the study area. Most of the land adjacent to the Hume Highway has been cleared and comprises mainly grasses.

Five noxious weeds listed under the NSW *Noxious Weeds Act 1993* for the Mulwaree LGA are present within the Proposal site [*Cassinia arcuata* (W3), *Senecio madagascariensis* (W2), *Echium plantagineum* (W3), *Rosa rubiginosa* (W3) and *Rubus fruticosus* (W3) species aggregate].

Stands of native vegetation are prominent in the eastern and western parts of the study area near Carrick and Towrang Roads respectively, and along Towrang and Deep Creeks (refer to **Appendix E**). Most of these stands occur on the northern side of the Highway, with one stand occurring on the southern side of the Highway opposite Towrang Road. There are also smaller stands of isolated trees present on the northern side of the Highway. In general, trees closer to the Highway are younger and less developed than those further away from the road, and those closer to the Highway are likely to be regrowth following previous roadworks. The remaining parts of the study area have been cleared of trees.

Section A

Land on the northern side of Section A supports a native woodland community which is continuous with native vegetation present along Deep Creek to the north and east of the study area. The Hume Highway and Carrick Road form the southern and western boundaries to this area of woodland.

The vegetation in this section has been previously disturbed, particularly within the first 40m from the edge of the Highway. Disturbances include formed access tracks, compacted bare earth, and earthworks to construct Highway embankments up to 4m in height.

The canopy is dominated by Argyle Apple (*Eucalyptus cinerea*), Brittle Gum (*Eucalyptus mannifera* ssp *mannifera*) and Yellow Box (*Eucalyptus melliodora*), to approximately 10-15m in height. The canopy is open, varying from 25-50% cover. The shrub layer is dominated by Leafless Sour Bush (*Omphacomeria acerba*), Early Wattle (*Acacia genistifolia)* and *Acacia* sp, up to 2m in height. The shrub layer is sparse, with less than 10% cover. The groundcover is dominated by Blue Flax Lily (*Dianella longifolia*), Tussock Grass (*Poa sieberiana*) and Kangaroo Grass (*Themeda australis*), with approximately 40% cover. Large parts of the ground consist of very dry bare stony earth.

Section B

The majority of Section B has been previously cleared and currently consists of open pasture, dominated by improved pasture grasses with a minor presence of native grass species.

Towrang Creek runs through this section, passing beneath the Highway through a three-pipe culvert. A narrow corridor of remnant woodland trees and shrubs occurs along the banks of Towrang Creek. Closer to the Highway, the canopy is dominated by Black Wattle (*Acacia mearnsii*) to approximately 3m in height, with a density of less than 10% cover. Further away from the Highway, eucalypts line the creek banks. The shrub layer consists of occasional regenerating *Acacia* species. Kangaroo Grass dominates the groundcover, with a

density of approximately 90% cover. Some sections of the creek bank near the Highway support no vegetation.

Section C

The majority of Section C consists of cleared open un-improved pasture dominated by a mixture of native and exotic grasses and herbs. The density of grasses increases beneath trees and in small drainage lines.

Small patches of open woodland occur in this section, and some small isolated stands of native trees. The canopy of these areas is dominated by Brittle Gum, Yellow Box and Argyle Apple, to approximately 10-15m in height, with some Scribbly Gums (*Eucalyptus rossii*). The density is approximately 30% cover.

A sparse (less than 10% cover) mid-canopy occurs in some areas, dominated by Black Wattle and Green Wattle (*Acacia decurrens*), up to 3m in height. The shrub layer varies from 10-30% cover and is dominated by Chinese Shrub (*Cassinia arcuata*) and Early Wattle (*Acacia genistifolia*), to 1.5m in height.

The groundcover varies from 10-70% cover, and is dominated by Mat-rush (*Lomandra longifolia*), Wattle Mat-rush (*Lomandra filiformis* ssp *coriacea*), Blue Flax Lily, Red Stem Cranesbill (*Geranium neglectum*), Wallaby Grass (*Danthonia* sp), Weeping Lovegrass (*Eragrostis parviflora*), Kangaroo Grass, Winter Grass (*Poa annua*), River Tussock (*Poa labillardieri*) and Tussock Grass.

Section D

Section D occurs on the western-most end of the study area and supports moderate-sized areas of relatively intact dry open woodland. A small drainage line passes beneath the Highway through a small pipe culvert near Towrang Road.

Cleared areas within Section D consist of un-improved pasture, dominated by a mixture of native and exotic grasses and herbs. A formed but disused road (probably an old alignment of Towrang Road) runs through the centre of the bushland remnant on the northern side of the Highway. There are steep cuttings up to 10m in height on the southern side of the Highway.

The canopy of the woodland is dominated by Brittle Gum, Argyle Apple, Yellow Box, and Grey Gum (*Eucalyptus punctata*) on the north side of the highway, and also Maidens Gum (*Eucalyptus maidenii*) on the south side of the highway. A mid-canopy occurs in some areas to 3m in height, dominated by Black Wattle, and also by Dwarf Native Cherry (*Exocarpus stricta*) on the southern side of the highway. Mid-canopy cover is less than 10%. The shrub layer is dominated by Early Wattle, Blackthorn (*Bursaria spinosa*), *Acacia* sp, Chinese Shrub (*Cassinia arcuata*) and Urn Heath (*Melichrus urceolatus*), to 1-2m in height. The shrub cover is less than 10%. The groundcover is dominated by Mat-rush, Tussock Grass, Wattle Mat-rush, Blue Flax Lily, Wallaby Grass and Kangaroo Grass.

Threatened flora

No flora species listed as threatened on either the TSC Act or EPBC Act were recorded during field surveys conducted in the study area. However, three flora species listed as threatened on the TSC Act and EPBC Act, the Thick-lipped Spider Orchid (*Caladenia tessellate)*, Austral Toadflax (*Thesium australe*) and Buttercup Doubletail (*Diuris aequalis*) could potentially be present within the study area. One flora species listed as threatened on the TSC Act, *Diuris tricolor* could potentially be present within the study area.

No flora species being part of any relevant "*endangered population*" or ecological communities listed under the TSC Act were recorded during the field surveys, and no such species are considered likely to occur.

Fauna

Fauna Habitats:
The Proposal site comprises of areas which are currently cleared or disturbed. Few fauna habitat features are present in these areas, and only the more common and disturbance-tolerant species would be expected to occur in such disturbed habitats in close proximity to the Hume Highway.

Section A

Fauna habitat features within Section A include:

- Open eucalypt canopy, which provides potential roosting and foraging resources for a variety of disturbance-tolerant birds, and a few small tree-hollows for shelter or nesting;
- Stony ground providing potential shelter for invertebrates and very small reptiles; and
- Proximity to Deep Creek, which provides potential habitat and resources for a wide range of fauna groups.

No dens, nests, obvious fauna trails or other evidence of native fauna have been recorded in Section A. Fauna recorded in this section include the Australian Magpie, Australian Raven and the introduced Rabbit.

The southern side of Section A within the study area consists entirely of an existing Highway embankment. Some limited young regeneration of eucalypts and acacias is occurring along the embankment, however these do not provide any notable habitat features or resources for native fauna. A narrow strip of eucalypts occurs along the top of the embankment, sandwiched between the embankment and a previously cleared and disturbed stockpile area.

Section B

The majority of this section of the study area has been previously cleared and currently consists of open pasture, dominated by improved pasture grasses with a minor presence of native grass species.

Towrang Creek runs through this section, passing beneath the Highway through a three-pipe culvert. Towrang Creek is deeply incised, with some erosion evident. Very low water levels were recorded during the survey period, with some stagnant pools. Towrang Creek connects to the Wollondilly River approximately 300-400m north of the study area.

A narrow corridor of native vegetation occurs along Towrang Creek. Towrang Creek and its associated vegetation provide habitat and resources for a variety of fauna groups, although only the more disturbance-tolerant species would be expected to occur.

The Common Eastern Froglet (*Crinia signifera*) was heard calling from around the pipe culverts on several occasions during the survey period. The Common Wombat was recorded in the area by scats, one den, and numerous trails. This species appears to be regularly using the western of the three culverts as a passage under the Highway. The Red-bellied Black Snake (*Pseudechis porphyriacus*) was also recorded in this area.

A number of birds were recorded at the Derrick VC rest area, about 50-100m south of the study area. Birds recorded include small passerine birds such as the Superb Fairy-wren and

Spotted Pardalote, a small flock of Yellow-faced Honeyeater, the Crimson Rosella, Magpie-lark, and several very common insectivorous/scavenging birds including the Australian Raven, Australian Magpie and Pied Currawong. Scats recorded in the area include those of the Common Wombat, introduced Rabbit, Eastern Grey Kangaroo, and Swamp Wallaby.

Section C

Fauna habitat features include:

- Small patches of dry open eucalypt canopy which provide potential roosting and foraging resources for a variety of disturbance-tolerant birds, but only a few small tree-hollows for shelter or nesting; and
- Stony ground and leaf litter providing potential shelter for invertebrates and very small reptiles.

No dens, nests, obvious fauna trails or other evidence of native fauna were recorded within this section. Fauna recorded in this section include the Australian Magpie, introduced Rabbit, domestic dog and the Common Eastern Froglet. A moderate-sized flock of Silvereye flicked through the area during the morning survey. Several other small passerine birds appeared to be using habitats more distant from the highway than the study area. These species were not identified due to noise from the Highway.

Section D

Fauna habitat features include:

- Areas of relatively intact native bushland providing a range of dry sclerophyll features and resources for native fauna;
- Some moderate-sized tree hollows on the southern side of the Highway. Only a few small hollows were recorded in vegetation on the northern side of the Highway;
- Stony ground with moderate amounts of leaf litter in some places, providing potential shelter for invertebrates and very small reptiles; and
- A small drainage line with some very small pools/puddles of water, passing beneath the Highway via a pipe culvert. This is a potential watering resource for a range of fauna groups.

Few fauna species were recorded in this area. Ravens were circling overhead during the survey, and Rabbit and Kangaroo scats were common throughout the bushland on the southern side of the Highway. However, it is expected that a greater variety of native fauna species would utilise the southern side of the Highway in this section during different seasons and when the plant species present are in flower.

The small pipe culvert beneath the Highway in Section D (Culvert No. 4) does not appear to be in use as an underpass by fauna. No light can be seen through the pipe.

Fauna Species:

Nine native birds, one reptile, one amphibian and three mammal species were recorded within the study area during the field investigations (refer to Table 8.1). In addition to these, two introduced species were also recorded.

Table 8.1: Fauna species recorded within the study area.

Status	Common Name	Scientific Name
	Birds	
	Crimson Rosella	*Platycercus elegans*
	Magpie-lark	*Grallina cyanoleuca*
	Superb Fairy-wren	*Malurus cyaneus*
	Spotted Pardalote	*Pardalotus punctatus*
	Yellow-faced Honeyeater	*Lichenostomus Chrysops*
	Pied Currawong	*Strepera graculina*
	Australian Magpie	*Gymnorhina tibicen*
	Australian Raven	*Corvus coronoides*
	Silvereye	*Zosterops lateralis*
	Reptiles	
	Red-bellied Black Snake	*Pseudechis porphyriacus*
	Amphibians	
	Common Eastern Froglet	*Crinia signifera*
	Mammals	
	Common Wombat	*Vombatus ursinus*
	Eastern Grey Kangaroo	*Macropus giganteus*
	Swamp Wallaby	*Wallabia bicolor*
*	Rabbit	*Oryctolagus cuniculus*
*	Dog	*Canis familiaris*

* = Introduced

Threatened Fauna

No fauna species listed as threatened on either the TSC Act or EPBC Act were recorded during field surveys conducted in the study area. However, three fauna species listed as threatened on the TSC Act and EPBC Act, the Regent Honeyeater (*Xanthomyza phrygia*), the Large-eared Pied Bat (*Chalinolobus dwyeri*) and Striped Legless Lizard (*Delma impar*) could potentially utilise the study area on occasions.

Five terrestrial bird species listed as migratory under the EPBC Act are known to occur in the locality (EPBC database), and could occur within the study area on occasions. Migratory marine species are not considered relevant to the study area due to a lack of wetland or marine habitats.

No fauna species being part of any relevant "*endangered population*" listed under the TSC Act were recorded during the field surveys, and no such species are considered likely to occur.

A search of the NSW DPI FishFiles database found that no threatened fish species listed under the FM Act occur within the vicinity of the study area. No threatened fish species are expected to be present within the Proposal site, as suitable habitat is not present.

Potential Impacts

Flora and Fauna

The Proposal would involve the clearing of all vegetation and habitats present within the footprint of the proposed intersection improvements. This clearing would be limited to within 25m from the edge of the existing road formation (eastern side of road).

The areas of vegetation and fauna habitats likely to be directly affected by the proposed works include:

- The area of disturbed and degraded native woodland present on the northern side of the Highway in Section A of the study area. This area does not appear to be of particular value for native fauna. The proposed clearing would not impact upon any habitat features such as caves, dens, and hollow-bearing trees, and would not cause the isolation or further isolation of vegetation and habitats in this section;
- A narrow strip of riparian vegetation along Towrang Creek on the northern side of the Highway in the eastern part of Section B. This area is weed-infested, dominated by Black Wattle and is not representative of a native vegetation community. Common and relatively disturbance-tolerant fauna species utilize this area, and appear to utilize existing culverts for passage beneath the existing Highway;
- Small fringes of relatively intact native woodland present on both the northern and southern sides of the Highway in Section D. There was more evidence of native fauna using the vegetation on the southern side of the Highway in comparison to the northern side. Clearing of vegetation in this section is expected to have only minor impacts on native fauna utilizing this area, including potentially two threatened species, the Regent Honeyeater and Large-eared Pied Bat. Whilst there are tree-hollows within Section D, they are located away from the existing Highway than the proposed extent of works, and are not likely to be affected by the Proposal. It appears that the existing Highway currently acts as a barrier to fauna movements in this section, and it is unlikely that the Proposal would increase this barrier.

No medium to large-sized tree hollows would be removed. It is difficult to estimate the number of small tree-hollows that are likely to be removed as they can have openings the size of a 20-cent coin and are difficult to detect from the ground.

While construction activities are being undertaken within Towrang Creek and near the three-pipe culvert, fauna that currently use the culvert to cross the Highway would be temporarily affected by the works. The culvert extension is not expected to impact on the existing use of the culverts by the Common Eastern Froglet, Common Wombat or Red-bellied Black Snake.

The study area does not support unique features or species that would be lost as a result of the proposed clearing associated with the Proposal. All species recorded within the study area are also likely to be present in the surrounding areas.

The proposed works are not part of any ongoing clearing and development in the area, and would not contribute to any significant cumulative impact upon the area.

Potential indirect impacts on native flora and fauna downstream of the Proposal site include increased nutrient loading of watercourses, the possible discharge of oils and other pollutants in watercourses, and increased erosion, soil loss and sedimentation. These

impacts would be minimized through the implementation of appropriate sediment and pollution control safeguards, and careful management of construction activities outlined in Sections 8.2 and 8.4.

Construction activities also have the potential for spreading noxious and Black Wattle through the clearing of vegetation, re-spreading of topsoil and general construction vehicle movements at the Proposal site. Road construction and maintenance activities within waterways and adjacent areas (e.g. banks) have the potential to spread noxious aquatic and other weeds to other, previously unaffected areas further downstream (RTA Roadscape Management Update No. 21 – Aquatic Weed Management). Should any aquatic weeds be present in Towrang Creek, the weeds could potentially spread downstream from small fragments while undertaking activities near Towrang Creek. Similarly, terrestrial weeds could potentially spread downstream with the transport of seeds and other plant parts through the water.

Threatened Flora and Fauna

The Proposal is not expected to significantly impact on any flora or fauna listed under the NSW TSC Act, as no listed species, populations or ecological communities were recorded during the surveys and there was no evidence for their presence within the study area.

The Striped Legless Lizard is not expected to be affected by the proposed works. However, it is likely that highly mobile threatened fauna species which are known to occur in the locality, and for which potential habitat occurs within the study area, may utilise the study area on occasions, and therefore may be affected by the Proposal. Species considered in this regard include the Regent Honeyeater and Large-eared Pied Bat. The significance of potential impacts of the Proposal on these species have been assessed pursuant to Section 5A of the EP&A Act (i.e. Eight Part Tests) (refer to **Appendix E**). The Eight Part Tests concluded that the Proposal is not likely to impose a significant effect upon the Regent Honeyeater or the Large-eared Pied Bat. A Species Impact Statement would not be required for these two species, or for any other threatened fauna.

The Proposal is not expected to significantly impact on any flora or fauna listed under the Commonwealth EPBC Act, or on any matters of NES. Referral to the Federal Minister for the Environment for further consideration or approval would therefore not be required.

Site Specific Safeguards

Terrestrial Flora

- Stockpile sites and the compound site would be located in areas that require no clearing of native vegetation.
- Topsoil potentially containing introduced grasses or weed propagules would be removed from the Proposal site and disposed of at a licensed landfill facility. Weed infested or contaminated topsoil would not be reused for the proposed works, including site rehabilitation works, and would not be stockpiled adjacent to any areas of native vegetation.
- All vegetation to be retained would be clearly highlighted on site and on site plans, and would be protected with fencing. Protective fencing would be erected beyond the dripline of trees and erected prior to the commencement of works. All staff would be informed and inducted of the limits of vegetation clearing and the areas of vegetation to be retained. No works would be undertaken within the fenced off areas.

- Should additional vegetation removal be required, including within the compound site, the proposed variation to the original scope of works would be referred to the Regional Environmental Adviser, Southern Region. The need for further assessment would be determined by the Regional Environmental Adviser, Southern Region.
- Noxious weeds present within the Proposal site would be removed and/or destroyed, and disposed of appropriately in accordance with their category under the *Noxious Weeds Act 1993*;
- Environmental weeds (eg. Black Wattle) present within the Proposal site would be removed in accordance with the *NSW Department of Agriculture Guidelines 1999*;
- Landscaping and revegetation works would be maintained for a period of no less than 12 months. During this time, any dead or dying plants would be removed and replaced;
- Cleared native vegetation would be mulched and used in the rehabilitation works post-construction;
- Woody weeds and seed-bearing exotic plants that are removed would not be mulched but bagged and taken to an approved Council waste facility;
- Mulched material would be stored within existing cleared areas;

Fauna

- Any wombats present in the Wombat den identified near the Towrang Creek culverts in Section B would be encouraged to leave the area by the gentle destruction of burrows close to dusk;
- Any extension to the existing culverts on Towrang Creek in Section B would use pipes of the same diameter and material as the existing pipes, and would continue the culvert in a straight line to ensure that light continues to be seen from either end of the culverts;
- A licensed person under s.132c of the *National Parks & Wildlife Act 1974* (NPW Act) would remove any fauna species found within areas to be disturbed;
- Should any hollow-bearing trees be removed, then a licensed person under s.132c of the NPW Act would be present at the time; and
- Should substantial time (ie. greater than 6 months) elapse prior to commencement of the proposed works, additional targeted surveys would be conducted for the Striped Legless Lizard (*Delma impar*), to ensure it has not moved into potential habitat present within the study area.

Aquatic Flora and Fauna

- The Minister for Fisheries (DPI) would be notified of details associated with the proposed works adjacent to and within Towrang Creek.
- When undertaking road widening works in the vicinity of Towrang Creek, pollution controls would be implemented to prevent contaminants and/or sediment from entering the creek.
- Works within Towrang Creek would be undertaken during either low to zero flow periods and would not be undertaken at a time when heavy rainfall is predicted.

8.7 Non-indigenous Heritage

Existing Situation

Database Searches

A search of the Australian Heritage Database was conducted on 11 January 2005, which revealed 71 listings for the Mulwaree LGA. Four items are located in Towrang, with only three items located within the study area. These three items are:

- Towrang Bridge and Culverts: The Towrang Bridge is located approximately 250m to the south of the Proposal site, and is not likely to be affected by the proposed works. The culverts are spread out within the study area, with two of the culverts located within the study area. One of these culverts (No 4) is located on the northern side of the Highway within the Proposal site, and could potentially be affected by the Proposal;
- Towrang Convict Stockade and Magazine: The Towrang Convict and Stockade is located approximately 100m to the north of the Proposal site. It is not likely to be affected by the proposed works; and
- Towrang Stockade Graves: The graves are located approximately 100m to the north of the Proposal site, and are not likely to be affected by the proposed works.

A search of the State Heritage Register was conducted on 30 May 2005, which revealed 28 listings within the Goulburn/Mulwaree LGA. None of these listings is located within the study area, and they would not be affected by the Proposal.

One item listed on the NSW National Trust's Historic Items Conservation Register is located in the vicinity of the study area. Lennox Bridge (also known as Towrang Bridge), is located approximately 250m to the south of the Proposal site, and is unlikely to be affected by the proposed works.

A search of the RTA's Heritage and Conservation Register (s170) was undertaken on 24 May 2005. There are 38 listings under this Register for the Southern Region. None of the listings are relevant to this Proposal, as they do not occur within the study area or in its immediate vicinity.

Two heritage items are listed in Schedule 1 of the Mulwaree LEP. Neither of these listings is located within the study area or in its vicinity and would not be affected by the proposed works.

Statement of Heritage Impact

Due to the presence of the above heritage items within the study area, a Statement of Heritage Impact (SOHI) was prepared for the Proposal in March 2005. The SOHI was prepared by the RTA's internal Heritage Consultant, and is attached as **Appendix F**.

Description of the Bridge and Culverts:

The Towrang Bridge, built over Towrang Creek, and the seven culverts nearby were constructed by convict labourers from the Towrang Stockade located to the north of the Proposal site. The stockade functioned from 1833 to 1843 and the culverts were built during this period, the bridge being built in 1839. These road works were all undertaken as part of the construction of the Great Southern Road. It is believed that prominent colonial bridge designer David Lennox may have designed the Towrang Bridge, although this has not

been proven. The bridge has a segmental arch and it is built of dressed coursed sandstone; the date 1839 was formerly visible on the keystone but it has now been vandalised.

The culverts are located to the west of the bridge and were intended to span the numerous ephemeral creeks in the area. They are built predominantly of shale with dressed sandstone voussoirs and quoins. With the exception of Culvert 2 (refer to Figure 2.2 in **Appendix F**), the integrity of these culverts is high. Refer to Table 8.2 for a description of the culverts.

Table 8.2: Description of the culverts

Item	Characteristics
Culvert 1	Located directly west of the bridge and (with Culvert 3) is the most readily accessible to the public. It has been refurbished with new blocks utilised in the low roadside wall above and in the projecting wing walls. In addition, the mortar joints of the voussoirs have been repointed.
Culvert 2	Site inspection conducted in June 2004 failed to locate Culvert 2. Prior to 2003, Culvert 2 underwent a partial collapse following damage incurred around the arch through the actions of a burrowing wombat. Allegedly the culvert was subsequently removed by the RTA during the establishment of the establishment of the Derrick VC rest area in 2003 (Doggart, letter dated 20 May 2004). However, subsequent investigations outlined in the SOHI indicate that the damaged and "removed" Culvert 2 is in fact still extant as the restored Culvert 1. The placement of the two culverts 1 and "2" in close proximity on Figure 2.2 (prepared by the Stockade Trust) of the SOHI is therefore deemed to be incorrect. The confusion surrounding the numbering system used for the culverts appears to be attributable to uncertainty in the past about the classification of Towrang Bridge as a bridge or culvert. In the latter instance it would form number 1 in the sequence of 7 culverts.
Culvert 3	This is the largest of the culverts and was built over the widest creek bed. It has received similar but more extensive refurbishment to Culvert 1.
Culvert 4	This culvert is the only structure in the network located to the north of the existing Hume Highway, the realignment of which has resulted in the burial of its south face.
Culverts 5, 6, 7	Culverts 5, 6 and 7 in comparison were built to span deeper gullies and their tall elliptical arches, which are less readily viewed by the public, have impressive landmark qualities in the undulating ground of Towrang.

Description of the Stockade and Graves

The Towrang Convict Stockade was established in 1833 in order to house the labour force, comprising 70 men in irons, sent to work on this section of the Great Southern Road. Towrang was the largest concentration of convicts in southern NSW at this time. The stockade consisted of a small cottage and a number of huts for the soldiers guarding the convicts, and their families, together with a garden tended by the military, and huts and boxes or timber cells about 4m^2 for the convicts. Some of the hearths and other rubble of the huts have been located and recorded through archaeological investigation.

The cemetery still exists and there are three headstones. The other major site is the powder magazine, which is partly excavated into the hillside above the Wollondilly River. Archaeological work has also unearthed items including uniform buttons, pins, broken crockery, and hand forged tools.

Description of the Weir

The site described as remains of an old stone bridge foundation is more readily interpretable as a weir, directly associated with the function and establishment of the Towrang Stockade. It is likely to have been one of the first structures built within the Towrang Stockade area as it was standard practice for a Garrison or a military unit to construct a weir on a slow moving creek once a permanent camp was decided on (Doggett, letter dated 20 May 2004).

The weir is partially overgrown with vegetation and is approximately 1.8m wide and 6m in length with distinct upward curves at the ends. It is in good condition though soil erosion has altered its setting considerably.

Cultural Significance

The Towrang Bridge and culverts are historically very significant for their association with the convict era and with the building of the Great South Road and thus the development of Goulburn and the southern region of NSW. The structures provide insights into early road building methods and they have rarity value due to the many changes made to the line of this Highway which have resulted in the loss of much of the original road. The bridge and culverts, having carried traffic over an extensive period, reflect a fine level of workmanship in stone.

The remains of the stockade structures and the powder magazine provide insights into both the nature of convict life and labour and early road building methods. The weir, as a surviving stockade structure should be recorded the same level of significance.

Potential Impacts

While Culvert 4 is shown as being within the proposed new road boundary and the weir is on the borderline, the extent to which they would be impacted by these works may not become apparent until closer to the construction phase.

There is the potential that the projected road widening works may take in the area currently occupied by the Culvert 4. In this event every effort would need to be made to relocate the north face of the culvert so that it is integrated into the final design.

In order to ensure that the relocated north face conforms to the existing aesthetic qualities, archival photographic recording should be undertaken prior to the proposed works commencing. These photographic images would then act as a reference point to achieve that end. Experienced heritage stonemasons who have been endorsed by Heritage Design Services of the Department of Commerce would then be commissioned to undertake the disassembly and reassembly of the shale and dressed sandstone voussoirs and quoins. The SOHI states that provided these measures are undertaken, the heritage impact is considered to be acceptable.

While Culvert 4 is located in the existing road reserve and would be impacted by the Proposal, and the weir is proposed to be included in the new road reserve, the extent to which they would be indirectly impacted by these works may not become apparent until closer to the detailed design stage. Should it become necessary to undertake works on these items, the Australian Heritage Council would be advised of its specific nature and a Section 140 permit would be obtained from the NSW Heritage Office prior to works commencing. It is recommended that all avenues be explored for their conservation *in situ*, and members of the Towrang Trust are included in further consultation in that regard.

The weir should be included in all future reference to the Towrang Stockade site and in accordance with the recommendations previously developed Towrang should be managed in its full context.

Site Specific Safeguards

- The RTA would liaise with the Towrang Stockade Reserve Trust as the detailed design of the Proposal progresses.
- Every effort would be made to relocate the north face of Culvert 4 so that it is integrated into the final design of the Proposal.
- At the detailed design stage the impacts on Culvert 4 and the weir would be further assessed.
- Archival photographic recording of Culvert 4 and the weir would be undertaken prior to the commencement of construction activities.
- Experienced heritage stonemasons would be commissioned to undertake the disassembly and reassembly of the shale and dressed sandstone voussoirs and quoins of Culvert 4.
- A Section 140 permit would be obtained from the NSW Heritage Office prior to the commencement of works.

8.8 Indigenous Heritage

Existing Situation

Database searches were undertaken for the study area, including searches of the DEC AHIMS database and the National Native Title Tribunal. The AHIMS search results indicate that three Aboriginal objects and Aboriginal places have been recorded in the vicinity of the study area, none of them located within the Proposal site or study area itself. The closest site is located approximately 300m south of the Proposal site, near Lennox Bridge.

The National Native Title Tribunal search revealed one existing claim over the study area, and one additional claim extending to the vicinity of Goulburn. Gundungurra Tribal Council Aboriginal Corporation #6 is an extensive claim that has been registered over the study area. Ngunawal People (NSW) is another extensive claim over lands and waters south of Goulburn. Claimant summaries are provided in **Appendix G**.

The RTA's Aboriginal Program Consultant (APC), Southern Region, was consulted during the preparation of this REF. The APC visited the Proposal site on 29 October 2004 with members of the Pejar Local Aboriginal Land Council (LALC). The entire Proposal site and areas near Towrang Creek, Deep Creek and the Wollondilly River were visited. Based on this site investigation, the APC recommended undertaking an Indigenous Heritage Assessment.

Kayandel Archaeological Services was engaged to undertake an Indigenous Heritage Assessment in February 2005. A full copy of the report, including a detailed description of the study area and methodology, refer to **Appendix G**.

The area covered by the Indigenous Heritage Assessment is approximately 28.6ha. It extends for a length of approximately 1300m along the existing Highway alignment. The western boundary of the study area is approximately 300m west of the intersection of

Towrang Road and the Hume Highway. The eastern boundary of the study area is approximately 200m east of the intersection of Carrick Road and the Hume Highway. The study area for the assessment is approximately 220m in width. The assessment involved background research, a field survey and reporting.

Aboriginal Sites

The survey identified five sites and a PAD site and evidence of Aboriginal cultural heritage within the study area. Table 8.3 provides an overview of all of the identified sites. The newly identified Aboriginal sites are all open artefact scatters and may represent one site with a number of discrete areas of increased artefact density.

All of the sites identified are located on the northern side of the Highway, where the majority of the works are proposed.

Landscape Sensitivity

The archaeological sensitivity of the study area is assessed to be moderate to high due to the present of a permanent water source immediately to the north of the study area, and an ephemeral water source within the study area.

The study area exhibits a range of soil types from shallow thin soils on the basal slopes to deep alluvial soils on the creek and river flats. Some portions of the study area, particularly those to the south of the Hume Highway have had the topsoil displaced completely. In comparison, those portions to the north of the Hume Highway are relatively undisturbed. Evidence is present over this portion of the study area for a small degree of soil disturbance from vegetation clearing and pastoral utilisation. The potential for undisturbed cultural material to occur within local deposits is therefore considered to be moderate to high.

No sandstone outcrops exhibiting the essential characteristics for other Aboriginal site types, such as habitable rock shelters, grinding grooves or rock engravings were identified in the study area.

Potential Impacts

The Proposal would result in disturbance to three Aboriginal sites (TC1-1, TC1-3 and TC1-4) and one area of PAD (TCPAD1). The proposed impacts would require a s.90 Heritage Impact Permit under the NP&W Act prior to the commencement of earthworks in the vicinity of each site. The Aboriginal site TC1-2 would not be affected by the Proposal.

TC1-5 has been previously impacted by earthworks associated with roadway construction and maintenance. Whilst the site is not expected to be affected by the Proposal, the site would be cordoned off to prevent any indirect impacts while the construction activities are being undertaken.

Site Specific Safeguards

- A s.90 Heritage Impact Permit (Partial Consent with Salvage) NP&W Act would be sought for the Proposal site.
- A qualified surveyor would be engaged to identify and flag the new road easement boundary to the north of the Hume Highway. Areas to the north of this identified perimeter are Aboriginal sites or PAD, and access to these areas would be restricted.

Table 8.3: Overview of Aboriginal sites and PAD located during the current surveys.

Site Name	Location	Environment	Site Type	Dimensions	Contents	Conditions	Likelihood of PAD
TC1-1	North of the Highway in an elevated position. Wollondilly River to the north and Towrang Creek to the east.	Basal slope, spur line	Open artefact scatter	60 x 50m	11 stone artefacts	Low disturbance – pastoral	Moderate
TC1-2	Immediately on the western bank of Towrang Creek.	Creek flat	Open artefact scatter	60 x 40m	7 stone artefacts	Low disturbance – pastoral	Moderate to High
TC1-3	Elevated position above the main channel of Towrang Creek.	Creek flat at confluence	Open artefact scatter	40 x 40m	7 stone artefacts	Relatively undisturbed	Moderate to High
TC1-4	Situated on a small terrace above Towrang Creek to the north of the Highway, 50m east of TC1-3.	Creek flat at confluence	Open artefact scatter	15 x 10m	1 stone artefact	Relatively undisturbed	Moderate to High
TC1-5	South of the Highway in an elevated position with Towrang Creek to the west. Derrick VC Rest Area access road is immediately west of the site.	Basal slope	Open artefact scatter	40 x 60m	6 stone artefacts	Heavily disturbed, road verge	Limited
TCPAD1	Deep Creek to the north, Towrang Creek to the west, Carrick Road to the east and Highway to the south.	Creek flat at confluence	Potential archaeological deposit	80 x 50m	Unknown	Low disturbance – pastoral	Moderate to High

- The immediate area of TC1-5 along with a 50m buffer zone or curtilage to avoid the associated PAD would be cordoned off to prevent inadvertent impact whilst the proposed works are carried out. The heritage consultant (Kayandel Archaeological Services) would be requested to supply details of the required location of fencing around the TC1-5/curtilage.
- In the event that any indigenous artefacts or items are located in those areas not previously sanctioned by a Section 90 Heritage Impact Permit, all work would cease in the vicinity of the find, and the RTA's Regional Environmental Adviser, Southern Region, RTA's Aboriginal Program Consultant, Southern Region, and DEC would be contacted.
- All personnel working on site would be made aware of their responsibilities in accordance with the *National Parks and Wildlife Act 1974*.

8.9 Noise and Vibration

Existing Situation

The existing road environment is that of a major road that provides access for motorists travelling between Sydney and Melbourne. Traffic noises from the Highway would be the main source of noise within the study area.

There are no residences or other sensitive noise sites within the study area or in its immediate vicinity. The closest residences to the Proposal site and study area occur approximately 300m south of the Proposal site. These residences are currently subject to light and heavy vehicle noise impacts from the Highway. An existing rest area occurs adjacent to the Proposal site.

Potential Impacts

It is anticipated that noise levels within the Proposal site and its immediate vicinity would increase during construction of the Proposal as a result of noise generated from machinery and equipment used for the Proposal. The noise levels are likely to be experienced by motorists using the Hume Highway and the Derrick VC rest area. The motorists and visitors to the rest area would only be impacted in the short-term, while passing through the Proposal site or for the duration of their stay at the rest area. The increase in noise levels at the Proposal site would only be experienced during the construction stage. No residences are expected to be impacted by noise and/or vibration impacts because the closest residences are located approximately 300m away from the Proposal site.

Operational noise levels are not expected to change from existing levels, as the Proposal would provide safer conditions for motorists using this section of the Highway, and would not lead to a change in vehicle numbers or changes to traffic flow.

Site Specific Safeguards

- Should works be required outside standard working hours, the procedures contained in the RTA's *Environmental Noise Manual 2001, "Practice Notes vii – Roadworks Outside of Normal Woking Hours"* would be followed.
- The residents located approximately 300m from the Proposal site would be contacted prior to the commencement of works via a letter box drop, or door knock, and would be informed of the proposed works, working hours, and period of construction.

Residents would also be provided with a contact name and number should any complaints wish to be registered.

- In accordance with RTA's *Stockpile Site Management Procedures 2001*, the site compound/stockpile sites would be located more than 250m from residents or other activities that may be affected by operational noise or other impacts of the site.
- The idling of machinery and equipment for a prolonged period of time would be avoided where possible.
- Best management practices would be adopted that are consistent with the RTA's *Environmental Noise Manual 2001.*

8.10 Visual Amenity and Landscape

Existing Situation

The study area is situated in a rural environment, which has been largely cleared of vegetation for agricultural activities, residential development, industrial development and for the construction of the Hume Highway and local roads.

The study area itself is characterised by the Hume Highway, with the majority of the landscape cleared as part of the road reserve or for residential development, and very little vegetation is evident on the landscape. The scenic quality of the study area is considered to be moderate as per RTA's *Environmental Impact Assessment Policy Guidelines Procedures (Version 4).*

Potential Impacts

Construction activities are likely to cause a short-term reduction in the visual amenity near the Proposal site. Likely visual impacts would include exposed surfaces associated with the removal of vegetation, compound site and the presence of machinery. The construction activities would be visible to motorists using the Highway, including motorists who have stopped at the Derrick VC rest area.

The removal of vegetation would have a minor visual impact along the Highway, as the majority of vegetation comprises grasses. Bare exposed surfaces would be stabilised as soon as possible and landscaping with appropriate local native species would be undertaken after the construction works have been completed.

Long-term visual impacts include a wider median and improved sight distance for vehicles turning onto the Hume Highway from Towrang and Carrick Roads. In the long-term, perceptible changes would be experienced mainly by road users and would be limited mainly to the presence of acceleration and deceleration lanes and a wider median.

The visual impact in the context of the overall visual character of the Highway is likely to be low. It is not anticipated that the Proposal would affect the visual amenity of the study area, locality or region to any great extent.

Site Specific Safeguards

- A detailed Landscape Plan would be prepared at the detailed design stage;

- All areas affected or exposed during works would be appropriately revegetated and landscaped after the completion of construction works;
- Weed management after the establishment of these plants would further enhance the visual amenity of the Proposal site; and
- The Proposal site would be kept tidy and rubbish free.

8.11 Socio-economic Considerations Including Landuse

Existing Situation

The Hume Highway is a major interstate corridor, which forms part of the National Highway network. Approximately 10 million people use the Highway every year and approximately 20 million tonnes of road freight is carried on the Highway every year. It provides the main route of access into and out of Goulburn.

Land uses within the study area include the Hume Highway, Towrang and Carrick Roads, the Derrick VC rest area on the southern side of the Highway, and rural land which has been previously used for agricultural purposes on either side of the Hume Highway.

Towrang and Carrick Roads join the Hume Highway approximately 10km north of Goulburn. Both roads join the Highway on the Sydney-bound side of the carriageway. Currently, vehicles entering the Highway from either Towrang or Carrick Roads have inadequate sight distance and inadequate acceleration and deceleration lanes. There are safety concerns associated with turning into these roads from the Hume Highway and turning out of these roads onto the Highway.

The nearest sensitive noise receptors are residences over 300m away from the Proposal site. These residences are located on Towrang Road, on the northern side of the Wollondilly River.

Until recently, the Towrang Stockade Reserve Trust had pedestrian access from the Highway to various historical sites located on the property to the north of the Highway via a stile over the existing RTA boundary fence. The stile has recently been removed due to safety concerns.

Potential Impacts

Local Traffic

During construction, the Proposal has the potential to delay through-traffic during working hours due to lane closures, although a Traffic Control Plan would be developed as part of the Proposal and appropriate traffic control measures would be implemented to minimise the minor delays experienced along the Highway. In addition, the community would be informed of changes to local road conditions during the construction stage. Notification of the proposed works and proposed changes to road conditions would be advertised widely, as vehicles travelling both locally and interstate use the Highway.

All the construction activities would be undertaken within the standard working hours specified in Section 7.5.6. Should any activities be undertaken at night, the local community would be informed of any such works prior to the commencement of those activities.

Safety

The Proposal would improve the safety of motorists using the road by providing a wider median and improved access to and from the Highway and Towrang and Carrick Roads. The Proposal is expected to result in a reduction in the number of accidents along this stretch of the road.

Property Acquisition

It is anticipated that partial acquisition of land would be required on the northbound side of the carriageway. Negotiations with affected landholders would be undertaken prior to the commencement of works. It is anticipated that the existing fence on the northbound side of the Highway would be affected by the Proposal, and it would be replaced or repaired, where appropriate.

Access

Access to the Derrick VC rest area would be maintained while construction works are being undertaken.

As part of the detailed design stage, the provision of pedestrian access for members of the Towrang Stockade Reserve Trust to the historic sites to the north of the Highway would be considered.

Site Specific Safeguards

- A Traffic Control Plan would be prepared in accordance with the RTA's *Traffic Control at Work Sites Manual 2003*, and approved by the RTA prior to implementation. The Traffic Control Plan would include the notification of any traffic alterations or closures.
- All property acquisitions would be negotiated in accordance with the RTA's Land Acquisition Policy, and compensation in accordance with the *Land Acquisition (Just Terms Compensation) Act, 1991*. Property acquisitions and/or leasing arrangements would be resolved between the RTA and property owners prior to the commencement of works.
- Any property fencing affected by the Proposal would be re-instated, where appropriate.
- The broader community would be informed about the proposed road works prior to the commencement of works. A contact name and number would be provided for complaints.
- Provision of pedestrian access to the historic sites located to the north of the Highway would be taken into consideration.

8.12 Waste Minimisation and Management

Potential Impacts

Currently, the main source of waste within the Proposal site is likely to be litter from vehicles along the Hume Highway, and this is likely to remain the main source of waste during the operational stage.

Waste products generated by the Proposal are likely to be due to construction activities, rather than the operation of the Proposal. The construction of the Proposal has the potential to generate liquid and non-liquid wastes. The key waste streams likely to be generated include:

- Cleared vegetation;
- Excavated soil;
- General construction waste;
- Gross pollutants and putrescible waste;
- Asphalt;
- Sewage from the compound site;
- Fuels, liquids and chemicals;
- Cement; and
- Litter.

These waste streams would need to be managed in an appropriate manner. Fuels and liquids would need to be stored and handled for example within a bunded area, and the management of the portable toilets within the site compound would need to ensure that no leakage or spillage of sewage could occur.

The principles of waste management are to minimise the amount of waste generated, reuse or 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).

Site Specific Safeguards

- A Waste Management Plan would be prepared in accordance with the RTA's QA Specifications and in accordance with the RTA's *Waste Minimisation & Management Guidelines, 1998* and the principles of the WARR Act.
- Trees to be removed would be assessed for their value as millable timber.
- Leaf material and small branches of native vegetation would be chipped and used as mulch in revegetation works.
- All working areas would be maintained and cleaned up at the end of each working day.
- All construction materials and wastes generated from the Proposal would be stockpiled and stored at the compound site prior to reuse, recycling or disposal.
- All materials, surplus soils and all wastes generated from the Proposal would be stockpiled at the compound site prior to re-use, recycling or disposal.
- Wastes would not be stored for long periods of time during construction of the Proposal. Empty drums of fuels, oils and other chemicals or fluids would not be stored on site during construction.
- Recycled content products and materials would be used where these are cost and performance competitive and where their environmental performance is at least equivalent to the non-recycled alternative(s).
- No waste would be burnt.

In addition, the Resource Management Hierarchy principles of the WARR Act would be adopted as follows:

1. Avoid unnecessary resource consumption as a priority;
2. Avoidance is followed by resource recovery (including reuse or materials, reprocessing, recycling, and energy recovery; and
3. Disposal is undertaken as a last resort.

8.13 Associated Infrastructure and Activities

Existing Situation

There are telecommunication cables are present within the Proposal site. Telstra cables run on both sides of the carriageway (parallel and outside the road boundary). Preliminary observation on site shows cables crossing the Hume Highway between the Towrang Road and Carrick Road intersections. A detailed utility survey is underway which will provide further details on the depth of utilities. A gas pipeline is also located nearby the Proposal site.

Potential Impacts

Whilst details are not available at the time of writing the REF, the Proposal may require the adjustment of telecommunications utilities located within the Proposal site. The Proposal is not expected to have any impact on a gas pipeline located nearby the Proposal site.

Site Specific Safeguards

- All public utilities to be impacted upon by the Proposal would be relocated prior to works commencing;
- The "dial before you dig" hotline would be contacted prior to the commencement of earthworks; and
- Should any utilities or services be impacted, the affected community would be notified.

8.14 Operational Hazards and Risks

Potential Impacts

Improvements to the intersections and the section of the Hume Highway within the study area would reduce the potential for accidents to occur and increase safety for motorists travelling along the Highway and in between the Highway and Towrang and Carrick Roads.

Site Specific Safeguards

No site specific safeguards are proposed to address the above potential impacts.

8.15 Demand on Resources

The RTA adopts the Resource Management Hierarchy principles embodied in the WARR Act. The Proposal would not require the use of any resources that are, or are likely to become, in short supply.

Water is currently in short supply in the Goulburn area. To reduce demand on water, recycled water (ie. tertiary treated sewage) would be sourced from Goulburn Mulwaree Council in Goulburn. If current water restrictions are lifted, water may be sourced from Goulburn's town water supply, or water may be drawn from local water sources such as the Wollondilly River, creeks or dams located within 10km of the Proposal site (Refer to Section 9.3).

Site Specific Safeguards

- No additional site specific safeguards are considered to be necessary.

8.16 Cumulative Environmental Effects

The proposed works are part of ongoing maintenance and upgrading of the Hume Highway. It is anticipated in the near future that the RTA would carry out upgrade works on the Hume Highway, approximately 500m to the east of the Proposal site. These works would involve the realignment of the northbound carriageway at Tiyces Lane. Cumulative impacts of the realignment (vegetation removal, fauna impacts, erosion/sedimentation, visual amenity impacts and water quality impacts) in combination with impacts of the Proposal are expected to be minor.

The positive cumulative benefits of the Proposal would include:

- The community would be expected to benefit from the upgrade of the intersections and the widening of the Highway due to improved safety, and fewer delays as a result of accidents and the ensuing maintenance activities.

Negative cumulative impacts of the Proposal would include:

- Clearing of native vegetation, and potential weed growth within the Proposal site and on adjacent land;
- Erosion and sedimentation, and potential water quality impacts during construction; and
- Reduction in the visual amenity of the Proposal site on the Hume Highway during construction.

Safeguards outlined in Section 9 of this REF would be implemented to mitigate the identified impacts of the Proposal.

8.17 Principles of Ecologically Sustainable Development

The National Strategy for Ecologically Sustainable Development (NSESD) has been formulated to ensure ESD is accounted for in all Proposals. There are three core objectives:

- To enhance individuals' and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

These objectives are complemented with a number of guiding principles that are considered below in Table 8.4 in terms of the Proposal.

Table 8.4: Principles of ESD applied to the Proposal

Principle	Application to the Proposal
Precautionary Principle	Design aspects have considered and addressed potential hazards and risks resulting from both the construction and operation of the Proposal. No issues have been identified that would cause any serious or irreversible environmental damage as a result of the introduction of the Proposal at this location. The introduction of site specific safeguards outlined in Section 9 of this REF would further ameliorate potential environmental impacts.
Intergenerational Equity	The Proposal would improve the level of supporting infrastructure required for the Hume Highway, and makes provision for a more efficient and safer transport corridor for use by future generations. Concurrently, the Proposal considers and minimises impacts to the local environment through the introduction of site specific safeguards to ensure the integrity of natural and social values of the environment for future generations.
Conservation of Biological Diversity & Ecological Integrity	The Proposal has been designed to minimise impacts to the local environment. A thorough assessment of the local ecology has been undertaken to identify and manage any potential environmental hazards or risks associated with the Proposal, and site specific safeguards outlined in Section 9 of this REF would ensure that the Proposal does not compromise the biological diversity or ecological integrity of the locality.
Improved Valuation & Pricing of Environmental Resources	The integrity of the local environment is recognised as a valuable resource to the area in terms of its recreational value, commercial value, water quality and supply and life support system for aquatic communities. The resources found within the Proposal site are of limited value in terms of provision of life support systems for local and migratory species. Appropriate plantings would be undertaken in accordance with a Landscape Plan to replace the vegetation that would be removed. Environmental safeguards outlined in Section 9 have been provided to ensure the value of the environmental resources at the Proposal site is maintained.

9 Environmental Management

9.1 General

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the Proposal and during construction and operation of the Proposal. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. All safeguards described in this REF and the Decision Report/Conditions of Approval would be incorporated into the Contractor's Environmental Management Plan (CEMP).

A CEMP would be developed in accordance with the specifications set out in the RTA's *Environmental Protection (Management Plan) – QA Specifications G36.* The CEMP would incorporate additional site-specific requirements, outlined below, which are not covered by G36, G38 and G40. The CEMP would be reviewed by the RTA's Environmental Adviser, Southern Region, prior to the commencement of any site works.

9.2 Summary of Proposed Safeguards

Table 9.1: Site Specific Environmental Safeguards.

Impact	Environmental Safeguards
Landform, Geology and Soils	• A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP, prior to the commencement of construction. The SWMP would address the environmental safeguards detailed in the RTA's QA Specifications G36 and G38. • Prior to the commencement of works, access routes and construction boundaries would be established. Access tracks to the compound site and the construction areas, including near Towrang Creek, would be staked, fenced and outlined on detailed designs. All plant and vehicle access would be restricted to the specified access routes and would not utilize any surrounding or adjacent surface areas. All staff would be advised of the access and route requirements. • Prior to the commencement of works, appropriate erosion and sedimentation controls would be installed. All erosion and sedimentation controls and bank stabilization methods would be selected to minimize impacts on the hydrology and geomorphology of Towrang Creek. • Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. This would include: ➢ Clearing sediment from behind barriers on a regular basis; ➢ Ensuring all controls are working effectively at all times;

	➢ Checking that all sediment control structures are properly installed and have not been displaced or damaged (especially after rain); and ➢ Checking that the sediment control structures are functioning. • Vegetation clearing would be undertaken in stages, to minimize the area of exposed soil. Cleared areas which may remain exposed for a length of time would be stabilized appropriately; • The stripping of topsoil and the stockpiling of surplus materials would not be undertaken during periods of heavy rainfall. • Topsoil would be retained and used in landscaping works. • Earth batters would be stabilized by hydromulching with a sterile cover crop and local native seeds. • Methods for bank stabilization and scour protection would include soft engineering options. All scour protection options would be designed in consultation with DIPNR and the RTA's Regional Environmental Adviser, Southern Region, during the detailed design stage and implemented where applicable prior to construction, during construction and post construction. • Imported fill required for the Proposal would be sourced from a proprietor(s) holding all relevant environmental and planning approvals. • Hard stand material or rumble grids would be used, where applicable, to prevent the tracking of soil and mud onto pavement surfaces. • Any material transported onto pavement surfaces would be swept and removed and disposed of at the end of each working day. • All stockpiles would be designed, established and operated and decommissioned in accordance with the RTA's *Stockpile Management Procedures 2001*. In addition, all stockpiles would be located 50m away from the high bank of Towrang Creek or any other creeks, rivers or drainage lines. • Should any spillage occur on soils during the construction stage, the Regional Environmental Adviser, Southern Region, would be contacted immediately, and contaminants would be immediately contained, removed, treated (if necessary) and disposed of to the satisfaction of the DEC.
Climate	• Timing of works and decisions regarding erosion and sedimentation controls would take into consideration climatic conditions, including rainfall and fog. • Works would not be undertaken during periods of heavy rainfall or when creek or river waters rise considerably.

	• Sufficient time would be allowed to vacate and clean up the Proposal site, prior to the commencement of heavy rainfall or anticipated rise in water levels.
Water Quality and Hydrology	• Should it be necessary to extract water from any waterways, a permit would be sought from DIPNR in accordance with the *Water Act 1912*, or future requirements under the *Water Management Act 2000*. The RTA's Regional Environmental Adviser, Southern Region would be advised and consulted as to the location of access and methodology in which water would be retrieved. • During the detailed design stage, further consultation with NSW Fisheries would be required regarding the proposed works within Towrang Creek. • Prior to the establishment of the stockpile and compound sites, temporary stormwater and water quality control devices and sediment controls would be implemented, where applicable. • The compound site would not be located within 50m of Towrang Creek or any natural or built drainage lines or areas prone to flash flooding. • All fuel, chemicals and liquids would be stored at least 50m away from any waterways. All fuels, chemicals and liquids would be securely stored within a bunded area of an impervious surface. • All plant, vehicles and equipment required for the Proposal would be refuelled off site or within the compound site, within a bunded area that has an impervious surface and is located away from drainage lines. • Vehicle washdowns would be undertaken within a designated bunded area with an impervious surface, or undertaken off site. • If concrete agitator trucks are to be washed out on site, an impermeable bunded area would be constructed to contain wash out water, and the concrete residue would be allowed to settle. Concrete residues would be incorporated into the road formation (if suitable), or disposed of at a licensed waste facility. If clean, the water from the bunded area would be used for watering of the road formation, or used to irrigate the median vegetation. • An incident emergency spill plan would be developed and incorporated into the CEMP. This would include measures to avoid spillages of fuels, chemicals and fluids into the creek. An emergency spill kit would be kept on site at all times; • Should any spillage occur during the construction activity the Regional Environmental Adviser, Southern Region, would be contacted immediately, and contaminants would be immediately contained, removed, treated (if necessary) and disposed of to the satisfaction of the DEC.

	• No polluted or sediment-laden stormwater runoff from the Proposal site would be allowed to enter directly into Towrang Creek. • No wastewater would be disposed of onsite unless it has been treated to the requirements of the DEC.
Air Quality	• All unsealed trafficable areas, stockpiles and exposed soils would be kept damp during working hours to minimize wind blown or traffic generated dust emissions. • Vehicles and equipment used on-site would be maintained in good working order and switched off when not operating to minimise exhaust emissions, and to ensure the emissions comply with regulations under the PoEO Act. • Truck movements would be controlled on site and restricted to designated roadways. • Any materials transported in trucks would be appropriately covered to reduce dust generation. • Construction activities that are likely to generate high dust levels would be avoided during high wind periods and stockpiles and exposed areas would be covered or watered. • No burning of any timber or other combustible materials would occur. • Rehabilitation of disturbed surfaces would be undertaken as soon as possible.
Biodiversity	*Terrestrial Flora* • Stockpile sites and the compound site would be located in areas that require no clearing of native vegetation. • Topsoil potentially containing introduced grasses or weed propagules would be removed from the Proposal site and disposed of at a licensed landfill facility. Weed infested or contaminated topsoil would not be reused for the proposed works, including site rehabilitation works, and would not be stockpiled adjacent to any areas of native vegetation. • All vegetation to be retained would be clearly highlighted on site and on site plans, and would be protected with fencing. Protective fencing would be erected beyond the dripline of trees and erected prior to the commencement of works. All staff would be informed and inducted of the limits of vegetation clearing and the areas of vegetation to be retained. No works would be undertaken within the fenced off areas. • Should additional vegetation removal be required, including within the compound site, the proposed variation to the original scope of works would be referred to the Regional Environmental Adviser, Southern Region. The need for further

	assessment would be determined by the Regional Environmental Adviser, Southern Region. • Noxious weeds present within the Proposal site would be removed and/or destroyed, and disposed of appropriately in accordance with their category under the *Noxious Weeds Act 1993*; • Environmental weeds (eg. Black Wattle) present within the Proposal site would be removed in accordance with the *NSW Department of Agriculture Guidelines 1999*; • Landscaping and revegetation works would be maintained for a period of no less than 12 months. During this time, any dead or dying plants would be removed and replaced; • Cleared native vegetation would be mulched and used in the rehabilitation works post-construction; • Woody weeds and seed-bearing exotic plants that are removed would not be mulched but bagged and taken to an approved Council waste facility; • Mulched material would be stored within existing cleared areas; Fauna • Any wombats present in the Wombat den identified near the Towrang Creek culverts in Section B would be encouraged to leave the area by the gentle destruction of burrows close to dusk; • Any extension to the existing culverts on Towrang Creek in Section B would use pipes of the same diameter and material as the existing pipes, and would continue the culvert in a straight line to ensure that light continues to be seen from either end of the culverts; • A licensed person under s.132c of the *National Parks & Wildlife Act 1974* (NPW Act) would remove any fauna species found within areas to be disturbed; • Should any hollow-bearing trees be removed, then a licensed person under s.132c of the NPW Act would be present at the time; and • Should substantial time (ie. greater than 6 months) elapse prior to commencement of the proposed works, additional targeted surveys would be conducted for the Striped Legless Lizard (*Delma impar*), to ensure it has not moved into potential habitat present within the study area. Aquatic Flora and Fauna • The Minister for Fisheries (DPI) would be notified of details associated with the proposed works adjacent to and within Towrang Creek. • When undertaking road widening works in the vicinity of Towrang Creek, pollution controls would be implemented to prevent contaminants and/or sediment from entering the creek.

	• Works within Towrang Creek would be undertaken during either low to zero flow periods and would not be undertaken at a time when heavy rainfall is predicted.
Non-Indigenous Heritage	• The RTA would liaise with the Towrang Stockade Reserve Trust as the detailed design of the Proposal progresses. • Every effort would be made to relocate the north face of Culvert 4 so that it is integrated into the final design of the Proposal. • At the detailed design stage the impacts on Culvert 4 and the weir would be further assessed. • Archival photographic recording of Culvert 4 and the weir would be undertaken prior to the commencement of construction activities. • Experienced heritage stonemasons would be commissioned to undertake the disassembly and reassembly of the shale and dressed sandstone voussoirs and quoins of Culvert 4. • A Section 140 permit would be obtained from the NSW Heritage Office prior to the commencement of works.
Indigenous Heritage	• A s.90 Heritage Impact Permit (Partial Consent with Salvage) under the NP&W Act would be sought for the Proposal site. • A qualified surveyor would be engaged to identify and flag the new road easement boundary to the north of the Hume Highway. Areas to the north of this identified perimeter are Aboriginal sites or PAD, and access to these areas would be restricted. • The immediate area of TC1-5 along with a 50m buffer zone or curtilage to avoid the associated PAD would be cordoned off to prevent inadvertent impact whilst the proposed works are carried out. The heritage consultant (Kayandel Archaeological Services) would be requested to supply details of the required location of fencing around the TC1-5/curtilage. • In the event that any indigenous artefacts or items are located in those areas not previously sanctioned by a Section 90 Heritage Impact Permit, all work would cease in the vicinity of the find, and the RTA's Regional Environmental Adviser, Southern Region, RTA's Aboriginal Program Consultant, Southern Region, and DEC would be contacted. • All personnel working on site would be made aware of their responsibilities in accordance with the *National Parks and Wildlife Act 1974.*
Noise and Vibration	• Should works be required outside standard working hours, the procedures contained in the RTA's *Environmental Noise*

	Manual 2001, "Practice Notes vii – Roadworks Outside of Normal Woking Hours" would be followed. • The residents located approximately 300m from the Proposal site would be contacted prior to the commencement of works via a letter box drop, or door knock, and would be informed of the proposed works, working hours, and period of construction. Residents would also be provided with a contact name and number should any complaints wish to be registered. • In accordance with RTA's *Stockpile Site Management Procedures 2001*, the site compound/stockpile sites would be located more than 250m from residents or other activities that may be affected by operational noise or other impacts of the site. • The idling of machinery and equipment for a prolonged period of time would be avoided where possible. • Best management practices would be adopted that are consistent with the RTA's *Environmental Noise Manual 2001.*
Visual Amenity and Landscape	• A detailed Landscape Plan would be prepared at the detailed design stage; • All areas affected or exposed during works would be appropriately revegetated and landscaped after the completion of construction works; • Weed management after the establishment of these plants would further enhance the visual amenity of the Proposal site; and • The Proposal site would be kept tidy and rubbish free.
Socio-economic Considerations including Landuse	• A Traffic Control Plan would be prepared in accordance with the RTA's *Traffic Control at Work Sites Manual 2003*, and approved by the RTA prior to implementation. The Traffic Control Plan would include the notification of any traffic alterations or closures. • All property acquisitions would be negotiated in accordance with the RTA's Land Acquisition Policy, and compensation in accordance with the *Land Acquisition (Just Terms Compensation) Act, 1991.* Property acquisitions and/or leasing arrangements would be resolved between the RTA and property owners prior to the commencement of works. • Any property fencing affected by the Proposal would be re-instated, where appropriate. • The broader community would be informed about the proposed road works prior to the commencement of works. A contact name and number would be provided for complaints. • Provision of pedestrian access to the historic sites located to the north of the Highway would be taken into consideration.

Waste Minimisation and Management	• A Waste Management Plan would be prepared in accordance with the RTA's QA Specifications and in accordance with the RTA's *Waste Minimisation & Management Guidelines, 1998* and the principles of the WARR Act. • Trees to be removed would be assessed for their value as millable timber. • Leaf material and small branches of native vegetation would be chipped and used as mulch in revegetation works. • All working areas would be maintained and cleaned up at the end of each working day. • All construction materials and wastes generated from the Proposal would be stockpiled and stored at the compound site prior to reuse, recycling or disposal. • All materials, surplus soils and all wastes generated from the Proposal would be stockpiled at the compound site prior to re-use, recycling or disposal. • Wastes would not be stored for long periods of time during construction of the Proposal. Empty drums of fuels, oils and other chemicals or fluids would not be stored on site during construction. • Recycled content products and materials would be used where these are cost and performance competitive and where their environmental performance is at least equivalent to the non-recycled alternative(s). • No waste would be burnt. In addition, the Resource Management Hierarchy principles of the WARR Act would be adopted as follows: 1. Avoid unnecessary resource consumption as a priority; 2. Avoidance is followed by resource recovery (including reuse or materials, reprocessing, recycling, and energy recovery; and 3. Disposal is undertaken as a last resort.
Associated Infrastructure and Activities	• All public utilities to be impacted upon by the Proposal would be relocated prior to works commencing; • The "dial before you dig" hotline would be contacted prior to the commencement of earthworks; and • Should any utilities or services be impacted, the affected community would be notified.

9.3 Licences and Approvals

Native Vegetation Conservation Act 1997

All vegetation to be removed by the Proposal would be located within the designated road corridor or land acquired for the purpose of road construction. Approval from DIPNR to clear vegetation within the road corridor would therefore not be required.

Water Act, 1912

At this stage it is unknown what quantity of water would be required for earthworks and dust suppression. It is proposed to source recycled water (ie. tertiary treated sewage) from Goulburn Mulwaree Council's sewage treatment plant (STP) in Goulburn. Recycled water would be used for construction purposes (ie. dust suppression). The Proposal site would be classified as 'uncontrolled' (for the purposes of recycled water use), as the public are not excluded from gaining access to the Proposal site.

If current water restrictions are lifted, water may be sourced from Goulburn's town water supply, or water may be drawn from local water sources such as Wollondilly River, creeks, or dams located within 10km of the Proposal site.

A water sharing plan under the *Water Management Act 2000* does not apply to the Proposal site. Should water for the Proposal 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 DIPNR. In addition, the RTA's Regional Environmental Adviser, Southern Region, would be advised of the location and methodology in which water would be drawn.

It should be noted that at any time after the completion of writing this REF the above sections of the *Water Act 1912* may 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.

NSW Fisheries Management Act 1994

The *Fisheries Management Act 1994*, through the NSW Fisheries *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. During the detailed design stage, further consultation with NSW Fisheries would be required regarding the proposed works (ie. remove/relocate woody debris, dredging or reclamation) within Towrang Creek.

Protection of the Environment Operations Act 1997

Should the Proposal at any time obtain, process or store for sale or reuse extractive material of more than 30,000m^3, a licence under Schedule 1 of the PoEO Act may need to be sought from DEC for Extractive Industry.

NSW Heritage Act 1977

The Proposal is likely to impact on a heritage culvert and weir, which are considered relics. Therefore, prior to the commencement of works, a Section 140 Application would be sought under Section 139 of the Act from the NSW Heritage Office.

National Parks and Wildlife Act 1974

The Proposal would involve knowingly destroying, defacing or destroying an object or an Aboriginal place, therefore a Section 90 permit would be required. This permit would be sought from DEC prior to the commencement of works.

10 Summary of Environmental Effects

10.1 Beneficial Effects

The Proposal would have a generally low impact on the environment. The expected benefits associated with the Proposal include:

- Improved safety for motorists using the length of the Hume Highway within the study area due to a wider median;
- Improved safety for motorists travelling between the Hume Highway and Towrang and Carrick Roads;
- Increased efficiency of freight transport by lowering costs and improving travel time; and
- General improvement in the condition of the Hume Highway.

10.2 Adverse Effects

The Proposal is likely to result in some adverse effects, which would include:

- Potential for soil erosion to occur as a result of soil disturbance and exposure;
- Temporary increases in dust emissions during construction;
- Short-term potential for sedimentation of Towrang Creek as a result of construction activities;
- Minor traffic delays during construction;
- Removal of native vegetation from the Proposal site;
- Potential for weed seeds to be introduced to the Proposal site through the importation of topsoil, or the transfer of soil from one part of the Proposal site to another;
- Potential impact to Culvert number 4 as a result of the widening of the Highway;
- Potential impacts on indigenous sites;
- Short-term socio-economic impacts (visual and dust); and
- Adjustment of utilities within the Proposal site.

11 Consideration of Environmental Factors

11.1 Clause 228(2) Checklist (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 11.1 below to ensure that the likely impacts of the proposed activities on the natural and built environment are fully considered.

Table 11.1: Compliance with Clause 228(2) of the EP&A Regulation 2000.

Factor	Impact
a) Any environmental impact on a community?	
Short-term negative impacts associated with the construction activities include potential minor traffic delays and an increase in noise levels. The increased noise levels would not inconvenience the community, as there are no sensitive noise receptors in close proximity to the Proposal site. Motorists using the Derrick VC rest area would experience increased noise levels, however they would only stop at the rest area for short periods of time.	Short-term minor negative
In the long-term, the proposed intersection upgrades would have a positive impact on the community, as the upgrades would improve safety for motorists travelling between Towrang and Carrick Roads and the Hume Highway.	Long-term positive
b) Any transformation of a locality?	
The Proposal site has been modified by rural land uses and road development. Vegetation clearance would be kept to a minimum, and the overall character of the area would remain the same. The proposed works would improve safety conditions for motorists and would not lead to any transformation of a locality.	Nil
c) Any environmental impact on the ecosystems of the locality?	
The Proposal would result in the removal of vegetation that is in poor condition and comprises mainly exotic grasses. Few fauna habitat features are present within this area. The widening of the Highway would also have an impact on the aquatic ecosystem, as a portion of Towrang Creek to the north of the Highway would form part of the widened Highway. Restoration works undertaken as part of the Proposal would restore the grass cover and revegetate the area with native endemic species. With the implementation of appropriate environmental safeguards described in Section 9 the impacts on terrestrial and aquatic ecosystems are not expected to be substantial.	Minor negative

Factor	Impact
d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	
Construction activities are likely to cause a short-term reduction in the visual amenity near the Proposal site, as a result of exposed surfaces associated with the removal of vegetation, the compound site and the presence of machinery. In the long-term the area of vegetation at the Proposal site would be replaced with a widened Highway. This would be a minor impact on the aesthetics of the locality.	Short-term negative
There would be minimal impact on the scientific quality of the environment by the removal of vegetation, as the majority of vegetation to be removed comprises pasture grasses. Some native trees are likely to be removed by the proposed works.	Long-term 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?	
The Proposal is likely to impact upon Culvert 4 and the weir. Culvert 4 would be removed before the commencement of works and would be replaced by an approved stonemason. It is also likely that the remains of a weir would be affected by the Proposal. These items are considered to be relics which are representative of the construction of the Great South Road.	Short-term negative
The Proposal would also impact on indigenous sites, comprising open artefact scatters, and a PAD site (TC1-1, TC1-3, TC1-4 and TCPAD1). Appropriate permits would be sought for the Proposal.	Negative
f) Any impact on the habitat of any protected or endangered fauna (within the meaning of the National Parks and Wildlife Act 1974?	
A number of fauna species have been recorded using the Proposal site. Whilst a small area of this habitat is likely to be removed as part of the Proposal, the species that utilise the habitats within the Proposal site and study area are likely to adapt quickly to the widened Highway because the area is already highly disturbed by a major road, high traffic levels and noise.	Minor negative
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	
Whilst the Proposal would involve the removal of disturbed vegetation from the Proposal site, the Proposal 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 Proposal would have positive long-term effects on the environment by improving safety for motorists using the Highway and the Towrang Road and Carrick Road intersections.	Long-term positive

Factor	Impact
i) Any degradation of the quality of the environment?	
Potential short-term impacts associated with the Proposal include traffic delays due to lane closures and traffic switches. Other potential impacts include increased dust levels and an overall decrease in the amenity of the local area during the construction stage. The people using the rest area and the motorists using the Highway could potentially be affected by noise associated with the construction of the Proposal.	Short-term negative
In the long-term, the Proposal is not expected to degrade the quality of the environment. The majority of the study area is already highly disturbed by clearing associated with the construction of the Highway, rest area, and agricultural activities. The quality of the environment would not be further degraded provided that the environmental safeguards detailed in Section 9 are properly implemented.	Long-term nil
j) Any risk to the safety of the environment?	
There is potential for accidental spillages of chemicals and other pollutants into Towrang Creek. However, with the implementation of the environmental safeguards outlined in Section 9, the likelihood of this occurring is considered to be low.	Short-term negative
k) Any reduction in the range of beneficial uses of the environment?	
There would be no reduction in the range of beneficial uses of the environment. The Proposal would improve safety for motorists using the Towrang Road and Carrick Road intersections, and the wider median would improve general safety for motorists using this stretch of the Hume Highway.	Nil
l) Any pollution of the environment?	
During the construction stage, clearing, excavation works, stockpiling activities and translocation of fill have the potential to generate high levels of dust, particularly during windy conditions. Local air quality also has the potential to decrease in the short-term from increased vehicle emissions associated with plant and construction equipment. Noise levels are likely to increase as a result of the construction activities, and would affect motorists and visitors using the Derrick VC rest area while these activities are taking place. While works are being undertaken near Towrang Creek, there is a risk of pollutants entering Towrang Creek and affecting the water quality of the creek through accidental spillages. However, with the implementation of the environmental safeguards outlined in Section 9, the potential for the above impacts to occur would be minimised.	Short-term negative Long-term nil
m) Any environmental problems associated with the disposal of waste?	
Waste would be generated as a result of the Proposal. Soil, bitumen and vegetation materials would be recycled or reused where possible. General waste material would be disposed of at a licensed waste facility and managed in accordance with the Resource Management Hierarchy of the WARR Act.	Nil

Factor	Impact
n) Any increased demands on resources, natural or otherwise which are, or are likely to become in short supply?	
The Proposal would not result in increased demands on resources, natural or otherwise which are, or are likely to become, in short supply.	Nil
o) Any cumulative environmental effect with other existing or likely future activities?	
The cumulative impacts associated with this Proposal and another Proposal at Tiyces Lane are likely to relate to vegetation removal, fauna impacts, erosion/sedimentation, visual amenity impacts and water quality impacts, however impacts are expected to be minor. The two projects would, however, improve the safety for motorists using this stretch of the Highway.	Short-term negative Long-term positive

11.2 EPBC Act 1999 (Commonwealth Legislation)

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

Factor	Impact
a) Any environmental impact on a World Heritage property?	
No impact on a World Heritage property would occur as a result of the Proposal.	Nil
b) Any environmental impact on National Heritage places?	
No impact on any places of national heritage significance would occur as a result of the Proposal.	Nil
c) Any environmental impact on wetlands of international importance?	
The EPBC Act search found that there are no wetlands of international importance located within a 5km radius of the Proposal site. The Proposal is not likely to have an impact on any wetland of international importance.	Nil
d) Any environmental impact on Commonwealth listed threatened species or ecological communities?	
Seven species listed as migratory or threatened under the EPBC Act have been previously recorded within 10km of the Proposal site (NPWS Wildlife Atlas). The proposed works would affect none of these species. No Commonwealth listed ecological communities have been recorded within the Proposal site or study area, and are not likely to be affected by the Proposal.	Nil
e) Any environmental impact on Commonwealth listed migratory species?	
Although three migratory species have been previously recorded within a 10km radius around the Proposal site, the Proposal is not likely to have any long-term impact on the habitat for these species. Should these species happen to utilise the stagnant pools of water within Towrang Creek on occasions, the disturbance to the creek during the construction activities would only be temporary. Furthermore, there are other waterways in the vicinity of the study area, including other sections of Towrang Creek, Deep Creek and the Wollondilly River. Overall, the Proposal is not likely to have any impact on Commonwealth listed migratory species.	Nil
f) Does any part of the proposal involve a nuclear action?	
The Proposal would not involve a nuclear action.	Nil
g) Any environmental impact on a Commonwealth marine area?	
The Proposal would not impact on a Commonwealth marine area.	Nil
In addition; Any impact on Commonwealth Land?	
Commonwealth land would not be affected, directly or indirectly, as part of this Proposal.	Nil

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.

for Yojana Chadhokar
Environmental Officer
Date: 31 May 2005

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

Jennifer Mak
Project Manager
Date:

12 References

Australian Heritage Commission Register of the National Estate 2003, (http://www.ahc.gov.au/register/easydatabase/database.html)

Bannerman SM and Hazelton PA. 1990. Soil Landscapes of the Penrith 1:100 000 Sheet. Soil Conservation Service of NSW, Sydney.

Bureau of Meteorology Website, Liverpool Statistics, http://www.bom.gov.au

Campbelltown City Council. 2002. *State of the Environment Report 2001-2002.* Campbelltown City Council, Campbelltown.

Cardno Willing. 2003. *Upper Georges River Catchment Wetlands Feasibility Study.* Report Prepared for the RTA, August 2003.

Department of the Environment and Heritage. 2004. *State of the Air: National Ambient Air Quality Status and Trends Report 1991-2001.* DEH, April 2004.

Department of Infrastructure, Planning and Natural Resources. 2002. *Guidelines to Accompany Map of Salinity Potential in Western Sydney.* DIPNR Sydney/South Coast Region, Wollongong.

Department of Infrastructure, Planning and Natural Resources. 2003. *Roads and Salinity.* Local Government Salinity Initiative. DIPNR, Sydney.

Department of Transport. 1998. *Action for Transport 2010. An Integrated Transport Plan for NSW.*

Environment Australia website (http://www.ea.gov.au/erin/ert/epbc/index.html)

Environmental Protection Authority. 1999. *Environmental Criteria for Road Traffic Noise.* EPA, Chatswood, NSW.

Goulburn Mulwaree Council 2005. Goulburn Mulwaree Council website. (http://www.goulburn.nsw.gov.au/)

Hazelton PA and Tille PJ. 1990. *Soil Landscapes of the Wollongong-Port Hacking 1:100 000 Sheet.* Soil Conservation Service of NSW, Sydney.

Hird C. 1991. *Soil Landscapes of the Goulburn 1:250 000 Sheet.* Soil Conservation Service of NSW, Sydney.

Lesryk Environmental Consultants. 2004. *Flora and Fauna Assessment, Proposed F5 Entry and Exit Ramps, Campbelltown Road, Ingleburn, NSW.* Report prepared for the RTA. Lesryk Environmental Consultants, Bundeena.

Masson Wilson Twiney. 2001. *Hume Highway, Campbelltown, Additional Ramps Study.* Report Prepared for the RTA.

NSW Consolidated Regulations website:
(http://www.austlii.edu.au/legis/nsw/consol_reg/tlep1996333)

NSW Heritage Office State Heritage Inventory 2003,
(http://www.heritage.nsw.gov.au/07_subnav_01.cfm)

Parliamentary Council's Office, (http://www.legislation.nsw.gov.au)

Roads & Traffic Authority. 1998. *Community Involvement Practice Notes and Resource Manual. July 1998.* RTA Environment & Community Policy Branch, NSW.

Roads & Traffic Authority 2001a. *Environmental Impact Assessment Policy, Guidelines and Procedures* . NSW.

Roads & Traffic Authority. 2001b. *NSW Roads and Traffic Authority: Environmental Noise Management Manual.* RTA, Sydney, NSW.

Roads & Traffic Authority. 2003. *Procedure for Selecting Treatment Strategies to Control Road Runoff.* RTA, Sydney, NSW.

Roads & Traffic Authority. *2003. National Highways Program – Forward Strategy Report 2003/04 to 2007/08. Appendix B – Route Strategies, Sydney – Melbourne Corridor: Hume Highway.*

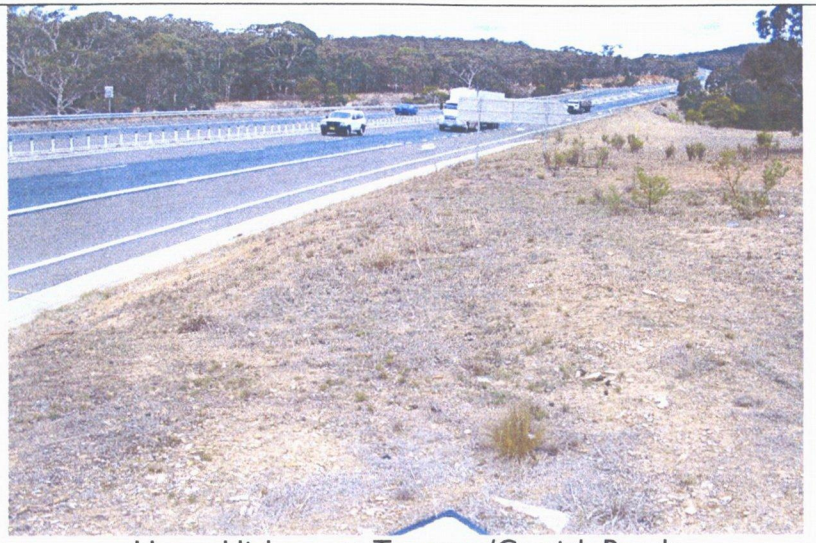
Roads & Traffic Authority. 2004. *Hume Highway Improvements to Junctions at Towrang & Carrick Roads Approximately 10km North of Goulburn. Stage 2 Project Proposal Report.* RTA Environmental Technology, Parramatta.

RTA Heritage and Conservation Register 2003,
http://www.rta.nsw.gov.au/environment/heritage/heritageconservreg/index.html

Sydney Catchment Authority. 2003. *Sydney Catchment Authority Water Quality Monitoring Report 2002-2003.*

Sinclair Knight Mertz (2003). *Investigations of Options for Upgrading the F5 between Menangle and the Crossroads, Sydney.* Sinclair Knight Mertz.

Appendix A Site Photographs



Hume Highway at Towrang/Carrick Roads

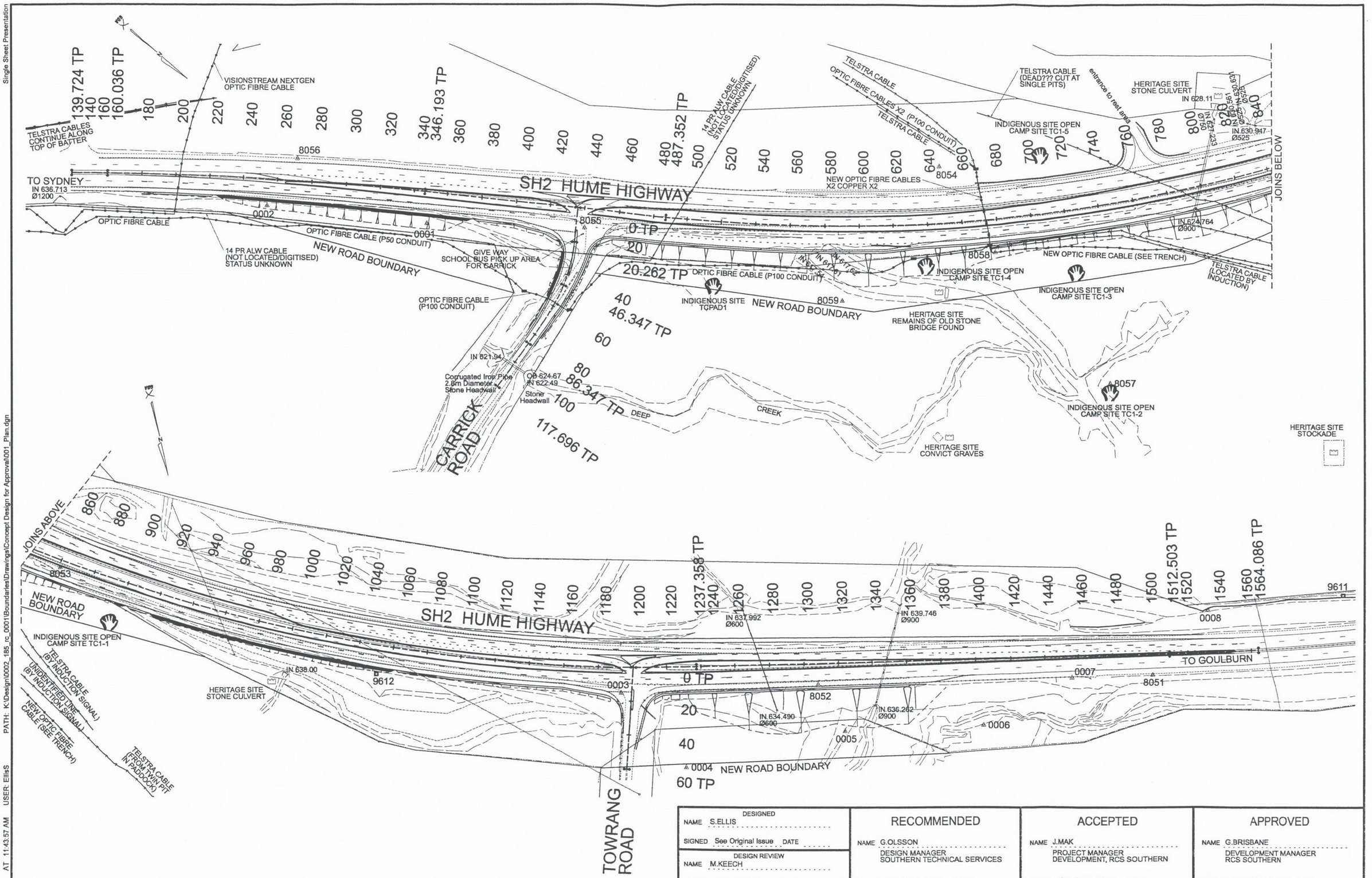
Hume Highway - Towrang Creek visible behind foreground vegetation

Towrang Creek three-cell culvert

Single-cell culvert Number 4

Site Photographs

Appendix B Concept Design



DESIGNED	RECOMMENDED	ACCEPTED	APPROVED
NAME S.ELLIS	NAME G.OLSSON	NAME J.MAK	NAME G.BRISBANE
SIGNED See Original Issue DATE	DESIGN MANAGER SOUTHERN TECHNICAL SERVICES	PROJECT MANAGER DEVELOPMENT, RCS SOUTHERN	DEVELOPMENT MANAGER RCS SOUTHERN
DESIGN REVIEW NAME M.KEECH	SIGNED See Original Issue DATE	SIGNED See Original Issue DATE	SIGNED See Original Issue DATE
SIGNED See Original Issue DATE			

No.	Amendment Description	Initials	Date
A	Indigenous site locations amended	S.E.	23/05/05

A3 original | This sheet may be prepared using colour and may be incomplete if copied | Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

SCALES
0 10 20 30 40 50
SCALE 1:1000m

RTA PREPARED BY SOUTHERN TECH SERVICES PROJECT DESIGN WOLLONGONG

ISSUE A

ROADS AND TRAFFIC AUTHORITY OF NSW

GREATER ARGYLE
SH2 HUME HIGHWAY
INTERSECTION IMPROVEMENTS AT
TOWRANG AND CARRICK ROADS
PLAN

FILE No.	DRAWING	PRINTED DATE	SHEET No.
2/297.1109	001_Plan.dgn	23/05/2005	001

REGISTRATION NUMBER
0002.185.CD.0002

Appendix C Consultation

Department of
Environment and Conservation (NSW)

Your reference : 4M3077
Our reference : WO294/29:WOF11916:CP
Contact : Craig Patterson, (02) 4224 4100

The General Manager
Roads & Traffic Authority
(Yojana Chadhokar)
PO BOX 3035
PARRAMATTA NSW 2124

Dear Sir

PREPARATION OF REVIEW OF ENVIRONMENTAL FACTORS
HUME HIGHWAY IMPROVEMENTS (JUNCTIONS AT TOWRANG & CARRICK ROADS

We are writing further to your letter dated 24 September 2004 requesting comments from Department of Environment and Conservation (DEC) for the preparation of a Review of Environmental Factors for the above near Goulburn, NSW.

Based on the information provided, the proposed road upgrade works will not be a scheduled development under the Protection of the Environment Operations Act 1997 and as such, will not require an Environment Protection Licence from DEC. However, if NSW Roads and Traffic Authority will be undertaking the road upgrade works, DEC will be the Appropriate Regulatory Authority for the proposed development. We have provided our comments in the Attachment to this letter.

Should you have any further enquiries, please contact the officer above.

Yours sincerely

11/10/04

TREVOR JONES
Regional Manager South Coast
Environment Protection and Regulation Division
Department of Environment and Conservation

Att

cc Department of Environment and Conservation
(Attention: Amanda Sullivan)
Conservation Programs and Planning Branch
PO Box 2115
QUEANBEYAN NSW 2620

(N:\PLANNING\LETTERS\WOF11916 - REF - HUME HWY TOWRANG UPGRADE - GOULBURN.DOC)

PO Box 513 Wollongong East NSW 2520 Australia
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Wollongong NSW 2500

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ATTACHMENT

ISSUES TO BE CONSIDERED IN THE PREPARATION OF A REVIEW OF ENVIRONMENTAL FACTORS

We advise that the REF should include but need not necessarily be limited to the following:

1. SCOPE OF WORKS

Issues to be addressed

Provide details on:

1.1 All stages of the proposed works including the scope of the upgrade work; location, easements, length and width of proposed entire works, location of site establishment, equipment to be used, materials used, distance of drains on the roads, environment protection measures to be installed, fire control measures during the works.

1.2 All works associated with the proposal including any concrete and bitumen batching on-site, truck cleaning and maintenance areas, storage/stockpile areas.

1.3 An overview of the affected environment to place the proposal in its local and regional environmental context including meteorology, topography, soil types & properties and any relevant ecological information (water system habitat, vegetation, fauna and flora).

1.4 An outline of the construction works including:

- disturbing any existing contaminated soil and actions to address the soil contamination.
- any earthworks (any associated subsidence or instability issues) or site clearing; re-use and disposal of cleared material (including use of spoil on-site).

1.5 Identification of sensitive receptors.

1.6 Construction timetable and staging of all sections, proposed construction, hours of construction and environment protection measures, including water controls, noise mitigation measures, dust control measures and waste management.

2. WATER

Environmental Outcomes

- All works associated with this development must be designed, installed and managed to minimise the potential for water pollution.
- The impact of any works associated with this development must not compromise the water quality and river flow objectives for the relevant waterways.
- Bunding must be in accordance with the EPA technical guidelines 'Bunding and Spill Management' and designed for no-discharge.

The following should form the basis for design and assessment of the stormwater management controls for the proposed development:

- "Managing Urban Stormwater – Soils and Construction", NSW Department of Housing, Fourth Edition, March 2004.
- "Managing Urban Stormwater: Treatment Techniques", NSW EPA, 1998, (Available from the EPA's Pollution Line on 131 555).
- Healthy Rivers Commission , Statement of Joint Intent for the Hawkesbury Nepean River available at www.hrc.nsw.gov.au
- ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
- State Environmental Planning Policy (SEPP) 58, Protecting Sydney's Water Supply.

Issues to be addressed

2.1 Identify and describe all potential sources and characteristics of water pollution.

2.2 Provide details of sediment and erosion controls proposed for the site pre, during and post construction.

2.3 Provide details of stormwater management controls proposed for the site pre, during and post construction.

2.4 Provide details on progressive rehabilitation to minimise the extent of area exposed pre, during and post construction.

2.5 Provide details on proposed monitoring regime and survey checks of pollution control measures at the site.

3. AIR

Environmental Outcomes

- Prevent as far as practicable visible dust emissions from any activity at the premises during the road upgrade works.
- Minimisation of the vehicular kilometres travelled.

The following should form the basis for air impact assessment and control, of this development:

- NSW EPA, 2001a, Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW;
- NSW EPA, 2001b, Technical Notes: Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW;
- NSW EPA, 2001c, Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW.

Issues to be addressed

3.1 Assess all potential air emissions including, but not necessarily limited to the following:

- Identify potential sources of dust during the construction of the development.
- Identify potential sources of odour during the construction of the development
- Identify measures/controls to be implemented to meet the environmental outcomes specified above. The assessment must address the entire site (including all proposed plant, equipment and activities)

3.2 Details of any monitoring programs to assess compliance with environmental performance goals for air emissions.

3.3 Provide details on transportation, material handling and storage.

4. NOISE

Environmental Outcomes

- The construction works must not cause intrusive noise at the nearest affected receiver.
- The criteria for blast vibration and air pressure noise specified in Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC) (1990) should be complied with.

The following should form the basis for noise assessment and control of this development:

- Environmental Noise Management Series: Environmental Criteria for Road Traffic Noise, May 1999.
- Chapter 171 'Construction Site Noise' of the NSW EPA Environmental Noise Control Manual.
- Environmental Noise Management Series: NSW Industrial Noise Policy, EPA, January 2000

Issues to be addressed

4.1 Determine all noise sources from the proposed development and expected noise level and noise character (for example: tonality, impulsiveness, vibration, etc) likely to be generated from noise sources during:

a) site establishment;
b) construction;
c) ancillary activities including traffic noise generated by the proposal;
d) other services.

4.2 Provide a map of the locality showing any identified noise sensitive locations in relation to the site.

4.3 Determine the noise and vibration levels likely to be received at the most sensitive locations. Potential impacts should be determined for any identified significant adverse meteorological conditions. Predicted noise levels under calm conditions may also aid in quantifying the extent of impact where this is not the most adverse condition.

4.4 Specify the times of operation for all phases of the development and for all noise producing activities.

4.5 Determine the most appropriate noise mitigation measures and expected noise reduction including noise controls and management of impacts for both construction and operational noise. This could include selecting quiet equipment and construction methods, noise barriers or acoustic screens, location of stockpiles, temporary offices, compounds and vehicle routes, scheduling of activities, etc.

4.6 Determine the existing and expected road traffic noise levels in accordance with the NSW Environmental Criteria for Road Traffic Noise, where road traffic noise impacts may occur.

4.7 Where blasting is intended, the following details of the blast design should be included in the noise assessment:

a) Bench height, burden spacing, spacing ratio;
b) Blast hole diameter, inclination and spacing;
c) Type of explosive, maximum instantaneous charge, blast block size blast frequency.

5. WASTE

Environmental Outcomes

- The works must be designed, constructed, managed and maintained to ensure that:
- The works are consistent with the principles of the waste hierarchy and cleaner production.
- The beneficial reuse of all wastes generated at the site is maximised.
- Opportunities as appropriate to incorporate waste materials into the design are maximised.
- Any process residues or contaminated products are stored or managed appropriately.
- The handling, processing and storage of all materials used at the site do not have negative environmental or amenity impacts.
- Wastes are tracked in accordance with the relevant legislative provisions.

In addition:

- All liquid and non-liquid waste wastes associated with the proposed construction works must be assessed, classified and managed in accordance with the Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes (NSW EPA, 1999).

Issues to be addressed

5.1 Provide details on the classification and management of all wastes associated with this proposed development.

5.2 Provide details of waste reuse/recycling/reprocessing of materials associated with the construction works (for example: use of topsoil)

5.3 Identify all types of waste that would be generated at the premises from the construction of the proposed development.

5.4 Provide details on the classification and management of all wastes associated with this proposed development.

5.5 Outline cleaner production actions, including:

- measures to minimise waste (typically, through addressing source reduction);
- proposals for use or recycling of by-products;
- proposed disposal methods for solid and liquid waste.

6. OTHER ISSUES

We ask that all operators on site be made aware of their environmental responsibilities and be properly trained or accredited in the installation and management of pollution control works.

Issues to be addressed

6.1 Details on Contingency Plans (including spillage and management of contaminated materials, machinery breakdown).

Department of
Infrastructure, Planning and Natural Resources

Contact: Darryl Goldrick
Phone: (02) 4224 9664
Fax: (02) 4224 9669

Our ref: ERM 2004/3537
Your ref: 4M3077

Manager
Roads & Traffic Authority
Level 5, Pod D
99 Phillip Street
PARRAMATTA NSW 2124

Attention: Yojana Chadhokar

Dear Sir/Madam

Hume Highway Improvements: Junctions at Towrang and Carrick Roads

The Department of Infrastructure Planning and Natural Resources (DIPNR) apologises for the delay in responding to your request in respect to the preparation of an Review of Environmental Factors (REF) for the above proposal in your letter dated 24 September 2004.

While your correspondence references the preferred option for the intersection improvements, no general project description in respect to road widening and earthworks, however the Department assumes that this is a probability.

Given the likely excavations in or within 40 metres of Towrang Creek and the Wollondilly River, the RTA is however exempt from the provisions of the Rivers and Foreshores Improvement Act 1948 for the need to acquire a Part 3A Permit for such works.

Nonetheless, such construction activities have the potential to cause erosion and sediment transport into these major waterways and the REF will need to acknowledge these risks and articulate a well defined erosion and sediment control strategy to be designed and implemented during and following the project construction phase.

DIPNR would be pleased to provide comment on the final REF documentation.

Should you have any further enquiries, please contact Darryl Goldrick on (02) 4224 9664 and please forward any future correspondence to Kate Luskan, Environmental Review Coordinator at the Wollongong office.

Yours sincerely

Marwan El-Chamy
Resource Access Manager
South Coast Region

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Now incorporating NSW Fisheries
ABN 51 73 412 4190-002

Our ref: RTA4-10-2726
Your ref: 4M3077

8 October 2004

Yojana Chadhokar, Environmental Officer
Roads and Traffic Authority
Level 5, Pod D
99 Phillip Street
PARRAMATTA NSW 2150

Dear Yojana Chadhokar,

Re: Hume Highway Improvements to Junctions at Towrang and Carrick Roads

Thank you for your letter requesting REF requirements from the Department of Primary Industries (DPI, now incorporating NSW Fisheries) for the proposal cited above.

DPI's principal area of concern would be the potential impacts that the proposed works would have on Towrang Creek. Specifically DPI would like to see the following issues addressed in the REF:

- Nature and extent of buffer zones to be put in place to protect Towrang Creek from construction activity during the proposed works.
- Sediment and erosion control methodology to be implemented at the proposed site during construction.
- Extent of any riparian vegetation removal to be undertaken in order to cross Towrang Creek.
- Details on any proposed culvert work. Any proposed creek crossing works should be undertaken in accordance with NSW Fisheries Fishnote *Policy and Guidelines for Fish Friendly Waterway Crossings* and *Why Do Fish Need to Cross The Road ? – Fish Passage Requirements for Waterway Crossings*. Both of these documents are available from the NSW Fisheries website (www.fisheries.nsw.gov.au).

As part of the environmental assessment process the RTA is to notify DPI of any works that it proposes to undertake that will involve dredging and reclamation

activities as defined in s. 198 of the *Fisheries Management Act* 1994, and take into account any issues that the Department raises. Before any further advice can be given from this Department, DPI will need to be provided with details on the proposed design/s of the road crossing of Towrang Creek and the aquatic habitat conditions in the vicinity of the proposed works. This information should be forwarded to this office at the earliest possible opportunity.

If you have further enquires please do not hesitate to contact me on (02) 9492 9442.

Yours sincerely

E Boggie

Liz Boggie
Conservation Manager (Central)

SYDNEY CATCHMENT AUTHORITY

PO Box 323 Penrith NSW 2751
Level 2, 311 High Street
Penrith NSW 2750
Tel 1300 722 468 Fax 02 4732 3666
Email info@sca.nsw.gov.au
Website www.sca.nsw.gov.au

Ref: 2004/02092
Your Ref: 4M3077

Ms Yojana Chadhoklar
Environmental Officer
Roads and Traffic Authority
Level 5, Pod D
99 Phillip Street
PARRAMATTA NSW 2124

Dear Ms Chadhoklar

Hume Highway Improvements to Junctions at Towrang and Carrick Roads

I refer to your letter dated 24 September 2004 regarding the above. The Sydney Catchment Authority (SCA) appreciates being consulted at this stage.

The SCA has the following comments for consideration in the development of the proposal and the environmental assessment process.

General comments

The proposed works are located in the hydrological catchment of the dams managed the SCA. In particular the works are located in the Wollondilly River subcatchment.

The proposed works have the potential to impact on the quality of waters in the catchment during both the construction and operation stages. The Roads and Traffic Authority should consider water quality issues in the design, construction and operational stages of the project. Application of the RTA's Water Policy and Code of Practice for Water Management should substantially address water quality issues of interest to the SCA.

Specific comments

1. Planning controls. State Environmental Planning Policy No.58-Protecting Sydney's Water Supply applies to the site. SEPP 58 states that road work on classified roads requires development consent from the local council other than road work comprising repair or maintenance. The SCA recommends that the RTA confirm with the local council as to whether they consider a development application is required.

2. Matters for consideration. Irrespective of whether the proposal is assessed under Part 4 or 5 of the Environmental Planning and Assessment Act, there is a need for decision making authorities to consider clause 10 of SEPP 58. Therefore the development application or the Review of Environmental Factors (REF) should specifically address each part of clause 10. Attached is a guideline prepared by DIPNR which may assist in this regard.

ABN 36 682 945 185

3. Stormwater management. The SCA considers there may be opportunities to improve the management of stormwater from adjacent sections of the highway in conjunction with the works required for the proposal. The SCA encourages the RTA to investigate these opportunities.

4. Soil and water management. The SCA would like the opportunity to comment on draft soil and water management plans.

5. Approvals. No approvals are required from the SCA for the proposal (note however that if a development application is required the council will need to notify the SCA of the application and provide the Authority with 21 days to provide comments.

The SCA requests the opportunity to provide comments on drafts of the development application or REF.

If you wish to discuss this matter please contact Malcolm Hughes on 47252139 or malcolm.hughes@sca.nsw.gov.au

Yours sincerely

LEE MORGAN
Manager Statutory Planning

Encl.

25.11.02

Appendix D Results of Database Searches

Southern region

In This Section
- Hunter region
- Northern region
- South West region
- Southern region
- Sydney region
- Western region

Southern Region

Abernethys Creek Bridge	4309517
Bellbird Creek Bridge	4309550
Bridge over Wologorong Creek	4301637
Charleyong Bridge over Mongarlowe River	4300172
Collection of movable heritage items - machinery and related equipment	4301434
Collection of movable heritage items - machinery and related equipment	4301432
Collection of movable items - photographs, surveyors books and equipment etc.)	4301444
Collection of movable items - surveyors equipment and field books.	4301458
Collection of plans of roads and bridges for the Southern Region.	4301456
Collection of surveyors folders / books and photographs	4301457
Crankies Plain Bridge, Bombala	4300006
Crookwell River Bridge	4309559
Dalgety Bridge over Snowy River	4301689
Fairy Creek Bridge	4309514
Gundaroo Bridge over Yass River at Gundaroo	4300157
Guthries Creek Bridge	4309555
Hampden Bridge, Kangaroo Valley	4301059
Heritage horse trough	4301454
Higgins Creek Bridge	4309518
House - 85 Farrell Road, Bulli	4301086
Lansdowne Bridge over Mulwaree Ponds	4300186
Large collection of movable heritage in the Mittagong Works Office	4301452
Large collection of movable heritage items - surveying and miscellaneous	4301431
Movable collection - machinery	4301437
Movable collection - other	4301438
Narooma Bridge	4300639
New Buildings Bridge over Towamba River	4300139
Nowra Bridge over the Shoalhaven River	4301658
Old Marulan Town	4300302
Rossis Bridge 4.5Km NW of Goulburn	4300156
Sections of Shoalhaven bridge	4301446
Spencers Creek Bridge	4309556
Stone lined channel outlet from Murray Lagoon, Federal Highway	4301028
Survey collection - field records and equipment	4301455
Truss Bridge over Crookwell River	4300130
Victoria Bridge over Stonequarry Creek, Picton	4301089
Yowaka Bridge near Eden	4300515

Back to top

Australian Heritage Database

Search Results

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

71 results found.

Anglican Church Cemetery Hume Highway	via Goulburn, NSW	(Indicative Place) Register of the National Estate
Badgerys Lookout View	Tallong, NSW	(Indicative Place) Register of the National Estate
Bannaby Anglican Churchyard	Bannaby via Taralga, NSW	(Indicative Place) Register of the National Estate
Baxters House	Currawang via Collector, NSW	(Indicative Place) Register of the National Estate
Bishopthorpe Grabben Gullen Rd	Goulburn, NSW	(Indicative Place) Register of the National Estate
Black Springs Race	Nerriga, NSW	(Indicative Place) Register of the National Estate
Blue Mountains National Park (1980 boundary) Great Western Hwy	Glenbrook, NSW	(Registered) Register of the National Estate
Bungonia State Recreation Area Lookdown Rd	Bungonia, NSW	(Registered) Register of the National Estate
Burrungurroolong Garden Braidwood Rd	Tirrannaville, NSW	(Registered) Register of the National Estate
Burrungurroolong and Stables Braidwood Rd	Tirrannaville, NSW	(Registered) Register of the National Estate
Caarne Historic Site Lookdown Rd	Bungonia, NSW	(Registered) Register of the National Estate
Christ Church Anglican Cemetery Rhyanna Rd	Chatsbury via Goulburn, NSW	(Indicative Place) Register of the National Estate
Coopers Vault	Willeroo Station via Collector, NSW	(Indicative Place) Register of the National Estate
Crokers Mint	Nerriga, NSW	(Indicative Place) Register of the National Estate
Cunningham Family Cemetery Taralga Rd	via Goulburn, NSW	(Indicative Place) Register of the National Estate
Currawang House Currawang Rd	Currawang via Collector, NSW	(Indicative Place) Register of the

Currawang Village	Currawang via Collector, NSW	National Estate (Indicative Place) Register of the National Estate
Danganelly Farmhouse Greenwich Park Rd	Towrang, NSW	(Registered) Register of the National Estate
Fernbank Mining Settlement (former)	Nerriga, NSW	(Indicative Place) Register of the National Estate
George Street Streetscape George St	Marulan, NSW	(Indicative Place) Register of the National Estate
Glenrock Homestead, Stone Outbuildings, Grounds and Trees Bundanoon Rd	Marulan, NSW	(Registered) Register of the National Estate
Inverary Park Inverary Rd	Bungonia, NSW	(Registered) Register of the National Estate
Kippilaw Garden Gurrundah Rd	Goulburn, NSW	(Registered) Register of the National Estate
Kippilaw Homestead Group Gurrundah Rd	Goulburn, NSW	(Registered) Register of the National Estate
Lake Bathurst Public School (former) Goulburn - Braidwood Rd	Lake Bathurst, NSW	(Registered) Register of the National Estate
Lake George and Surrounds Federal Hwy	Collector, NSW	(Rejected Place) Register of the National Estate
Lockyersleigh	via Towrang, NSW	(Registered) Register of the National Estate
Lockyersleigh Garden	via Towrang, NSW	(Registered) Register of the National Estate
Long Gully Mining Area	Bungonia, NSW	(Registered) Register of the National Estate
Lumley Park Homestead, Outbuildings and Curtilage Windellama Rd	Bungonia, NSW	(Registered) Register of the National Estate
Mantons Reef (Village, Battery and Mine Site)	via Bungonia, NSW	(Indicative Place) Register of the National Estate
Merrilla Uniting Church Cemetery Gurrundah Rd	Goulburn, NSW	(Indicative Place) Register of the National Estate
Minda Eucalyptus Site Nerriga Rd	Windellama via Bungonia, NSW	(Indicative Place) Register of the National Estate
Morton National Park (1980 boundary)	Bundanoon, NSW	(Registered) Register of the National Estate
Mummell Catholic Cemetery Grabben Gullen Rd	Mummell via Goulburn, NSW	(Indicative Place) Register of the

Nadgigomar Dam Mining Site	Sandy Point, NSW	National Estate (Indicative Place)
New Come Up Ridge Mining Area	Bungonia, NSW	Register of the National Estate (Indicative Place)
Norwood Middle Arm Rd	Goulburn, NSW	Register of the National Estate (Registered)
Oallen Dam Oallen Nerriga Rd	Nerriga, NSW	Register of the National Estate (Indicative Place)
Oallen Treasury Oallen Nerriga Rd	Nerriga, NSW	Register of the National Estate (Indicative Place)
Old Marulan Anglican Church Cemetery Bungonia Rd	Marulan, NSW	Register of the National Estate (Indicative Place)
Old Marulan Catholic Cemetery Hume Hwy	Marulan, NSW	Register of the National Estate (Indicative Place)
Rossi Bridge Grabben Gullen Rd	Gouburn, NSW	Register of the National Estate (Registered)
Sewells Point Sluicing Site	Nerriga, NSW	Register of the National Estate (Indicative Place)
Spa Historic Area	Nerriga, NSW	Register of the National Estate (Indicative Place)
Spring Creek Bungonia Historic Area Spring Ridge Rd	Bungonia, NSW	Register of the National Estate (Registered)
Spring Creek Hotel Site	Nerriga, NSW	Register of the National Estate (Indicative Place)
Spring Creek Mining Area (Including Blanketburn Gully)	Nerriga, NSW	Register of the National Estate (Indicative Place)
Spring Creek Oallen Historic Area	Nerriga, NSW	Register of the National Estate (Indicative Place)
Springfield Homestead, Outbuildings and Garden Braidwood Rd	Goulburn, NSW	Register of the National Estate (Indicative Place)
St James Anglican Church Cemetery Gurrundah Rd	Goulburn, NSW	Register of the National Estate (Registered)
St James Chapel on Kippilaw Gurrundah Rd	Goulburn, NSW	Register of the National Estate (Registered)
Stonequarry General Cemetery Golspie Rd	Taralga, NSW	Register of the National Estate (Indicative Place)
Tallong Public Recreation Reserve Old Wingello Rd	Tallong, NSW	Register of the National Estate (Indicative Place)

Tarago Railway Station Goulburn - Braidwood Rd	Tarago, NSW	National Estate (Registered)
Taralga Courthouse (former) Orchard St	Taralga, NSW	Register of the National Estate (Registered)
Taralga War Memorial Orchard St	Taralga, NSW	Register of the National Estate (Indicative Place)
Tarlo River National Park (1991 boundary)	Taralga, NSW	Register of the National Estate (Registered)
The Blue Mountains	Katoomba, NSW	Register of the National Estate (Indicative Place)
The Greater Blue Mountains Area Geat Western Hwy	Katoomba, NSW	Register of the National Estate (Declared property)
The Greater Blue Mountains Area	Katoomba, NSW	World Heritage List (Indicative place)
Tirranna - Gibson Family Cemetery Braidwood Rd	Tirrannaville, NSW	National Heritage List (Registered)
Tirranna Original Garden Remains Braidwood Rd	Tirranaville, NSW	Register of the National Estate (Registered)
Tirranna, Garden, Farm Complex and Cemetery. Braidwood Rd	Tirrannaville, NSW	Register of the National Estate (Registered)
Towrang Bridge and Culverts Hume Hwy	Towrang, NSW	Register of the National Estate (Registered)
Towrang Convict Stockade & Magazine Hume Hwy	Towrang, NSW	Register of the National Estate (Registered)
Towrang Stockade Graves Hume Hwy	Towrang, NSW	Register of the National Estate (Indicative Place)
Wollogorang Garden Hume Hwy	via Breadalbane, NSW	Register of the National Estate (Registered)
Wollogorang and Stable Block Hume Hwy	via Breadalbane, NSW	Register of the National Estate (Registered)
Wombeyan Caves Area Wombeyan Caves Rd	Taralga, NSW	Register of the National Estate (Interim List)
Yellow Springs Sluicing Site	Nerriga, NSW	Register of the National Estate (Indicative Place)

Report Produced: Tue Jan 11 15:36:15 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
Alpine Lodge Hotel	244-248 Sloane Street	Goulburn	Goulburn Mulwaree	Yes
Catholic Church of Christ the King	Macarthur Street	Taralga	Goulburn Mulwaree	Yes
Christ Church Anglican	King Street	Bungonia	Goulburn Mulwaree	Yes
CML Building	Clifford Street	Goulburn	Goulburn Mulwaree	Yes
Connollys Mill	Sloane Street	Goulburn	Goulburn Mulwaree	Yes
Glen-Dor - Welcome Reef Dam	Windellama Road	Lower Boro	Goulburn Mulwaree	Yes
Goulburn Brewery	Bungonia Road	Goulburn	Goulburn Mulwaree	Yes
Goulburn Correctional Centre complex	Maud Street (off)	Goulburn	Goulburn Mulwaree	Yes
Goulburn Court House and Residence	Montague Street	Goulburn	Goulburn Mulwaree	Yes
Goulburn Post Office	165 Auburn Street	Goulburn	Goulburn Mulwaree	Yes
Goulburn Pumping Station, Marsden Weir & Appleby Steam Engine	Wollondilly River	Goulburn	Goulburn Mulwaree	Yes

Goulburn railway group movable relics	Main Southern railway	Goulburn	Goulburn Mulwaree	Yes
Goulburn Railway Station, yard and workshop	Main Southern railway	Goulburn	Goulburn Mulwaree	Yes
Goulburn Viaduct (Mulwaree Ponds)	Main Southern railway	Goulburn	Goulburn Mulwaree	Yes
Hillas Farm Homestead and Outbuildings		Bannaby	Goulburn Mulwaree	Yes
Kenmore Hospital Precinct	Taralga Road	Goulburn	Goulburn Mulwaree	Yes
Lansdowne	Bungonia Road	Goulburn	Goulburn Mulwaree	Yes
Marulan Railway Station and yard group	Main Southern railway	Marulan	Goulburn Mulwaree	Yes
Mayfield - Welcome Reef Dam	Mayfield Road	Lower Boro	Goulburn Mulwaree	Yes
Old Police Barracks	Sloane Street	Goulburn	Goulburn Mulwaree	Yes
Ooranook - Welcome Reef Dam	Mayfield-Charleyong Road	Stewarts Crossing	Goulburn Mulwaree	Yes
Railway Workshops (former)	Sloane Street	Goulburn	Goulburn Mulwaree	Yes
Riversdale	Maud Street	Goulburn	Goulburn Mulwaree	Yes
Rossis Bridge over Wollondilly River	Main Road 248	Goulburn	Goulburn Mulwaree	Yes
St Clair	318 Sloane Street	Goulburn	Goulburn Mulwaree	Yes
Tallong Railway Station, yard and water supply	Main Southern railway	Tallong	Goulburn Mulwaree	Yes
Tarago Railway Station group	Goulburn-Bombala railway	Tarago	Goulburn Mulwaree	Yes
Whole of township	Multiples	Marulan	Goulburn Mulwaree	Yes

There were **28** 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)
Administration Block	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Antrim House	11 George Street	Goulburn	Goulburn Mulwaree	LGOV
Blackshaw Road Underbridges, Goulburn	Plate Web Girders Down & Up Sidings	Goulburn	Goulburn Mulwaree	SGOV
Boiler House	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV

Central Building and former Pavilions	GOLDSMITH,FAITHFULL,CLIFFORD STREETS	GOULBURN	Goulburn Mulwaree	SGOV
Chapel	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Christ Church Rectory	128 Addison Road	Goulburn	Goulburn Mulwaree	LGOV
Coorawong House/Regional Office	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage 1	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage 15	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage 2	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage No. 11	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottage No. 12	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Cottages 13 and 14	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Dental Clinic Building	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Double Cottage	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Electrician/Painter	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Farm Garage	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Gate Pavilion	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Glasshouse/Stores	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Goulburn Ambulance Station	18 CLIFFORD STREET	GOULBURN	Goulburn Mulwaree	SGOV
Goulburn Correctional Centre - A Wing	Maud Street (off)	Gouburn	Goulburn Mulwaree	SGOV
Goulburn Correctional Centre - B Wing	Maud Street (off)	Goulburn	Goulburn Mulwaree	SGOV
Goulburn Correctional Centre - C Wing	Maud Street (off)	Goulburn	Goulburn Mulwaree	SGOV
Goulburn Correctional Centre - Chapel	Maud Street (off)	Goulburn	Goulburn Mulwaree	SGOV
Goulburn Correctional			Goulburn	

Centre - Civilian Service Building	Maud Street (off)	Goulburn	Mulwaree	SGOV
Goulburn Correctional Centre - D Wing	Maud Street (off)	Goulburn	Goulburn Mulwaree	SGOV
Goulburn Correctional Centre - Superintendent Office	Maud Street (off)	Goulburn	Goulburn Mulwaree	SGOV
Goulburn Correctional Centre - Training Centre Inner Grounds	Maud Street (off)	Goulburn	Goulburn Mulwaree	SGOV
Goulburn Station Footbridge		Goulburn	Goulburn Mulwaree	SGOV
Goulburn Station, Yard And Workshop		Goulburn	Goulburn Mulwaree	SGOV
Goulburn Viaduct (Mulwaree Ponds)		Goulburn	Goulburn Mulwaree	SGOV
Goulburn Yard Footbridge	Over Multiple Track Yard South Of Platforms	Goulburn	Goulburn Mulwaree	SGOV
Grain Silos and Farm Buildings	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Hillas Farm Homestead and Outbuildings		Bannaby	Goulburn Mulwaree	LGOV
Homestead and Stables	Garroorigang Estate	Goulburn	Goulburn Mulwaree	LGOV
Hospital Cottage	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
House	22 Argyle Street	Goulburn	Goulburn Mulwaree	LGOV
House	133 Kinghorn Street	Goulburn	Goulburn Mulwaree	LGOV
House and Outbuildings	Garroorigang Road	Goulburn	Goulburn Mulwaree	LGOV
Jewish Cemetery	25 Long Street	Eastgrove	Goulburn Mulwaree	LGOV
Kenmore Hospital Complex	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Landsdowne Bridge	Bungonia Road over Mulwaree Ponds	Goulburn	Goulburn Mulwaree	LGOV
Lawrenny	6 Lawrenny Avenue	Goulburn	Goulburn Mulwaree	LGOV
Leigh House with stables	2 Chantry Street	Goulburn	Goulburn Mulwaree	LGOV
Locomotive Round House and Wellington Shed	Braidwood Road	Goulburn	Goulburn Mulwaree	LGOV
Male Amenities Building	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Marulan Station And Yard Group		Marulan	Goulburn Mulwaree	SGOV

Mittagong Footbridge	At Station	Mittagong	Goulburn Mulwaree	SGOV
Mortuary	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Moss Vale (Down Side) Footbridge	Access From Argyle Street To Station	Moss Vale	Goulburn Mulwaree	SGOV
Moss Vale (Up Side) Footbridge	North Of Platform Over Up Yard	Moss Vale	Goulburn Mulwaree	SGOV
Orphanage	Taralga Road	Goulburn	Goulburn Mulwaree	LGOV
Pharmacy/Engineer	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Picton (85.8 Km) Footbridge	South Of Station Over Mains And Branch	Picton	Goulburn Mulwaree	SGOV
Picton (86 Km) Footbridge	At 86Km Over Mains And Branch	Picton	Goulburn Mulwaree	SGOV
Recreation Hall	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Residence	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Sports Pavilion	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Sports Shed	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
St Matthew's Church		Bannaby	Goulburn Mulwaree	LGOV
St Matthew's Church		Bannaby	Goulburn Mulwaree	LGOV
St Nicholas Anglican Church	15-17 Kinghorne Street	Goulburn	Goulburn Mulwaree	LGOV
St Patrick's College	Clintons Street	Goulburn	Goulburn Mulwaree	LGOV
Stables and Shed	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Staff Amenities	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Stores/Shed	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Summer House	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Tallong Station, Yard And Water Supply		Tallong	Goulburn Mulwaree	SGOV
Tarrawingee	10 Opal Street	Goulburn	Goulburn Mulwaree	LGOV
Temporary Laundry/Store and Tower	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Tenneriffe	Mary's Mount Road	Goulburn	Goulburn Mulwaree	LGOV

Tennis Pavilion	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
The Potteries	Common Street	Goulburn	Goulburn Mulwaree	LGOV
The Rectory	Gilmore Street	Goulburn	Goulburn Mulwaree	LGOV
Ward 1	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 10	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 11	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 12	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 13/14	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 15	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 17	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 18	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 19	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 2	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 3	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 4	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 5	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 6	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 8	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Ward 9	TALRALGA ROAD	KENMORE	Goulburn Mulwaree	SGOV
Wollondilly River Underbridge, Goulburn	Steel Trusses 3Km Past Station	Goulburn	Goulburn Mulwaree	SGOV
Wynella	off Mazamet Road	Goulburn	Goulburn Mulwaree	LGOV

There were **95** records in this section matching your search criteria.

There was a total of **123** 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.

FISH FILES Search Results

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Scientific Name: Bidyanus bidyanus **Common Name: Silver perch**
Family: Terapontidae **CAAB:** 37321008
NSW Threatened Status: Vulnerable **Protected Status:** (N/A)

Catch Record ID	Nearest Town	Bioregion	Basin Name	River or Dam	Sighting Date	No. Observed	Source
134838	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	3	Freshwater Fish Research Database

Scientific Name: Macquaria australasica **Common Name: Macquarie perch**
Family: Percichthyidae **CAAB:** 37311088
NSW Threatened Status: Vulnerable **Protected Status:** (N/A)

Catch Record ID	Nearest Town	Bioregion	Basin Name	River or Dam	Sighting Date	No. Observed	Source
53338	Kurrajong	Sydney Basin	HAWKESBURY	Wheeny Creek	2001	1	Community
134635	Wollongong	Sydney Basin	HAWKESBURY	Cordeaux River	2001	1	Freshwater Fish Research Database
53733	Appin	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	7	Freshwater Fish Research Database
134719	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	1	Freshwater Fish Research Database
134723	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	1	Freshwater Fish Research Database
							Freshwater

134728	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	1	Fish Research Database
134731	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	2	Freshwater Fish Research Database
134734	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	1	Freshwater Fish Research Database
134735	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	2	Freshwater Fish Research Database
134736	Glenbrook	Sydney Basin	HAWKESBURY	Glenbrook Creek	2002	1	Freshwater Fish Research Database
134825	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	5	Freshwater Fish Research Database
53732	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	37	Freshwater Fish Research Database
134822	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	1	Freshwater Fish Research Database
134827	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	9	Freshwater Fish Research Database
134830	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	3	Freshwater Fish Research Database
134832	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	7	Freshwater Fish Research Database
134833	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	1	Freshwater Fish Research Database
134834	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	10	Freshwater Fish Research Database

134839	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	3	Freshwater Fish Research Database
134842	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	7	Freshwater Fish Research Database
134844	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	1	Freshwater Fish Research Database
134846	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	2	Freshwater Fish Research Database
134848	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	1	Freshwater Fish Research Database
134819	Appin	Sydney Basin	HAWKESBURY	Cataract Dam	2002	2	Freshwater Fish Research Database
134974	Wollongong	Sydney Basin	HAWKESBURY	Cordeaux River	2002	2	Freshwater Fish Research Database
134972	Wollongong	Sydney Basin	HAWKESBURY	Cordeaux River	2002	2	Freshwater Fish Research Database
53653	Bargo	Sydney Basin	HAWKESBURY	Cordeaux River	2002	1	Community

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Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

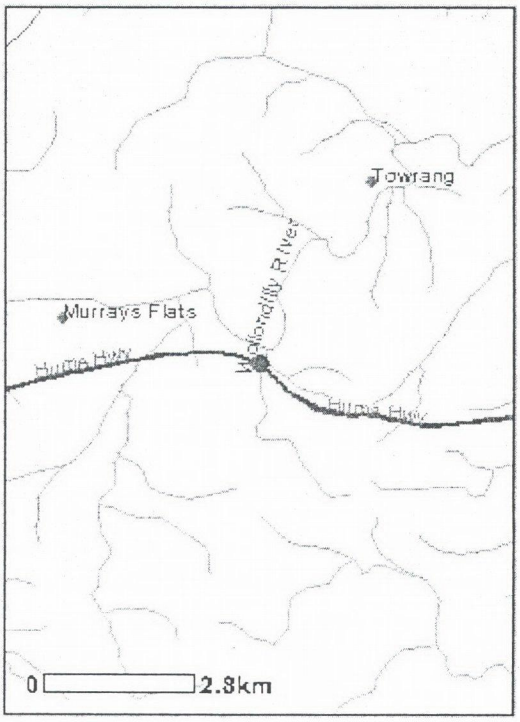
11 January 2005 15:52

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



Search Type: Point

Buffer: 5 km

Coordinates: -34.7340,149.82975

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)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	1
Threatened Species:	11
Migratory Species:	7

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:	3
Listed Marine Species:	11
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:	None
Other Commonwealth Reserves:	None
Regional Forest Agreements:	None

Details

Matters of National Environmental Significance

Threatened Ecological Communities [Dataset Information]	Status	Type of Presence
Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory	Endangered	Community may occur within area
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
Xanthomyza phrygia Regent Honeyeater	Endangered	Species or species habitat may occur within area
Fishes		
Macquaria australasica * Macquarie Perch	Endangered	Species or species habitat may occur within area
Prototroctes maraena * Australian Grayling	Vulnerable	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
Pteropus poliocephalus Grey-headed Flying-fox	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Hoplocephalus bungaroides * Broad-headed Snake	Vulnerable	Species or species habitat likely to occur within area
Plants		
Thesium australe Austral Toadflax, Toadflax	Vulnerable	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
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to 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	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine	Species or species habitat may occur within area

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

Places on the RNE [Dataset Information]
Note that not all Indigenous sites may be listed.

Historic

Danganelly Farmhouse NSW

Towrang Bridge and Culverts NSW

Towrang Convict Stockade & Magazine NSW

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

Your Ref: 21072004
Our Ref: AHIMS #10409

RTA - Environmental Technology
P O Box 3035
Parramatta NSW 2124

Tuesday, 27 July 2004

Attention: Trent Williams

Dear Sir or Madam:

Re: AHIMS Search for the following area at North of Goulburn
Zone 55 Eastings: 757500-762500 Northings: 6148811-6153811

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 3 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

NSW NATIONAL PARKS AND WILDLIFE SERVICE

NPWS is part of the Department of Environment and Conservation

ABN 30 841 387 271

43 Bridge Street
PO Box 1967
Hurstville NSW
1481 Australia
Tel: (02) 9585 6444
Fax: (02) 9585 6555
www.nationalparks.nsw.gov.au

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

Yours Sincerely

David Gordon
Acting AHIMS Administrator
Information Systems Unit
Cultural Heritage Division
Phone: (02) 9585 6513
Fax: (02) 9585 6094

Appendix E Ecological Assessment

HUME HIGHWAY –
TOWRANG AND CARRICK ROADS

PROPOSED INTERSECTION IMPROVEMENTS

ECOLOGICAL ASSESSMENT – FLORA AND FAUNA

November 2004

HAYES ENVIRONMENTAL

HAYES
ENVIRONMENTAL

ABN 89 877 340 321
Wombeyan Caves Road, High Range 2575
Tel 02 4878 5542
Fax 02 4878 5543
Mob 0412 600 173
Email rhayes@hayesenv.com.au

HUME HIGHWAY – TOWRANG AND CARRICK ROADS

PROPOSED INTERSECTION IMPROVEMENTS

ECOLOGICAL ASSESSMENT – FLORA AND FAUNA

This assessment has been prepared by:

RHayes

Rebecca Hayes
BSc (environmental biology) MEngMngt MEIANZ MECA

21/3/05

Date

SUMMARY

This Ecological Assessment – Flora and Fauna report has been prepared as part of a Review of Environmental Factors (REF) for the proposed improvements to the intersections of Towrang Road and Carrick Road with the Hume Highway, approximately 13km north of Goulburn.

The majority of areas to be directly affected by the proposed works are currently cleared or partially cleared, and have been previously disturbed. Vegetation is generally in poor condition and few fauna habitat features are present in these areas. Only the more common and disturbance-tolerant fauna species would be expected to occur in such disturbed habitats in such close proximity to the existing Hume Highway.

No flora or fauna species, populations or ecological communities listed as threatened on either the TSC Act or EPBC Act were recorded during field surveys conducted in the study area.

Two fauna species listed as threatened on the TSC Act, the Regent Honeyeater *Xanthomyza phrygia* and the Large-eared Pied Bat *Chalinolobus dwyeri*, may utilise the study area on occasions, and therefore may be affected by the proposed works. An Assessment of the Significance of potential impacts of the proposed works upon these species has been conducted, pursuant to Section 5A of the EP&A Act. The assessment concluded that the proposed works would not impose a significant impact upon these species. A Species Impact Statement is not required for this proposal.

The Regent Honeyeater *Xanthomyza phrygia* and the Large-eared Pied Bat *Chalinolobus dwyeri* are both also listed as threatened on the EPBC Act. Similarly, the proposed works are not considered likely to impose a significant impact upon these species under the EPBC Act. Several terrestrial migratory species listed under the EPBC Act are known to occur in the locality. The proposed works are not considered likely to impose a significant impact upon these species. Referral of the proposal to the Commonwealth Minister for Environment and Heritage under the EPBC Act is not required.

The study area does not support 'core koala habitat' as defined under SEPP 44, therefore SEPP 44 does not apply to the proposed works.

A list of recommendations that should be implemented to minimise impacts of the proposed works upon native fauna is provided in Chapter 8.2 of the report.

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HUME HIGHWAY – TOWRANG AND CARRICK ROADS

PROPOSED INTERSECTION IMPROVEMENTS

ECOLOGICAL ASSESSMENT – FLORA AND FAUNA

December 2004

1 INTRODUCTION

1.1 Context and Development Proposal

This Ecological Assessment – Flora and Fauna report has been prepared as part of a Review of Environmental Factors (REF) for the proposed improvements to the intersections of Towrang Road and Carrick Road with the Hume Highway, approximately 13km north of Goulburn.

The proposed intersection improvements will involve widening of the Hume Highway between Towrang and Carrick Roads, to create a wider median and allow construction of a 'seagull' treatment at each intersection.

1.2 Study Area

The study area for this report extends for 1.3km along the Hume Highway, from 300m west of Towrang Road to 200m east of Carrick Road, and up to 50m north and south of the proposed development footprint. The study area is approximately 13 hectares in size.

The study area is described in this report in 4 sections (illustrated on Figure 1):

Section A

- Includes land from the eastern end of the study area, up to Carrick Road.
- The proposal does not involve modifications to the southern side of the Goulburn-bound travel lane of the Highway within this section of the study area. No native vegetation or habitats occur within 50m from the southern edge of proposed works. The majority of this 50m extent is existing road formation.
- Land to the north of the highway and east of Carrick Road supports a native woodland community.

Section B

- Includes land west from Carrick Road up to the turn-off to Derrick VC rest area.
- This section of the study area is predominantly cleared land supporting improved pasture grass species.
- A length of Towrang Creek passes beneath the Highway at the eastern end of this section, and then continues approximately parallel to the Highway on its northern side, before connecting to

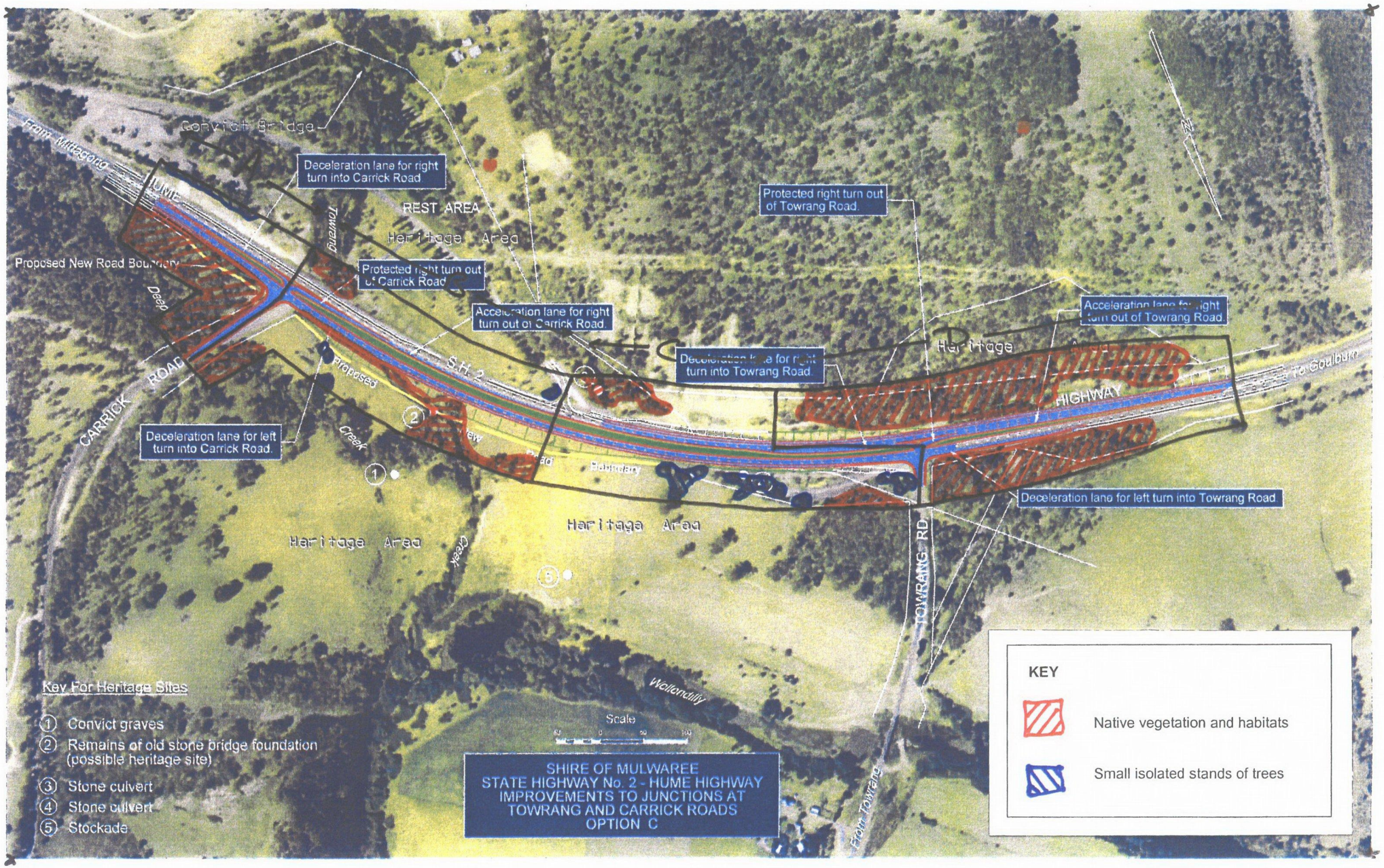


FIGURE 1 Aerial photo of the study area illustrating the 4 sections of the study area, and existing vegetation/habitats.

the Wollondilly River approximately 300-400m to the north of the study area. Remnant woodland trees and shrubs occur along the banks of Towrang Creek.

Section C

- Includes land west from the Derrick VC rest area, up to Towrang Road on the northern side of the Highway, and up to the edge of a native woodland community on the southern side of the Highway.
- This section of the study area supports cleared open grassland with access tracks and small remnant stands of disturbed native woodland.

Section D

- Includes land west from Section C, to the western end of the study area.
- Land on both sides of the Highway within this section of the study area support a native woodland community.

1.3 Objectives

The objectives of this investigation and report are:

- to identify and describe the existing flora, fauna and habitats of the study area;
- to determine the likelihood of threatened species, populations or ecological communities (as listed on the *NSW Threatened Species Conservation Act 1995* or on the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*) occurring in the study area or being affected by the proposed works;
- to assess the significance of likely impacts of the proposed works upon threatened biota, pursuant to Section 5A of the *NSW Environmental Planning & Assessment Act 1979* (EP&A Act), as modified by the NSW *Threatened Species Conservation Act 1995* ('eight-part test');
- to assess the study area in relation to State Environmental Planning Policy No. 44 – Koala Habitat Protection;
- to consider whether the proposal should be referred to the Commonwealth Minister for Environment & Heritage with regard to flora and fauna listed under the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999*; and
- to consider appropriate impact amelioration and environmental protection measures which should be implemented in the study area, to minimise the potential impacts of the proposed works on the natural ecology of the area.

2 FIELD SURVEYS AND RESEARCH

2.1 Research

Relevant data (including records of threatened species) were obtained from previous knowledge of the area, from a search of records listed within 10km of the site on the NSW National Parks & Wildlife Service (NPWS) Atlas of NSW Wildlife (data obtained September 2004), and from a search of Environment Australia's EPBC on-line database (data obtained September 2004).

Liaison with Environment and Planning staff from Mulwaree Shire Council did not result in any additional information with respect to native flora and fauna in the vicinity of the study area. No local interest groups are known to have an interest in the fauna of the study area.

Threatened flora and fauna species known to occur within 10km of the study area are listed in Table 3 later in this report. Table 3 also provides known details of habits, habitat and foraging requirements, and distributions of these species.

2.2 Flora

Detailed botanical surveys were conducted throughout the study area on the 12th of September 2004 and 2nd of November 2004. Specific searches were conducted with reference to the Random Meander technique (Cropper 1993) for relevant plant species of conservation significance known to occur in the locality (relevant databases, previous investigations), or anticipated to occur in the study area.

Plant identifications conform to nomenclature in Harden (1990-1993) and to recent reclassifications and name changes listed in *Cunninghamia* and *Telopea*. An inventory was compiled of all plant species recorded (Appendix 1).

Native vegetation was surveyed and assessed according to the structural classifications detailed in Specht (1970). Ecological communities were identified and described with reference to the descriptions included in the Final Determinations of communities listed on the *NSW Threatened Species Conservation Act 1995* (TSC Act) and the *Commonwealth Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act).

The conservation significance of species, populations and ecological communities recorded during the survey was established with reference to the EPBC Act in the national context, and to the TSC Act in the state context.

2.3 Fauna

A general fauna survey including habitat evaluation was conducted throughout the study area on the 8th and 11th of September 2004, with an additional brief inspection conducted on the 21st of September 2004.

The survey involved observations of animal activity, habitat surveys and searches for indirect evidence of fauna (such as nests, scats, tracks and scratchings). Specific searches were conducted for habitat or resources of relevance for threatened fauna species known from the general locality (relevant databases, previous investigations), or which might be anticipated to occur on the site.

Specific bird surveys were conducted throughout all habitat types present in the study area, and involved both visual and aural detection of species (Table 1). Specific reptile searches involved the turning of rocks, logs and other debris, and scratching amongst leaf litter at the base of trees (Table 1).

Diurnal mammal and amphibian surveys were conducted throughout the study area in areas of potential or relevant habitat, where present (Table 1). An emphasis was placed on searches for scats, tracks and scratchings, and other indirect signs, and for aural detection of amphibians. Targeted amphibian surveys extended into the late afternoon and evening, in areas of potential habitat (Table 1).

Spotlighting surveys were conducted throughout the study area (Table 1), to target nocturnal birds (such as owls), nocturnal mammals (such as possums and gliders), and amphibians.

An Anabat II Bat Detector was used on one survey night, but was not used the second night due to lack of clear records on the first night, proximity of the study area to noise and disturbance associated

with the Hume Highway, and intermittent light rain. Due to these field survey difficulties, it is assumed that microchiropteran bat species known to occur in the locality would utilise the study area on occasions.

Table 1 Fauna Survey Effort

Date	Method	Target Fauna
8th September 2004	Targeted afternoon surveys (3 hours), and evening spotlighting (2 hours), Anabat detection	Birds, reptiles, amphibians, general habitat observation and recording, searches for scats and other indirect evidence
11th September 2004	Targeted late afternoon survey (1 hour) and evening spotlighting survey (2 hours)	Birds, reptiles, amphibians, searches for scats and other indirect evidence
21st September 2004	General morning survey (2 hours)	General observations

Opportunistic records of all fauna species were maintained throughout the survey period, and an inventory compiled to include all species detected (Appendix 2). The conservation significance of native fauna recorded during the survey or expected to occur on the site was established with reference to the EPBC Act in the national context, and to the TSC Act in the state context.

Weather conditions during the fauna survey are described in Table 2 below.

Table 2 Weather Conditions during the Fauna Survey Period

Date	Time	Weather
8th September 2004	Afternoon/Evening	Cool to mild, clear, with a moderate cool wind.
11th September 2004	Afternoon/Evening	Cool to mild, generally overcast, occasional light rain, light breeze
21st September 2004	Morning	Mild to warm, clear and sunny, light breeze.

2.4 Survey Limitations

Pasture grass species present in the study area, particularly to the east of the existing mine site entrance, were not able to be identified due to their desiccated condition and due to being grazed almost to ground level.

The field surveys were conducted in early spring, while weather conditions were still cool. It is likely that some fauna species would still be relatively inactive during this time and would not be easily detected. To compensate for this, assessment of the proposed works was based largely on species records contained on databases, evaluation of habitats present in the study area, and indirect evidence for fauna.

The noise generated from the Hume Highway limited the success of aural detection of more cryptic and quieter birds, and also made it very difficult to detect bats using an ultrasonic call detector. In this regard, threatened species known to occur in the locality are assumed to also utilise the study area on occasions, in accordance with a precautionary approach.

3 EXISTING ENVIRONMENT

3.1 General Description

The study area is described in this report in 4 sections (illustrated on Figure 1).

3.1.1 Section A

Land on the northern side of Section A supports a native woodland community which is continuous with native vegetation present along Deep Creek to the north and east of the study area. This woodland community does not appear to have been previously described or named. The Hume Highway and Carrick Road form a southern and western boundary to this area of woodland.

The canopy is dominated by Argyle Apple *Eucalyptus cinerea*, Brittle Gum *Eucalyptus mannifera* ssp *mannifera* and Yellow Box *Eucalyptus melliodora*, to approximately 10-15m in height. The canopy density is fairly open, varying from 25-50% cover.

The shrub layer is dominated by Leafless Sour Bush *Omphacomeria acerba*, Early Wattle *Acacia genistifolia* and *Acacia* sp, up to 2m in height. The shrub layer is fairly sparse, with less than 10% cover.

The groundcover is dominated by Blue Flax Lily *Dianella longifolia*, Tussock Grass *Poa sieberiana* and Kangaroo Grass *Themeda australis*, with approximately 40% cover. Large parts of the ground consist of very dry bare stony earth.

The vegetation in this section has been previously disturbed, particularly within the first 40m from the edge of the existing highway. Disturbances include formed access tracks, compacted bare earth, and earthworks to construct highway embankments up to 4m in height.

Fauna habitat features include:

- the open eucalypt canopy which provides potential roosting and foraging resources for a variety of disturbance-tolerant birds, but only a few small tree-hollows for shelter or nesting;
- stony ground providing potential shelter for invertebrates and very small reptiles;
- proximity to Deep Creek which provides potential habitat and resources for a wide range of fauna groups.

No dens, nests, obvious fauna trails or other evidence of native fauna occupying Section A of the study area were recorded during the field surveys. Fauna recorded in this section include the Australian Magpie, Australian Raven and the introduced Rabbit. Several small passerine birds appeared to be using habitats more distant from the highway than the study area. These species were not identified due to noise from the highway, and moderate windy conditions during surveys of this section.

The southern side of Section A within the study area consists entirely of an existing highway embankment. Some limited young regeneration of eucalypts and acacias is occurring along the embankment. These do not provide any notable habitat features or resources for native fauna. A narrow strip of eucalypts occurs along the top of the embankment, sandwiched between the embankment and a previously cleared and disturbed stockpile area.

3.1.2 Section B

The majority of this section of the study area has been previously cleared and currently consists of open pasture, dominated by improved pasture grasses with a minor presence of native grass species.

Towrang Creek runs through this section, passing beneath the highway through a series of 3 large pipe culverts. Towrang Creek is deeply incised, with some erosion. Very low water levels were recorded during the survey period, with some stagnant pools. Towrang Creek connects to the Wollondilly River approximately 300-400m north of the study area.

A narrow corridor of native vegetation occurs along Towrang Creek. Within the study area, the canopy is dominated by Black Wattle *Acacia mearnsii*, to approximately 3m in height, with a density of less than 10% cover. More distant from the highway, eucalypts line the banks as well. The shrub layer consists of occasional regenerating *Acacia* species. The groundcover is dominated by Kangaroo Grass *Themeda australis*, with a density of approximately 90% cover.

Towrang Creek and associated vegetation provide habitat and resources for a variety of fauna groups, although only the more disturbance-tolerant species would be expected to occur.

The Common Eastern Froglet *Crinia signifera* was heard calling from around the pipe culverts on several occasions during the survey period. The Common Wombat was recorded in the area by scats, one den, and numerous trails. This species appears to be regularly using the western of the three culverts as a passage under the highway. The Red-bellied Black Snake was also recorded in this area.

Part of the survey period was spent at the Derrick VC rest area which is on the Towrang River approximately 50-100m south of the study area. It was quieter here and a greater number of fauna species were recorded.

Birds recorded include small passerine birds such as the Superb Fairy-wren and Spotted Pardalote, a small flock of Yellow-faced Honeyeater, the Crimson Rosella, Magpie-lark, and several very common insectivorous/scavenging birds including the Australian Raven, Australian Magpie and Pied Currawong.

Scats recorded in the area include those of the Common Wombat, introduced Rabbit, Eastern Grey Kangaroo, and Swamp Wallaby.

3.1.3 Section C

This section of the study area has been previously cleared and disturbed. The majority of this section consists of cleared open un-improved pasture dominated by a mixture of native and exotic grasses and herbs. Grass and herb species were difficult to identify due to the extremely dry conditions. Density of grasses increased beneath trees and in small drainage lines.

Small patches of open woodland occur in this section, and some small isolated stands of native trees. The canopy of these areas is dominated by Brittle Gum *Eucalyptus mannifera* ssp *mannifera*, Yellow Box *Eucalyptus melliodora* and Argyle Apple *Eucalyptus cinerea*, to approximately 10-15m in height, with some Scribbly Gum *Eucalyptus rossii*. The density is approximately 30% cover.

A sparse (less than 10% cover) mid-canopy occurs in some areas, dominated by Black Wattle *Acacia mearnsii* and Green Wattle *Acacia decurrens*, up to 3m in height. The shrub layer varies from 10-30% cover and is dominated by Chinese Shrub *Cassinia arcuata* and Early Wattle *Acacia genistifolia*, to 1.5m in height.

The groundcover varies from 10-70% cover, and is dominated by Mat-rush *Lomandra longifolia*, Wattle Mat-rush *Lomandra filiformis* ssp *coriacea*, Blue Flax Lily *Dianella longifolia*, Red Stem Cranesbill *Geranium neglectum*, Wallaby Grass *Danthonia* sp, Weeping Lovegrass *Eragrostis parviflora*, Kangaroo Grass *Themeda australis*, Winter Grass *Poa annua*, River Tussock *Poa labillardieri* and Tussock Grass *Poa sieberiana*.

Fauna habitat features include:

- small patches of dry open eucalypt canopy which provide potential roosting and foraging resources for a variety of disturbance-tolerant birds, but only a few small tree-hollows for shelter or nesting;

- stony ground and leaf litter providing potential shelter for invertebrates and very small reptiles.

No dens, nests, obvious fauna trails or other evidence of native fauna occupying Section C of the study area were recorded during the field surveys. Fauna recorded in this section include the Australian Magpie, introduced Rabbit, domestic dog and the Common Eastern Froglet *Crinia signifera*. A moderate-sized flock of Silvereye flicked through the area during the morning survey. Several other small passerine birds appeared to be using habitats more distant from the highway than the study area. These species were not identified due to noise from the highway.

3.1.4 Section D

This section of the study area supports moderate-sized areas of relatively intact dry open woodland. A small drainage line passes beneath the freeway through a small pipe culvert near Towrang Road.

The canopy of the woodland is dominated by Brittle Gum *Eucalyptus mannifera* ssp *mannifera*, Argyle Apple *Eucalyptus cinerea*, Yellow Box *Eucalyptus melliodora*, and Grey Gum *Eucalyptus punctata* on the north side of the highway, and also Maidens Gum *Eucalyptus maidenii* on the south side of the highway.

A mid-canopy occurs in some areas to 3m in height, dominated by Black Wattle *Acacia mearnsii*, and also by Dwarf Native Cherry *Exocarpus stricta* on the southern side of the highway. Mid-canopy cover is less than 10%.

The shrub layer is dominated by Early Wattle *Acacia genistifolia*, Blackthorn *Bursaria spinosa*, *Acacia* sp, Chinese Shrub *Cassinia arcuata* and Urn Heath *Melichrus urceolatus*, to 1-2m in height. The shrub cover is less than 10%.

The native groundcover is more diverse within this section of the study area than other parts of the study area, and is dominated by Mat-rush *Lomandra longifolia*, Tussock Grass *Poa sieberiana*, Wattle Mat-rush *Lomandra filiformis* ssp *coriacea*, Blue Flax Lily *Dianella longifolia*, Wallaby Grass *Danthonia* sp and Kangaroo Grass *Themeda australis*. Other common native groundcovers recorded include Goodenia *Goodenia pinnatifida*, Fuzzweed *Vittadinia muelleri* and Tufted Bluebell *Wahlenbergia communis*.

Cleared areas within Section D consist of un-improved pasture, dominated by a mixture of native and exotic grasses and herbs. A formed but disused road (probably an old alignment of Towrang Road) runs through the centre of the bushland remnant on the northern side of the highway. There are steep embankments up to 10m in height up to the highway in this section.

Fauna habitat features include:

- Areas of relatively intact native bushland providing a range of dry sclerophyll features and resources for native fauna;
- some moderate-sized tree hollows occur on the southern side of the highway. Only a few small hollows were recorded in vegetation on the northern side of the highway;
- stony ground with moderate amounts of leaf litter in some places, providing potential shelter for invertebrates and very small reptiles;
- a small drainage line with some very small pools/puddles of water, passing beneath the highway via a pipe culvert. This is a potential watering resource for a range of fauna groups.

Few fauna species were recorded in this area. Ravens were circling overhead during the survey, and Rabbit and Kangaroo scats were common throughout the bushland on the southern side of the highway. However, it is expected that a greater variety of native fauna species would utilise the southern side of the highway in this section during different seasons and when the plant species present are in flower.

The small pipe culvert beneath the highway does not appear to be in use as an underpass by fauna. No light can be seen through the pipe.

3.2 Flora of conservation significance

No plant species listed as a 'threatened species' under either the TSC Act or the EPBC Act were recorded within the study area. Table 3 below discusses the threatened species known to occur in the locality (NPWS Wildlife Atlas), or likely to occur in the locality (EPBC database), and their potential relevance to the study area.

No plant species being part of any relevant 'endangered population' listed under the TSC Act were recorded within the study area.

The vegetation present within the study area does not meet the description for any threatened 'ecological community' listed under either the TSC Act or the EPBC Act.

Five noxious weeds listed under the *NSW Noxious Weeds Act 1993* for the Mulwaree LGA were recorded within the study area – *Cassinia arcuata*, *Senecio madagascariensis*, *Echium plantagineum, Rosa rubiginosa* and *Rubus fruticosus* species aggregate (refer to Appendix 1, weed category controls are provided at the end of the species list).

3.3 Fauna of conservation significance

No fauna species listed as "*threatened*" under either the TSC Act or EPBC Act were recorded during the surveys. Table 3 below discusses the threatened species known to occur in the locality (NPWS Wildlife Atlas), or likely to occur in the locality (EPBC database), and their potential relevance to the study area.

Species which may be affected by the proposed works include:

- Regent Honeyeater *Xanthomyza phrygia*; and
- Large-eared Pied Bat *Chalinolobus dwyeri.*

These species are discussed further in Chapter 5 below.

Five terrestrial bird species listed as migratory under the EPBC Act are known to occur in the locality (EPBC database), and could occur within the study area on occasions. These species are discussed further in Chapter 6 below. Migratory marine species are not considered relevant to the study area due to a lack of wetland habitats.

No fauna species being part of any relevant "*endangered population*" listed under the TSC Act were recorded during the field surveys, and no such species are considered likely to occur.

Table 3 Relevance of threatened species known to occur within 10km of the study area, or considered likely to occur within 10km of the study area (NPWS Atlas, EPBC database).

Species	Habits/Requirements	Relevance to Study Area
Fauna		
Swift Parrot *Lathamus discolor* E (TSC) E (EPBC)	Breeds only in Tasmania, inhabits eucalypt forest and woodland, forages in the upper tree canopy (Lindsey 1992, Blakers *et al* 1984)	Not listed within 10km on NPWS Atlas. Study area is limited in extent and is substantially disturbed. Extensive areas of similar potential foraging habitat surround the study area. Not likely to be affected by proposed works.

Table 3 cont Relevance of threatened species known to occur within 10km of the study area, or considered likely to occur within 10km of the study area (NPWS Atlas, EPBC database).

Species	Habits/Requirements	Relevance to Study Area
Australian Painted Snipe *Rostratula australis* V (TSC) V (EPBC)	Inhabits swampy vegetation bordering tropical and warm temperate shallow freshwater wetlands (Lindsey 1992; NPWS 1999). In Australia it is most numerous in the Murray-Darling basin and interior south-east (Lindsey 1992; NPWS 1999).	Not listed within 10km on NPWS Atlas. The study area does not provide potential habitat for this species. Not likely to occur within the study area nor likely to be affected by the proposed works.
Regent Honeyeater *Xanthomyza phrygia* E (TSC) E (EPBC)	Semi-nomadic, usually recorded on western slopes of Great Dividing Range, in open eucalypt forest and woodland, forages in the upper canopy of flowering eucalypts (NPWS 1999). Usually recorded in box-ironbark associations, and wet lowland coastal forests. Nectar taken from approximately 16 species of eucalypt	One record in the locality, in 2000 (NPWS Atlas . The study area does not support typical habitat for this species, but does contain some Yellow Box which is a frequent nectar source for the species (NPWS 1999). The Regent Honeyeater may occasionally occur in the study area, during seasons when the Yellow Box present is flowering profusely. This species may be affected by the proposed works.
Grey-headed Flying-fox *Pteropus poliocephalus* V (TSC) V (EPBC)	Roosts in large congregations during the day, dispersing at night to forage on flowering and fruiting plants across a large range (Strahan 1995).	Not listed within 10km on NPWS Atlas. No evidence for a 'camp' was recorded in the study area. This species could possibly utilise the study area for foraging on rare occasions, although surrounding areas provide extensive resources for this species. Not considered likely to be affected by the proposed works.
Large-eared Pied Bat *Chalinolobus dwyeri* V (TSC) V (EPBC)	Inhabits dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range, roosts by day in caves and dis-used mine-tunnels (Strahan 1995).	Not listed within 10km on NPWS Atlas. May forage in the study area on occasions. May possibly roost/shelter beneath historic bridges and culverts in the locality. May be affected by the proposed works.
Spotted-tailed Quoll *Dasyurus maculatus* V (TSC) V (EPBC)	Variety of habitats including sclerophyll forest and woodland, heathland and rainforest. Requires suitable den sites (*eg* hollow logs or caves), an abundance of food (small terrestrial birds and mammals), and relatively large areas of intact vegetation for foraging (NPWS 1999).	One record in the locality, in 1992 (NPWS Atlas). The study area does not support large areas of intact vegetation. No den sites, potential den sites, or indirect evidence of this species were recorded during the surveys. This species may utilise vegetation in the locality on occasions, but is not considered likely to occur within the study area, due to the levels of habitat disturbance, and the noise and light generated by the Hume Highway. This species is not likely to be affected by the proposed works.
Brush-tailed Rock Wallaby *Petrogale penicillata* V (TSC) V (EPBC)	Inhabits rocky areas in a variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland and semi-arid country. Favours sites with numerous ledges caves & crevices (Strahan 1995)	Not listed within 10km on NPWS Atlas. The study area does not contain rocky outcrops or similar features. This species is not considered likely to occur in the study area, and is not likely to be affected by the proposed works.

Table 3 cont Relevance of threatened species known to occur within 10km of the study area, or considered likely to occur within 10km of the study area (NPWS Atlas, EPBC database).

Species	Habits/Requirements	Relevance to Study Area
Green & Golden Bell Frog *Litoria aurea* E (TSC) E (EPBC)	Large permanent swamps and ponds with plenty of emergent vegetation (Robinson 1998; Cogger 1996)	One record in the locality in 1975 (NPWS Atlas). Not listed as likely to occur in the locality on the EPBC database. Not recorded despite late afternoon/evening surveys on 2 occasions. The study area does not provide typical habitat for this species. A low diversity of amphibian species was recorded during the surveys. This species is not likely to occur or be able to breed in the study area, and is not likely to be affected by the proposed works.
Broad-headed Snake *Hoplocephalus bungaroides* E (TSC) V (EPBC)	Occurs within a 250km radius of Sydney. Largely confined to the Hawkesbury Sandstone formation where it is usually found under large slabs or rocky ridges, or in rocky crevices (Cogger 1996).	Not listed within 10km on NPWS Atlas. The study area does not provide potential habitat for this species. It is unlikely to occur in the study area and unlikely to be affected by the proposed works.
Striped Legless Lizard *Delma impar* V (TSC) V (EPBC)	Usually nocturnal, found under logs, rocks and ground debris in a variety of forest and woodland habitats, and grassy areas (Cogger 1996; Swan 1990).	One record in the locality, in 1997 (NPWS Atlas). This species was not recorded in the study area, despite targeted searches beneath rocks and amongst ground litter. This species is likely to be relatively sedentary, occupying a limited home range. It does not appear to occur in areas of potential habitat within the study area and is therefore unlikely to be affected by the proposed works. If a substantial time period elapses prior to commencement of works, it is recommended that additional targeted searches be conducted for this species, to ensure that it has not moved into potential habitats present in the study area.
Flora		
Thick-lipped Spider Orchid *Caladenia tessellata* E (TSC) V (EPBC)	Generally very sporadically distributed through low open forest in coastal NSW, extending onto the tablelands in southern NSW (Bishop 2000). Flowers Sept to Nov (Bishop 2000).	Surveys were conducted in the study area in September and November 2004, during which time the species might be expected to be flowering, if present. This species was not recorded despite targeted surveys. This species is not listed as having been recorded within 10km of the site on the NPWS Atlas. This species does not appear to be present on the site.

Table 3 cont Relevance of threatened species known to occur within 10km of the study area, or considered likely to occur within 10km of the study area (NPWS Atlas, EPBC database).

Species	Habits/Requirements	Relevance to Study Area
Austral Toadflax *Thesium australe* V (TSC) V (EPBC)	Erect perennial herb to 40 cm, which grows in grassland or woodland, often in damp sites. Widespread, but rare, found in the following regions: North Coast, Central Coast, Northern Tablelands, Southern Tablelands, North Western Slopes, Central Western Slopes: QLD, Vic, Tas, E Asia. (Harden 1992).	Surveys were conducted in the study area in September and November 2004. This species was not recorded despite targeted surveys. The study area is generally very dry. This species is not listed as having been recorded within 10km of the site on the NPWS Atlas. This species does not appear to be present on the site.
Buttercup Doubletail *Diuris aequalis* E (TSC) V (EPBC)	Favours montane eucalypt forest with a grassy-heathy understorey, growing in gravelly clay-loam, often on gently slopes (Bishop 2000). Braidwood to the Blue Mountains. Invariably grows with a small-flowered *Gompholobium* species (Bishop 2000). Flowers mainly in November (Bishop 2000).	Surveys were conducted in the study area in November 2004, during which time the species might be expected to be flowering, if present. This species was not recorded despite targeted surveys, nor were any small-flowered *Gompholobium* species. One record within 10km of the site on the NPWS Atlas, dated 1904. This species does not appear to be present on the site.
Diuris tricolor V (TSC)	Generally occurs on the western slopes of NSW, usually in grassy *Callitris* woodland on sandy soils in flat country or on the top of small hills (Bishop 2000). Flowers Sept to Nov (Bishop 2000).	Surveys were conducted in the study area in September and November 2004, during which time the species might be expected to be flowering, if present. This species was not recorded despite targeted surveys. The study area does not support grassy *Callitris* woodlands. One record within 10km of the site on the NPWS Atlas, dated 1906. This species does not appear to be present on the site.

4 DISCUSSION OF IMPACTS

The proposed works would involve clearing of all vegetation and habitats present within the footprint of the proposed intersection improvements. This clearing would be limited to within 25m from the edge of the existing formations.

The majority of areas to be directly affected by the proposed works are currently cleared or partially cleared, and have been previously disturbed. Few fauna habitat features are present in these areas, and only the more common and disturbance-tolerant species would be expected to occur in such disturbed habitats in such close proximity to the existing Hume Highway.

Areas of vegetation and fauna habitat likely to be directly affected by the proposed works include:

- the fairly disturbed and degraded fringe of an area of native woodland present on the northern side of the existing highway in Section A of the study area. This area does not appear to be of particular value for native fauna. The proposed clearing would not impact upon any significant habitat features such as caves, dens, hollow trees *etc*. The proposed clearing would not cause isolation or significant further isolation of vegetation and habitats in this section;
- a narrow strip of riparian vegetation along Towrang Creek on the northern side of the existing highway in the eastern part of Section B of the study area. The area of vegetation likely to be affected is weed-infested, dominated by Black Wattle *Acacia mearnsii*, and is not representative of a native vegetation community. Common and relatively disturbance-tolerant fauna species utilise this area, and appear to utilise existing culverts for passage beneath the existing highway. Care should be exercised in this area to minimise impacts on native fauna inhabiting this area (see Chapter 8.2 of this report); and
- small fringes of relatively intact native woodland present on both the northern and southern sides of the existing highway in Section D of the study area. Limited evidence of native fauna was recorded in vegetation present on the northern side of the highway in this section, compared to vegetation present on the southern side. Clearing of vegetation in this section is likely to impose some minor impacts upon native fauna utilising the area, including potentially two threatened species, the Regent Honeyeater and Large-eared Pied Bat (refer to Table 3 above and Chapter 5 below for further details). The majority of tree-hollows recorded in this section (particularly the rare moderate-sized ones) are more distant from the existing highway than the proposed extent of works, and would not be likely to be destroyed by the proposal. However, it is probable that some occasional small hollows would be removed for the proposed works. It appears that the existing highway currently provides a significant barrier to fauna movements in this section. It is unlikely that the proposed works would significantly increase this barrier.

The study area does not support unique features or species that would be lost as a result of the proposed clearing. All species recorded within the study area are also likely to be present in surrounding areas.

The proposed works are not part of any on-going clearing and development of the area, and would not contribute to any significant cumulative impact upon the area.

Potential indirect impacts on native flora and fauna downstream of the site include increased nutrient loading of watercourses, the possible discharge of oils and other pollutants in watercourses, and increased erosion, soil loss and sedimentation. These impacts are to be minimised through the implementation of appropriate standard pollution and sediment control measures, and careful management of construction and on-going wastes. These impacts are not likely to be new or significant for any native fauna species.

5 NSW THREATENED SPECIES CONSERVATION ACT 1995

The *NSW Threatened Species Conservation Act 1995* (TSC Act) has modified the *NSW Environmental Planning & Assessment Act 1979* (EP&A Act) by including in Section 5A eight factors which are to be considered when determining "*whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats*". These eight factors "*must be taken into account*" by a consent or determining authority when considering a development proposal or Development Application, particularly in administering Sections 78, 79 and 112 of the EP&A Act.

5.1 Relevant Threatened Biota

5.1.1 Species

No flora or fauna species listed as threatened on the TSC Act were recorded during surveys conducted within the study area. In addition, no indirect evidence for such species was recorded.

However, it is likely that highly mobile threatened fauna species which are known to occur in the locality (NPWS Atlas), and for which potential habitat occurs within the study area, may utilise the study area on an occasional basis and therefore may be affected by the proposed works.

Species considered in this regard include the Regent Honeyeater and Large-eared Pied Bat (refer to Table 3 above for further details).

The significance of potential impacts of the proposed works upon these species have been assessed pursuant to Section 5A of the EP&A Act, in accordance with a precautionary approach (summarised in Chapter 5.2 below, with details in Appendix 3).

5.1.2 Populations

No flora or fauna species being part of any relevant "*endangered population*" listed under the TSC Act were recorded in the study area.

5.1.3 Ecological Communities

The vegetation present within the study area does not meet the description of any "*endangered ecological community*" listed under the TSC Act. The proposed works are not likely to impact upon any such community.

5.2 Summary of Eight Part Tests

5.2.1 Regent Honeyeater Xanthomyza phrygia

In summary of the eight parts (complete 8 part tests are provided in Appendix 3):

a) it is not likely that the proposed works would disrupt the life cycle of "*a viable local population*" of the Regent Honeyeater such that it would "*be placed at risk of extinction*";

b) the Regent Honeyeater is not listed as being an "*endangered population*" in the locality;

c) the proposed works are not considered likely to involve "*a significant area of known habitat*" for the Regent Honeyeater "*to be modified or removed*";

d) the proposed works would widen a short length of the cleared Hume Highway corridor, but are not likely to notably isolate or further isolate known habitat for the Regent Honeyeater;

e) the proposed works would not affect any declared critical habitat;

f) the occurrence of the Regent Honeyeater within conservation reserves is not well known. However, given that the species is listed as "*threatened*" on the TSC Act, it would seem unlikely that it is "*adequately represented in conservation reserves ... in the region*";

g) the proposed works would involve some clearing of native vegetation and habitats, and thus constitute an "*activity that is recognised as a threatening process*";

h) the Regent Honeyeater would not be located "*at the limit of ... known distribution*" in the study area on the Hume Highway.

Upon consideration of the above, it is not considered likely that the proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn would impose "*a significant effect*" upon the Regent Honeyeater *Xanthomyza phrygia*.

5.2.2 Large-eared Pied Bat Chalinolobus dwyeri

In summary of the eight parts (complete 8 part tests are provided in Appendix 3):

a) it is not likely that the proposed works would disrupt the life cycle of "*a viable local population*" of the Large-eared Pied Bat such that it would "*be placed at risk of extinction*";

b) the Large-eared Pied Bat is not listed as being an "*endangered population*" in the locality;

c) the proposed works are not considered likely to involve "*a significant area of known habitat*" for the Large-eared Pied Bat "*to be modified or removed*";

d) the proposed works would widen a short length of the cleared Hume Highway corridor, but are not likely to notably isolate or further isolate known habitat for microchiropteran bats;

e) the proposed works would not affect any declared critical habitat;

f) the occurrence of the Large-eared Pied Bat within conservation reserves is not well known. However, given that the species is listed as "*threatened*" on the TSC Act, it would seem unlikely that it is "*adequately represented in conservation reserves ... in the region*";

g) the proposed works would involve some clearing of native vegetation and habitats, and thus constitute an "*activity that is recognised as a threatening process*";

h) the Large-eared Pied Bat would not be located "*at the limit of ... known distribution*" in the study area on the Hume Highway.

Upon consideration of the above, it is not considered likely that the proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn would impose "*a significant effect*" upon the Large-eared Pied Bat *Chalinolobus dwyeri*.

5.3 Summary

The proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn are not considered likely to impose "*a significant effect*" upon any threatened species, population or ecological community listed on the TSC Act.

A Species Impact Statement is not required for this proposal.

6 COMMONWEALTH EPBC ACT 1999

The *Commonwealth Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) requires that an action which has, will have or is likely to have a significant impact upon one or more matters of National Environmental Significance (NES) must be referred to the Commonwealth Minister for Environment & Heritage for approval. These actions are referred to as 'controlled actions'.

Matters of NES include World Heritage properties, listed Ramsar Wetlands of international importance, listed threatened species and communities, listed migratory species, nuclear actions and Commonwealth marine areas.

6.1 Matters of National Environmental Significance

The Large-eared Pied Bat and Regent Honeyeater are both listed as threatened species under the EPBC Act, and are listed as potentially occurring in the locality (EPBC database).

It is possible that some of the terrestrial migratory bird species listed as occurring in the locality (EPBC database) could occur in the study area on occasions. Migratory species listed include the White-bellied Sea Eagle, White-throated Needletail, Black-faced Monarch, Satin Flycatcher and Regent Honeyeater.

No other matters of NES are considered likely to be affected by the proposed works.

6.2 Requirement for Referral to the Commonwealth

6.2.1 Threatened Species

The proposed works would be likely to have a significant impact upon these threatened species if the works would be likely to:

- lead to a long-term decrease in the size of a population; or
- reduce the area of occupancy of the species; or
- fragment an existing population into two or more populations; or
- adversely affect habitat critical to the survival of a species; or
- disrupt the breeding cycle of a population; or
- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or
- result in invasive species that are harmful to the species becoming established within the species' habitat; or
- interfere with the recovery of the species.

The proposed works are not considered likely to impose a significant impact upon either the Large-eared Pied Bat or the Regent Honeyeater on the basis that:

- the proposed works involve clearing and disturbance to fringes of native vegetation immediately adjacent to the existing Hume Highway. The majority of vegetation to be affected has been previously cleared and/or disturbed;
- the proposed works do not involve clearing or loss of any features or resources unique to the study area, locality or region;
- both of these species are wide-ranging and highly mobile;
- no evidence for either of these species (either sighting, or indirect *eg* nests, feathers) was recorded during the surveys; and
- assessment of the significance of potential impacts of the proposed works upon these species under NSW legislation concluded that there would not be a significant impact.

6.2.2 Migratory Species

The proposed works would be likely to have a significant impact upon migratory species if the works would be likely to:

- substantially modify, destroy or isolate an area of important habitat of the migratory species; or

- result in invasive species that is harmful to the migratory species becoming established in an area of important habitat of the migratory species; or
- seriously disrupt the lifecycle of an ecologically significant proportion of the population of the species.

The proposed works are not considered likely to impose a significant impact upon migratory species on the basis that:

- the proposed works involve clearing and disturbance to fringes of native vegetation immediately adjacent to the existing Hume Highway. The majority of vegetation to be affected has been previously cleared and/or disturbed;
- the proposed works do not involve clearing or loss of any features or resources unique to the study area, locality or region;
- migratory species are by nature wide-ranging and highly mobile species; and
- no evidence for any of these species (either sighting, or indirect *eg* nests, feathers) was recorded during the surveys.

6.2.3 Conclusion

The proposed works are not considered likely to impose 'a significant impact' upon any matter of NES. On this basis, referral to the Commonwealth Minister for Environment and Heritage under the EPBC Act is not required.

7 SEPP 44 – KOALA HABITAT PROTECTION

7.1 Relevance of SEPP 44

State Environmental Planning Policy No 44 (SEPP 44) "*aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline*".

The policy applies to land within Local Government Areas listed on Schedule 1 of the policy. Mulwaree LGA is listed on Schedule 1.

Part 2 of the policy (Development Control of Koala Habitats) applies to land with an area (or adjoining lands under the same ownership with a combined area) of greater than 1 hectare. The study area is greater than 1 hectare in size (approximately 13ha).

Therefore, SEPP 44 is of relevance to the proposed works.

7.2 Determination of 'potential koala habitat'

'Potential koala habitat' is native vegetation where tree species listed under Schedule 2 of the Policy constitute 15% or greater of the number of trees present.

One tree species listed on Schedule 2 of the Policy occurs within the study area – Grey Gum *Eucalyptus punctata*. This species occurs as the least dominant of four dominant eucalypt species on the northern side of the existing highway, within Section D of the study area. This species may constitute close to 15% of the number of trees present in this small area.

Therefore the study area may support 'potential koala habitat'.

7.3 Determination of 'core koala habitat'

'Core koala habitat' is land which has been classed as 'potential koala habitat', and which supports a resident population of Koalas, evidenced by breeding females, recent sightings and historical records.

No Koalas were recorded within the study area, nor any indirect evidence for Koalas (*eg* scats, scratchings, fur tufts). There are no records of the Koala occurring within 10km of the study area on the NPWS Atlas of NSW Wildlife, and the species is not listed as likely to occur in the area on the EPBC Act online database.

There does not appear to be a resident population of Koalas within the study area. Therefore the study area does not support 'core koala habitat', and SEPP 44 no longer applies to the proposed works.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn are not considered likely to impose "*a significant effect*" upon any threatened species, population or ecological community listed on the TSC Act. A Species Impact Statement is not required for this proposal.

The proposed works are not considered likely to impose 'a significant impact' upon any matter of NES. On this basis, referral to the Commonwealth Minister for Environment and Heritage under the EPBC Act is not required.

The study area does not support 'core koala habitat' as defined under SEPP 44, therefore SEPP 44 does not apply to the proposed works.

8.2 Recommendations

The following measures should be implemented to minimise the potential impacts of the proposed works upon native flora and fauna:

- if a substantial time period (*ie* more than around 6 months) elapses prior to commencement of proposed works, additional targeted surveys should be conducted for the Striped Legless Lizard *Delma impar*, to ensure that it has not moved into potential habitat present within the study area;

- extreme care should be taken when clearing and working in the vicinity of Towrang Creek, in Section B of the study area, to avoid contaminants or sediment polluting the existing pools of water;
- a Wombat den and numerous Wombat tracks occur within 10-20 metres of the existing highway near the Towrang Creek culverts within Section B. Any wombats present should be encouraged to leave the area by gentle destruction of burrows conducted close to dusk;
- any extension to the existing culverts on Towrang Creek in Section B should use pipes of the same diameter and material as the existing pipes, and should continue the culvert in a straight line to ensure that light continues to be seen from either end of the culverts;
- large trees, particularly those containing hollows, should be removed relatively intact and placed on the ground in adjacent bushland, to provide additional habitat features for native fauna;
- appropriate sediment control measures should be implemented during the clearing and construction phases of the project (*eg* silt fences, sediment traps), to protect terrestrial and aquatic habitats in the immediate vicinity and downstream. These should conform to relevant standard guidelines, should be maintained throughout the construction period and should be carefully removed following the completion of works;
- all weed material cleared from the works site should be removed and/or destroyed, having particular regard to the requirements for weed species listed as 'noxious' under the *NSW Noxious Weeds Act 1993*; and
- the use of locally indigenous plant species in any replanting schemes, to provide habitat features for native flora and fauna, and to maintain the local and regional genetic resource.

These measures would assist to reduce the impacts of the proposed works, but do not compensate for the loss of vegetation and habitats. Compensatory measures are not regarded as necessary for the proposed works, given the limited extent of clearing proposed, the currently degraded condition of the majority of vegetation to be cleared, and that the proposed works are not likely to significantly affect any threatened flora or fauna species.

BIBLIOGRAPHY

Beruldsen G. 1995. *Which Bird of Prey is that?* Gordon Beruldsen, Kenmore Hills, Qld.

Blakers M, Davies SJJF and Reilly PN. 1984. *The Atlas of Australian Birds.* Royal Australian Ornithologists Union/Melbourne University Press.

Brooker MIH and Kleinig DA. 1990. *Field Guide to Eucalypts Volume 1 - Southeastern Australia.* Inkata Press, Melbourne.

Cogger HG. 1992. *Reptiles and Amphibians of Australia.* AH & AW Reed, Sydney.

Environment Australia. 2000. *EPBC Act Administrative Guidelines on Significance.* Environment Australia.

Griffiths K. 1987. *Reptiles of the Sydney Region.* Three Sisters Publications, Winmalee.

Harden G (*ed*). 1990. *Flora of New South Wales Vol 1.* NSW University Press, Kensington.

Harden G (*ed*). 1991. *Flora of New South Wales Vol 2.* NSW University Press, Kensington.

Harden G (*ed*). 1992. *Flora of New South Wales Vol 3.* NSW University Press, Kensington.

Harden G (*ed*). 1993. *Flora of New South Wales Vol 4.* NSW University Press, Kensington.

Lindsey TR. 1992. *Encyclopaedia of Australian Animals: Birds.* Australian Museum/Angus & Robertson.

Robinson M. 1996. *A Field Guide to Frogs of Australia.* Australian Museum/Reed Books.

Slater P, Slater P and Slater R. 1989. *The Slater Field Guide to Australian Birds.* Weldon Publishing, Sydney.

Specht RL. 1970. *Vegetation.* In Leeper GW (*ed*). *The Australian Environment.* CSIRO Australia.

Strahan R (*ed*). 1995. *The Mammals of Australia.* Angus & Robertson Publishers, Sydney.

Swan G. 1990. *A Field Guide to the Snakes and Lizards of New South Wales.* Three Sisters Publications, Winmalee.

Triggs B. 1998. *Tracks, Scats and Other Traces: A Field Guide to Australian Mammals.* Oxford University Press, Melbourne.

HUME HIGHWAY – TOWRANG AND CARRICK ROADS PROPOSED INTERSECTION IMPROVEMENTS

ECOLOGICAL ASSESSMENT – FLORA AND FAUNA

APPENDIX 1

Inventory of flora species recorded

November 2004

APPENDIX 1 Flora species recorded in the study area along the Hume Highway during specific field investigations.

KEY	
Status	
*	Introduced species, including horticultural and native non-indigenous species
N	Noxious Weed (category[1]) listed on the *NSW Noxious Weeds Act 1993*

Status	SCIENTIFIC NAME	COMMON NAME
	PTERIDOPHYTA: FILICOPSIDA	
	Dennstaedtiaceae	
	Pteridium esculentum	Common Bracken Fern
	MAGNOLIOPSIDA: DICOTYLEDONS	
	Apiaceae	
*	*Foeniculum vulgare*	Fennel
	Asteraceae	
*	*Arctotheca calendula*	Capeweed
*	*Bidens pilosa*	Cobblers Peg
	Brachycome sp.	Daisy
	Cassinia aculeata	Dolly Bush
N(W3)	*Cassinia arcuata*	Sifton Bush/Chinese Shrub
	Cassinia quinquefaria	Cough Bush
*	*Cirsium vulgare*	Thistle
	Chrysocephalum apiculatum	Common Everlasting/Yellow Buttons
*	*Conzya bonariensis*	Flaxleaf/Fleabane
	Euchiton gymnocephalus	Creeping Cudweed
	Helichrysum scorpioides	Button Everlasting
*	*Hypochoeris radicata*	Cat's Ears
	Olearia viscidula	Wallaby Weed
	Ozothamnus diosmifolius	White Dogwood
	Pseudognaphalium luteoalbum	Jersey Cudweed
N(W2)	*Senecio madagascariensis*	Fireweed
	Senecio quadridentatus	Cotton Fireweed
*	*Sonchus oleraceus*	Common Sowthistle
	Vittadinia muelleri	Fuzzweed
	Boraginaceae	
N(W3)	*Echium plantagineum*	Paterson's Curse/Salvation Jane
	Brassicaceae	
*	*Hirschfeldia incana*	Hairy Brassica/Buchan Weed
	Carophyllaceae	
*	*Cerastium glomeratum*	Mouse Ear Chickweed
*	*Petrorhagia nanteuilii*	Proliferous Pink
	Campanulaceae	
	Wahlenbergia communis	Tufted Bluebell
	Chenopodiaceae	
	Einadia cuneata	Climbing Saltbush
	Convolvulaceae	
	Convolvulus erubescens	Bindweed

APPENDIX 1 cont Flora species recorded in the study area along the Hume Highway during specific field investigations.

Status	SCIENTIFIC NAME	COMMON NAME
	Epacridaceae	
	Lissanthe strigosa	Peach Heath
	Melichrus urceolatus	Urn Heath
	Fabaceae: Faboideae	
	Bossiaea obcordata	
	Daviesia leptophylla	Slender Bitter-Pea
	Hardenbergia violacea	Native Sarsparilla
*	*Medicago polymorpha*	Medic
*	*Meliotus albus*	Bokhara Clover
	Pultenaea microphylla	Bush Pea
*	*Trifolium campestre*	Hop Clover
*	*Trifolium repens*	White Clover
*	*Vicia villosa* ssp *eriocarpa*	Russian Vetch
	Fabaceae: Mimosoideae	
	Acacia baileyana	Cootamundra Wattle
	Acacia decurrens	Black/Green Wattle
	Acacia genistifolia	Early Wattle
*?	*Acacia longifolia* ssp *longifolia* cv	wattle
	Acacia mearnsii	Black Wattle
	Acacia rubida	Red-leaved Wattle
	Acacia terminalis ssp *aurea*	Sunshine Wattle
	Geraniaceae	
*	*Erodium brachycarpum*	Heronsbill
	Geranium neglectum	Red Stem Cranesbill
	Goodeniaceae	
	Goodenia hederacea ssp *hederacea*	Goodenia
	Goodenia pinnatifida	Goodenia
	Malaceae	
*	*Cotoneaster glaucophyllus*	Cotoneaster
*	*Malus* sp.	Domestic Apple
	Malvaceae	
*	*Modiola caroliniana*	Carolina Mallow
	Myrtaceae	
	Callistemon citrinus	Crimson Bottlebrush
	Eucalyptus cinerea	Argyle Apple
	Eucalyptus mannifera ssp *mannifera*	Brittle Gum
	Eucalyptus macrorhyncha	Red Stringybark
	Eucalyptus maidenii	Maiden's Gum
	Eucalyptus melliodora	Yellow Box
	Eucalyptus rossii	Scribbly Gum
	Oleaceae	
*	*Ligustrum sinense*	Small-leaved Privet
	Onagraceae	
*	*Oenothera stricta* ssp *stricta*	Common Evening Primrose
	Oxalidaceae	
	Oxalis perennans	Wood Sorrel
	Phytolaccaceae	
*	*Phytolacca octandra*	Inkweed

APPENDIX 1 cont Flora species recorded in the study area along the Hume Highway during specific field investigations.

Status	SCIENTIFIC NAME	COMMON NAME
	Plantaginaceae	
*	*Plantago lanceolata*	Lambs Tongues
	Primulaceae	
*	*Anagallis arvensis*	Scarlet Pimpernel (Red Flowering)
	Polygonaceae	
*	*Rumex crispus*	Curled Dock
	Proteaceae	
	Persoonia linearis	Narrow-leaf Geebung
	Rosaceae	
*	*Crataegus monogyna*	Hawthorn
*	*Prunus* sp.	Flowering Fruit Tree
N(W3)	*Rosa rubiginosa*	Sweet Briar
N(W3)	*Rubus fruticosus*	Blackberry
*	*Sanguisorba minor* ssp *muricata*	Sheep's Burnet
	Rubiaceae	
	Asperula conferta	Common Woodruff
	Santalaceae	
	Exocarpus cupressiformis	Cherry Ballarat/Native Cherry
	Exocarpus stricta	Dwarf Native Cherry
	Omphacomeria acerba	Leafless Sour Bush
	Scrophulariaceae	
*	*Verbascum thapsus*	Blanket Weed
	Verbenaceae	
*	*Verbena bonariensis*	Purple Top
	MAGNOLIOPSIDA: MONOCOTYLEDONS	
	Cyperaceae	
	Carex appressa	
*	*Cyperus rotundus*	Nut Grass
	Lepidosperma laterale	Sedge
	Juncaceae	
	Juncus acutus	Sharp Rush
	Lomandraceae	
	Lomandra longifolia	Spiny-headed Mat-rush
	Lomandra filiformis ssp *coriacea*	Mat-rush
	Orchidaceae	
	Diuris sulphurea	Tiger/Hornet Orchid
	Phormiaceae	
	Dianella longifolia var *longifolia*	Blue Flax Lily
	Dianella revoluta var *revoluta*	Blue Flax Lily
	Poaceae	
	Aristida sp	Wiregrass
	Austrodanthonia caespitosa	Ringed Wallaby Grass
	Austrodanthonia auriculata	Lobed Wallaby Grass
	Austrostipa scabra	Corkscrew Speargrass
*	*Avena fatua*	Wild Oat
	Bothriochloa macra	Redleg Grass

APPENDIX 1 cont Flora species recorded in the study area along the Hume Highway during specific field investigations.

Status	SCIENTIFIC NAME	COMMON NAME
	Poaceae cont	
*	*Bromus* sp.	Brome Grass
	Chionochloa pallida	Silvertop Wallaby Grass
*	*Dactylis glomerata*	Cocksfoot
*	*Digitaria* sp.	Summer Grass
*	*Festuca elatior*	Tall Fescue
	Eragrostis parviflora	Weeping Lovegrass
*	*Holcus lanatus*	Yorkshire Fog
*	*Lolium perenne*	Perennial Ryegrass
*	*Paspalum dilatum*	Paspalum
*	*Phalaris aquatica*	Phalaris
*	*Poa annua*	Winter Grass
	Poa labillardieri	River Tussock
	Poa sieberiana var. *sieberiana*	Snowgrass
	Themeda australis	Kangaroo Grass
	Vulpia myuros	Rat's Tail Fescue

[1] Noxious Weed Categories
W2 – The weed must be fully and continuously suppressed and destroyed.
W3 – The weed must be prevented from spreading and its numbers and distribution reduced.

HUME HIGHWAY – TOWRANG AND CARRICK ROADS PROPOSED INTERSECTION IMPROVEMENTS

ECOLOGICAL ASSESSMENT – FLORA AND FAUNA

APPENDIX 2

Inventory of fauna species recorded

November 2004

APPENDIX 2 Fauna species recorded in the study area along the Hume Highway during specific field investigations, and previously in the vicinity (NPWS Wildlife Atlas).

KEY	
Status	
*	Introduced species
M	Migratory species listed under the Commonwealth EPBC Act
E (EPBC)	Endangered species listed on the Commonwealth EPBC Act
E (TSC)	Endangered species listed on the NSW TSC Act
V (EPBC)	Vulnerable species listed on the Commonwealth EPBC Act
V (TSC)	Vulnerable species listed on the NSW TSC Act
Location	
A	Species recorded in the study area during current surveys.
B	Species recorded previously within 10 kilometers of the study area (NPWS Atlas of NSW Wildlife)

Status	COMMON NAME	SCIENTIFIC NAME	A	B
	BIRDS			
	Phasianidae			
	Stubble Quail	*Coturnix pectoralis*		✓
	Anatidae			
M	Australian Wood Duck	*Chenonetta jubata*		✓
	Ardeidae			
	White-faced Heron	*Egretta novaehollandiae*		✓
	White-necked Heron	*Ardea pacifica*		✓
	Threskiornithidae			
	Australian White Ibis	*Threskiornis molucca*		✓
	Accipitridae			
M	Wedge-tailed Eagle	*Aquila audax*		✓
	Falconidae			
M	Brown Falcon	*Falco berigora*		✓
	Rallidae			
	Eurasian Coot	*Fulica atra*		✓
	Laridae			
	Silver Gull	*Larus novaehollandiae*		✓
	Columbidae			
	Crested Pigeon	*Ocyphaps lophotes*		✓
	Cacatuidae			
	Long-billed Corella	*Cacatua tenuirostris*		✓
	Galah	*Cacatua roseicapilla*		✓
	Sulphur-crested Cockatoo	*Cacatua galerita*		✓
	Psittacidae			
	Eastern Rosella	*Platycercus eximius*		✓
	Crimson Rosella	*Platycercus elegans*	✓	✓
	Red-rumped Parrot	*Psephotes haematonotus*		✓
	Strigidae			
	Southern Boobook	*Ninox boobook*		✓
	Halcyonidae			
	Laughing Kookaburra	*Dacelo novaeguineae*		✓
	Pachycephalidae			
	Golden Whistler	*Pachycephala pectoralis*		✓

APPENDIX 2 cont Fauna species recorded in the study area along the Hume Highway during specific field investigations, and previously in the vicinity (NPWS Wildlife Atlas).

Status	COMMON NAME	SCIENTIFIC NAME	A	B
	Dicruridae			
	Grey Fantail	*Rhipidura albiscapa*		✓
	Willie Wagtail	*Rhipidura leucophrys*		✓
	Magpie-lark	*Grallina cyanoleuca*	✓	
	Campephagidae			
	Cicadabird	*Coracina tenuirostris*		✓
	Maluridae			
	Superb Fairy-wren	*Malurus cyaneus*	✓	
	Pardalotidae			
	Spotted Pardalote	*Pardalotus punctatus*	✓	
	Striated Pardalote	*Pardalotus striatus*		✓
	Meliphagidae			
	Noisy Miner	*Manorina melanocephalus*		✓
	Noisy Friarbird	*Philemon corniculatus*		✓
	Red Wattlebird	*Anthochaera carunculata*		✓
	Yellow-faced Honeyeater	*Lichenostomus chrysops*	✓	
E (TSC & EPBC)	Regent Honeyeater	*Xanthomyza phrygia*		✓
	Artamidae			
	Pied Currawong	*Strepera graculina*	✓	✓
	Australian Magpie	*Gymnorhina tibicen*	✓	✓
	Corvidae			
	Australian Raven	*Corvus coronoides*	✓	✓
	Corcoracidae			
	White-winged Chough	*Corcorax melanorhamphos*		✓
	Sylviidae			
	Golden-headed Cisticola	*Cisticola exilis*		✓
	Zosteropidae			
	Silvereye	*Zosterops lateralis*	✓	
	Sturnidae			
	Common Starling	*Sturnus vulgaris*		✓
	REPTILES			
	Gekkonidae			
	Eastern Stone Gecko	*Diplodactylus vittatus*		✓
	Pygopodidae			
V (TSC & EPBC)	Striped Legless Lizard	*Delma impar*		✓
	Typhlopidae			
	Proximus Blind Snake	*Ramphotyphlops proximus*		✓
	Elapidae			
	Variable Black-naped Snake	*Suta spectabilis dwyeri*		✓
	Eastern Brown Snake	*Pseudonaja textilis*		✓
	Red-bellied Black Snake	*Pseudechis porphyriacus*	✓	
	AMPHIBIANS			
	Hylidae			
E (TSC & EPBC)	Green & Golden Bell Frog	*Litoria aurea*		✓
	Myobatrachidae			
	Common Eastern Froglet	*Crinia signifera*	✓	

APPENDIX 2 cont Fauna species recorded in the study area along the Hume Highway during specific field investigations, and previously in the vicinity (NPWS Wildlife Atlas).

Status	COMMON NAME	SCIENTIFIC NAME	A	B
	MAMMALS			
	Ornithorhynchidae			
	Platypus	*Ornithorhynchus anatinus*		✓
	Dasyuridae			
V (TSC & EPBC)	Spotted-tailed Quoll	*Dasyurus maculatus*		✓
	Vombatidae			
	Common Wombat	*Vombatus ursinus*	✓	
	Macropodidae			
	Common Wallaroo	*Macropus robustus*		✓
	Eastern Grey Kangaroo	*Macropus giganteus*	✓	✓
	Red-necked Wallaby	*Macropus rufogriseus*		✓
	Swamp Wallaby	*Wallabia bicolor*	✓?	✓
	Introduced Mammals			
*	Rabbit	*Oryctolagus cuniculus*	✓	
*	Dog	*Canis familiaris*	✓	

HUME HIGHWAY – TOWRANG AND CARRICK ROADS PROPOSED INTERSECTION IMPROVEMENTS

ECOLOGICAL ASSESSMENT – FLORA AND FAUNA

APPENDIX 3

Assessment of Significance pursuant to Section 5A of the EP&A Act

November 2004

APPENDIX 3

Assessment of Significance of potential impacts of the proposed intersection improvements along the Hume Highway at Towrang and Carrick Roads upon the Regent Honeyeater *Xanthomyza phrygia* and the Large-eared Pied Bat *Chalinolobus dwyeri*, pursuant to Section 5A of the EP&A Act.

1 INTRODUCTION

The *NSW Threatened Species Conservation Act 1995* (TSC Act) has modified the *NSW Environmental Planning & Assessment Act 1979* (EP&A Act) by including in Section 5A eight factors which are to be considered when determining "*whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats*". These eight factors "*must be taken into account*" by a consent or determining authority when considering a development proposal or Development Application.

Two threatened fauna species, the Regent Honeyeater *Xanthomyza phrygia* and the Large-eared Pied Bat *Chalinolobus dwyeri*, may utilise the study area on occasions, and therefore may be affected by the proposed works.

In accordance with a precautionary approach, the potential impacts of the proposal upon these species has been assessed.

2 FACTORS for CONSIDERATION

2.1 Regent Honeyeater *Xanthomyza phrygia*

(a) in the case of a threatened species, whether the life cycle 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

The Regent Honeyeater is a semi-nomadic bird, usually recorded on western slopes of Great Dividing Range. It occurs in open eucalypt forest and woodland, and forages in the upper canopy of flowering eucalypts (NPWS 1999). The Regent Honeyeater is usually recorded in box-ironbark associations, and wet lowland coastal forests. It is known to take nectar from approximately 16 species of eucalypt and some mistletoes (NPWS 1999).

One record of this species is known from within 10km of the site (NPWS Atlas, record in 2000). The study area does not support typical habitat for the Regent Honeyeater, but does contain some Yellow Box which is a frequent nectar source for the species (NPWS 1999).

The Regent Honeyeater may occasionally occur in the study area, during seasons when the Yellow Box present is flowering profusely. The species is more likely to occur in the less disturbed and more extensive habitat areas on the southern side of the highway in Section D, and perhaps to the south of the study area, along Towrang Creek.

The Regent Honeyeater is regarded as a potential migrant/visitor to the study area. It is not considered likely that this species would breed in the area, or would be present for substantial periods of time.

The proposed works would involve clearing the fringe area of the native woodland present in Section D, to enable widening of the highway in this area. The area of vegetation to be removed is extremely small in relation to native vegetation present on adjacent lands to the south, which also provide potential habitat for this species.

No habitat features of particular significance or uniquity are to be removed for the proposed works.

Upon consideration of the above, it is not likely that the proposed works would disrupt the life cycle of "*a viable local population*" of the Regent Honeyeater such that it would "*be placed at risk of extinction*".

(b) in the case of an endangered population, whether the life cycle 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

The TSC Act defines an "*endangered population*" as "*a population specified in Part 2 of Schedule 1*" of the Act.

The Regent Honeyeater is not listed as being an "*endangered population*" in the locality.

(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

The Regent Honeyeater may potentially occur throughout the entire region. Extensive areas of potential foraging and shelter habitat for this species occur in the region, and individuals of this species could occur almost anywhere through the region on occasions, depending on seasonal conditions and flowering of preferred eucalypt species.

The proposed works would involve clearing the fringe area of the native woodland present in Section D, to enable widening of the highway in this area. The area of vegetation to be removed is extremely small in relation to native vegetation present on adjacent lands to the south, which also provide potential habitat for this species.

On the basis of the above, the proposed works are not considered likely to involve "*a significant area of known habitat*" for the Regent Honeyeater "*to be modified or removed*".

(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 would widen a short length of the cleared Hume Highway corridor, but are not likely to notably isolate or further isolate known habitat for the Regent Honeyeater.

(e) whether critical habitat will be affected

The TSC Act 1995 defines "*critical habitat*" as "*habitat declared to be critical habitat under part 3*" of the Act.

The proposed works would not affect any declared critical habitat.

(f) whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region

The occurrence of the Regent Honeyeater within conservation reserves is not well known. However, given that the species is listed as "*threatened*" on the TSC Act, it would seem unlikely that it is "*adequately represented in conservation reserves ... in the region*".

(g) whether the development or activity is of a class of development or activity that is recognised as a threatening process

The TSC Act 1995 defines "*threatening process*" as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*".

Disturbance to native vegetation is generally regarded as a threatening process for most native fauna species. The NSW Scientific Committee has recently listed the clearing of native vegetation as a Key Threatening Process under the TSC Act.

The proposed works would involve some clearing of native vegetation and habitats, and thus constitute an "*activity that is recognised as a threatening process*".

(h) whether any threatened species, population or ecological community is at the limit of its known distribution

The Regent Honeyeater would not be located "*at the limit of ... known distribution*" in the study area on the Hume Highway.

Summary

In summary of the above eight parts:

a) it is not likely that the proposed works would disrupt the life cycle of "*a viable local population*" of the Regent Honeyeater such that it would "*be placed at risk of extinction*";

b) the Regent Honeyeater is not listed as being an "*endangered population*" in the locality;

c) the proposed works are not considered likely to involve "*a significant area of known habitat*" for the Regent Honeyeater "*to be modified or removed*";

d) the proposed works would widen a short length of the cleared Hume Highway corridor, but are not likely to notably isolate or further isolate known habitat for the Regent Honeyeater;

e) the proposed works would not affect any declared critical habitat;

f) the occurrence of the Regent Honeyeater within conservation reserves is not well known. However, given that the species is listed as "*threatened*" on the TSC Act, it would seem unlikely that it is "*adequately represented in conservation reserves ... in the region*";

g) the proposed works would involve some clearing of native vegetation and habitats, and thus constitute an "*activity that is recognised as a threatening process*";

h) the Regent Honeyeater would not be located "*at the limit of ... known distribution*" in the study area on the Hume Highway.

Upon consideration of the above, it is not considered likely that the proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn would impose "*a significant effect*" upon the Regent Honeyeater *Xanthomyza phrygia*.

2.2 Large-eared Pied Bat *Chalinolobus dwyeri*

(a) in the case of a threatened species, whether the life cycle 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

The Large-eared Pied Bat is known to occur across a substantial distribution (Strahan 1995), with current knowledge suggesting that it is capable of flying large distances in search of suitable foraging habitat and roosting sites.

The study area provides a potential foraging resource for this species, and it is possible that it may shelter/roost beneath historic stone culverts and bridges located close to the study area. The study area itself does not provide caves or other potential roost sites for this species. Whilst this species was not recorded in the study area during recent surveys, it is considered likely that individuals would utilise the study area, on some occasions.

The study area provides potential foraging resources for this species in the form of dry open woodland, predominantly within Section D of the study area. The canopy cover in this area is relatively continuous with vegetation to the south, and a variety of plant species are present likely to attract a variety of prey insects.

The proposed works would involve clearing the fringe area of the native woodland present in Section D, to enable widening of the highway in this area. The area of vegetation to be removed is extremely small in relation to native vegetation present on adjacent lands to the south, which also provide potential habitat for this microchiropteran bat species.

No habitat features of particular significance or uniquity are to be removed for the proposed works.

Upon consideration of the above, it is not likely that the proposed works would disrupt the life cycle of "*a viable local population*" of the Large-eared Pied Bat such that it would "*be placed at risk of extinction*".

(b) in the case of an endangered population, whether the life cycle 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

The TSC Act defines an "*endangered population*" as "*a population specified in Part 2 of Schedule 1*" of the Act.

The Large-eared Pied Bat is not listed as being an "*endangered population*" in the locality.

(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

Within the region, the Large-eared Pied Bat is known to occur in a variety of habitats to the east and west of the Great Dividing Range.

Extensive areas of potential foraging and shelter habitat for this species occur in the surrounding area, and it is likely that individuals of this species would occur widely through the region, depending on seasonal conditions and availability of prey insects.

The proposed works would involve clearing the fringe area of the native woodland present in Section D, to enable widening of the highway in this area. The area of vegetation to be removed is extremely small in relation to native vegetation present on adjacent lands to the south, which also provide potential habitat for this microchiropteran bat species.

On the basis of the above, the proposed works are not considered likely to involve "*a significant area of known habitat*" for the Large-eared Pied Bat "*to be modified or removed*".

(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 would widen a short length of the cleared Hume Highway corridor, but are not likely to notably isolate or further isolate known habitat for microchiropteran bats.

(e) whether critical habitat will be affected

The TSC Act 1995 defines "*critical habitat*" as "*habitat declared to be critical habitat under part 3*" of the Act.

The proposed works would not affect any declared critical habitat.

(f) whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region

The occurrence of the Large-eared Pied Bat within conservation reserves is not well known. However, given that the species is listed as "*threatened*" on the TSC Act, it would seem unlikely that it is "*adequately represented in conservation reserves ... in the region*".

(g) whether the development or activity is of a class of development or activity that is recognised as a threatening process

The TSC Act 1995 defines "*threatening process*" as "*a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities*".

Disturbance to native vegetation is generally regarded as a threatening process for most native fauna species. The NSW Scientific Committee has recently listed the clearing of native vegetation as a Key Threatening Process under the TSC Act.

The proposed works would involve some clearing of native vegetation and habitats, and thus constitute an "*activity that is recognised as a threatening process*".

(h) whether any threatened species, population or ecological community is at the limit of its known distribution

The Large-eared Pied Bat occurs through southeastern Australia to the north and south of the study area, and to the east and west of the Great Dividing Range.

The Large-eared Pied Bat would not be located "*at the limit of ... known distribution*" in the study area on the Hume Highway.

Summary

In summary of the above eight parts:

i) it is not likely that the proposed works would disrupt the life cycle of "*a viable local population*" of the Large-eared Pied Bat such that it would "*be placed at risk of extinction*";

j) the Large-eared Pied Bat is not listed as being an "*endangered population*" in the locality;

k) the proposed works are not considered likely to involve "*a significant area of known habitat*" for the Large-eared Pied Bat "*to be modified or removed*";

l) the proposed works would widen a short length of the cleared Hume Highway corridor, but are not likely to notably isolate or further isolate known habitat for microchiropteran bats;

m) the proposed works would not affect any declared critical habitat;

n) the occurrence of the Large-eared Pied Bat within conservation reserves is not well known. However, given that the species is listed as "*threatened*" on the TSC Act, it would seem unlikely that it is "*adequately represented in conservation reserves ... in the region*";

o) the proposed works would involve some clearing of native vegetation and habitats, and thus constitute an "*activity that is recognised as a threatening process*";

p) the Large-eared Pied Bat would not be located "*at the limit of ... known distribution*" in the study area on the Hume Highway.

Upon consideration of the above, it is not considered likely that the proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn would impose "*a significant effect*" upon the Large-eared Pied Bat *Chalinolobus dwyeri*.

3 CONCLUSIONS

The eight factors which are required to be considered under Section 5A of the EP&A Act in the determination of "*whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats*" are discussed above with regard to the Regent Honeyeater *Xanthomyza phrygia* and the Large-eared Pied Bat *Chalinolobus dwyeri*.

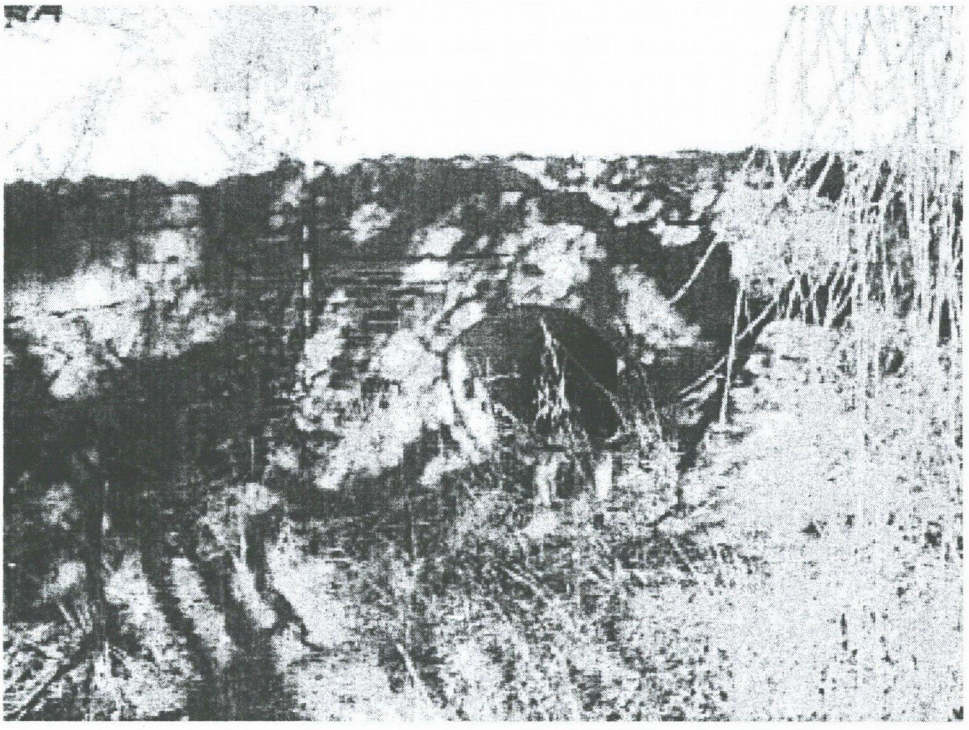
On the basis of the above considerations, the proposed intersection improvements at Towrang and Carrick Roads along the Hume Highway north of Goulburn are not considered likely to impose "*a significant effect*" upon any threatened fauna species or population listed on the NSW TSC Act.

A Species Impact Statement is not required for this proposal.

Appendix F Statement of Heritage Impact

Statement of Heritage Impact

Proposed widening and intersection improvements on the Hume Highway at Towrang and Carrick Roads, Towrang, NSW



Prepared for RTA Southern Region Client Services

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Document Controls

Business Unit	Environmental Technology Branch, RTA Operations		
Project No.			
Document description	Statement of Heritage Impact - Proposed widening and intersection improvements on the Hume Highway at Towrang and Carrick Roads, Towrang, NSW		
	Name	**Signed**	**Date**
Approving Manager	Lisa Brown		March 2005

Person managing this document	**Person(s) writing this document**
Ian Berger	Ian Berger
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Client Reference	**Status**	**Date**
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Prepared by Environmental Technology Branch, RTA Operations

Contents

1 Introduction and Background to the Proposal

The NSW Roads and Traffic Authority (RTA) proposes to upgrade the existing junctions of the Hume Highway (SH2) at Towrang and Carrick Roads, 10 kilometres north of Goulburn in order to improve road safety. The section of the Hume Highway between Carrick Hill and Boxers Hill (near Boxers Creek) is the only section of the carriageway between Mittagong and Goulburn with very narrow median. Both Carrick and Towrang Road junctions are contained within this section. Goulburn bound and Mittagong bound traffic lanes are separated by a painted median (2m wide) and wire rope barrier.

Vehicles turning right out of Towrang and Carrick Roads to the Hume Highway have restricted sight distance, and vehicles turning right off the Hume Highway have sheltered right turn bays at Carrick and Towrang Roads. The local community have raised safety concerns primarily relating to turning right onto the Highway from Towrang and Carrick Roads (speed of traffic, reduce sight distance, narrow median in which to wait, and no acceleration lane) and turning left off the Highway into these roads (short deceleration lanes). During August 2003, a public display of options was displayed at the (then) Mulwaree Council chamber at Goulburn, and a preferred option for the upgrade of the two intersections was selected taking into consideration community responses.

As the culverts located in the study area (**Figure 1.1**) are in excess of 50 years old, they are classified as "relics" under the provisions of the NSW *Heritage Act* 1977. As the Proposal would involve alteration of a heritage item, a Statement of Heritage Impact (SOHI) is required in order to determine the potential heritage impact of the proposal on the items and whether it is acceptable.

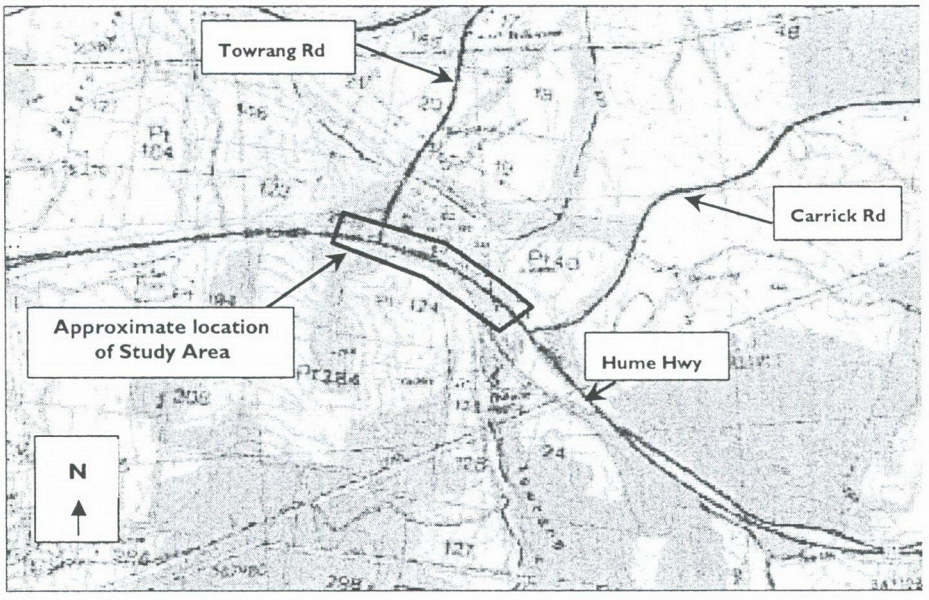


Figure 1.1: Location of the Study Area

2 History and significance of the culverts and stockade

2.1 History of Towrang and Goulburn

The study area falls into the "Wiradjuri" tribal area delineated by Tindale (1974) that was located within the Murray-Darling Basin and extended from Dubbo and Bylong in the north to Talangatta in the south and west from Lithgow to the Hay Plain and Ivanhoe.

In 1798 John Wilson and his party became the first Europeans to see the Goulburn Plains. In 1818 the exploratory party of Hamilton Hume and James Meehan traversed the Plains and named them after Henry Goulburn, the British Secretary of State for the Colonies.

The following year Governor Macquarie ordered the construction of the Great South Road (the basis of the Hume Highway) from Picton to the Goulburn Plains. He travelled to the Plains in 1820 and found 'a noble, extensive, rich meadow near a fine large pond of fresh water, the cattle being up to their bellies in as fine, long sweet grass as I have seen anywhere'. He also noted the good water supply, timbered hills and general suitability of the area for grazing and crops. Two days later John Oxley became the first European to walk upon the future townsite.

Settlers soon followed in Macquarie's wake. The first on the townsite was Andrew Allan who arrived in 1825. The Plains were used for stock raising and wheat growing although wheat production slowly faded out from the 1860s. Goulburn's reputation as a producer and exporter of fine merino wool was established in the early 1830s although transportation to Sydney was agonisingly slow until the 1850s. The fruits of the pastoralists' success are evident in the distinguished colonial mansions, which dot the local landscape.

A town plan was drawn up in 1828 with a view to settling discharged soldiers. A few allotments were taken up but Governor Bourke thought it too flood-prone and, in 1832, ordered a re-survey on higher ground. The new site was gazetted in 1833 while the original site is now part of Goulburn North. An inn and store were operational by 1832.

The Great South Rd was re-routed by Thomas Mitchell in the 1830s and Goulburn was placed in its trajectory for the first time, rendering the new town a major stopover and regional centre. Accordingly, a major stockade for chain-bound convicts and others involved in the construction of the Great South Road was established at Towrang, 15 km northeast, between 1833 and 1843. The stockade became the principal penal establishment in the southern district and was noted for its harsh discipline.

In 1843 Surveyor J. Larmer carried out a survey of thirteen portions of land at Towrang and these were sold to various people including Owen Gorman over a period of years. In 1989 a grant was awarded to the Towrang Stockade Trust (formed in about 1970) for the restoration of the bridge, culverts and powder magazine.

2.2 History of the Hume Highway

The Hume Highway is the main road leading from Sydney to Albury, and thence to Melbourne, via Liverpool, Cross Roads, Narellan, Camden, Picton and Berrima to Goulburn, and onwards through Gunning, Yass, Coolac, Gundagai, Tarcutta and Holbrook to Albury.

Prior to 1928 the Hume Highway (State Highway No.2) was known as the Great Southern Road (Main Road No.17). In 1928, the Main Roads Board adopted the principle of giving each important State Highway the same name throughout its length and, after consultation with the local governing bodies concerned, arranged with the Country Roads Board of Victoria for the re-naming of the road as the Hume Highway. This name was adopted as a tribute to Hamilton Hume, one of the two pioneers who led the first exploration party overland to Port Phillip in Victoria, much of the route of the Highway being along that followed by Hume on his overland journey.

The first definite record of a road being constructed from Sydney to the south is the construction of a section between Sydney and Liverpool by William Roberts, and its opening on March 22, 1814 (DMR, 1948:123).

The discoveries of Hume and Meehan to the south in 1818 had disclosed the existence of promising agricultural land and Governor Macquarie decided to encourage settlement in the area. In order to give access to it a road was necessary, and this was constructed by convict labour. The work was commenced on October 9, 1819, and was completed in February 1821. The road was 75 miles in length and required the construction of six bridges. The road crossed the Bargo River at the same point as the present highway, before passing over the Mittagong Range. Proceeding south, the new road crossed the Wingecarribee River below the present bridge at Bong Bong, and passed through what are now Moss Vale and Sutton Forest, beyond which it went west across Paddy's river by means of a low-level bridge, and a short distance further on the road crossed the Wollondilly River. It then ran through Arthursleigh, an early land grant, thence to Greenwich Park and across the Cookbundoon Range. The old road appears to have reached the Wollondilly River again at what is now Throsby's Ford.

Approval was given in 1832 to the construction of a road extending south of this point devised by the Surveyor-General in 1830. In the course of an address to the Legislative Assembly in 1833, the Governor stated the road might be opened in six months. However, it was not completed until several years later.

The control of the main southern road was assumed by the Department of Public Works in the year 1861. At that time a fair amount of metalling had been carried out between Sydney and Goulburn, although the surface quality was generally poor. From Goulburn to Albury very little construction work had been undertaken.

The Shires Act of 1905 transferred the care and control of public roads to the Councils of Shires and Municipalities. With the passing of the Main Roads Act in 1925 the Great Southern Road became eligible for assistance with Main Roads Funds. In 1928 it was proclaimed a State Highway and named in honour of Hamilton Hume. Since 1925 the highway has been improved throughout, including the construction of many deviations. By 1940 it had been provided with a bituminous or other dustless surface over its full length in New South Wales, 375 miles, and similarly on through Victoria to Melbourne.

After the construction of railways, and prior to the introduction of motor vehicles, the Great Southern Road, like other main rural highways, lost much of its earlier significance, and improvement lagged. This lost ground was more than regained since the introduction of motor vehicles. The highway performed a vital function during the Second World War and continues to carry a heavy and concentrated traffic (DMR, 1948:126).

2.3 Description of the bridge and culverts

The Towrang Bridge, built over Towrang Creek, and the seven culverts nearby were constructed by convict labourers from the Towrang Stockade located a short distance away. The stockade functioned from 1833 to 1843 and the culverts were built during this period, the bridge being built in 1839 (**figure 2.1**). These road works were all undertaken as part of the construction of Surveyor General, Sir T L Mitchell's Great South Road. It is believed that prominent colonial bridge designer David Lennox may have designed the Towrang Bridge, though this has not been proven. The bridge has a segmental arch and it is built of dressed coursed sandstone; the date 1839 was formerly visible on the keystone but it has now been vandalised. Built predominantly of shale, the seven culverts have dressed sandstone voussoirs and quoins (RNE).

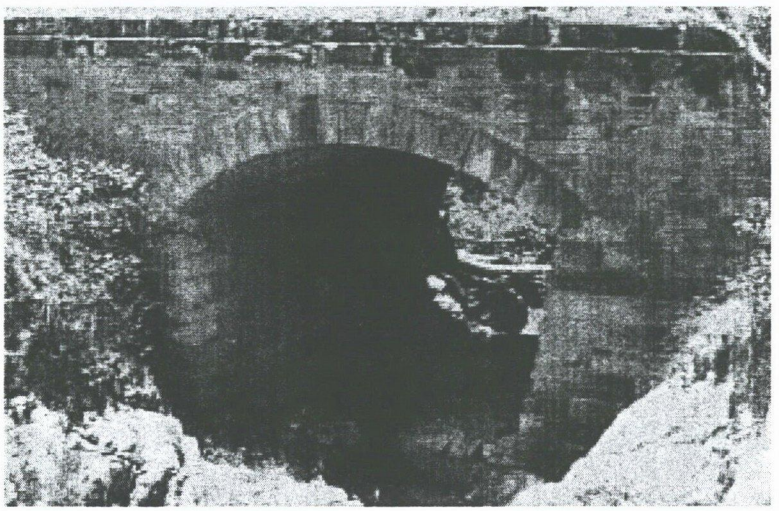


Figure 2.1: Towrang Bridge built in 1839.

The culverts are located to the west of the bridge and were intended to span the numerous ephemeral creeks within the study area (**figure 2.2**). They are built predominantly of shale with dressed sandstone voussoirs and quoins. With the exception of Culvert 2, the integrity of these culverts is high. **Figure 2.2** has been reproduced from the publication Towrang Stockade produced by the Towrang Stockade Trust and forms the basis for an interpretative plaque established within the Derrick VC rest area.

Culvert 1 is located directly west of the bridge and (with Culvert 3) is the most readily accessible to the public. To this end it has been refurbished with new blocks utilised in the low roadside wall above and in the projecting wing walls. In addition the mortar joints of the voussoirs have been repointed (**figure 2.3**).

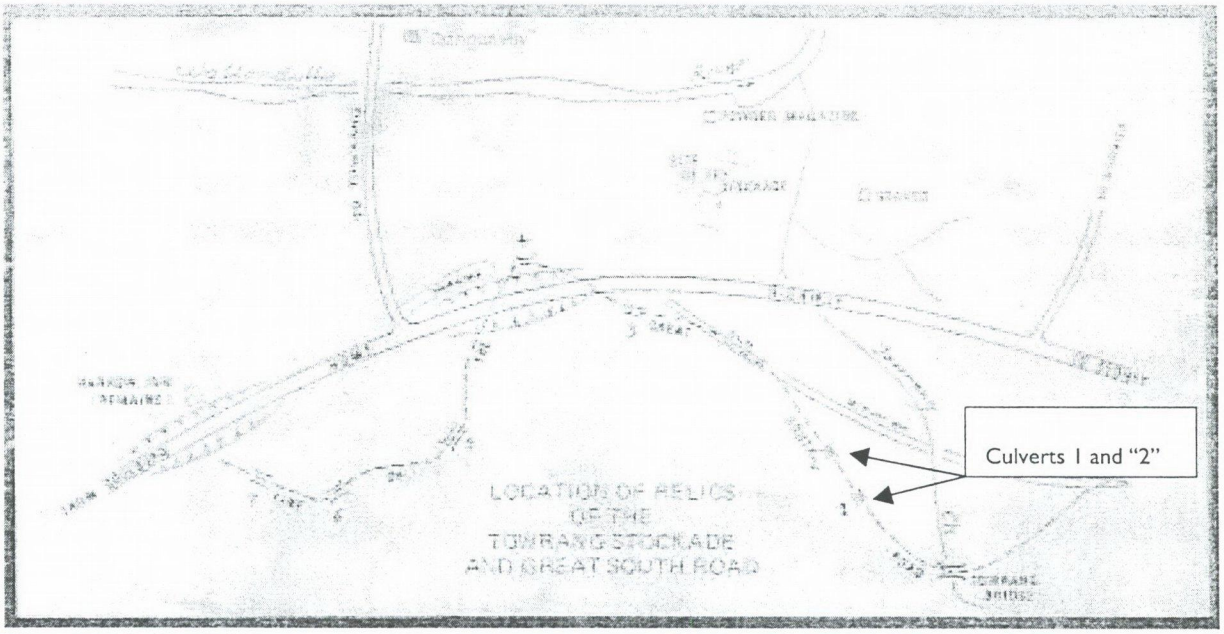


Figure 2.2: Plan of heritage sites within the study area (Towrang Stockade Trust, 1999).

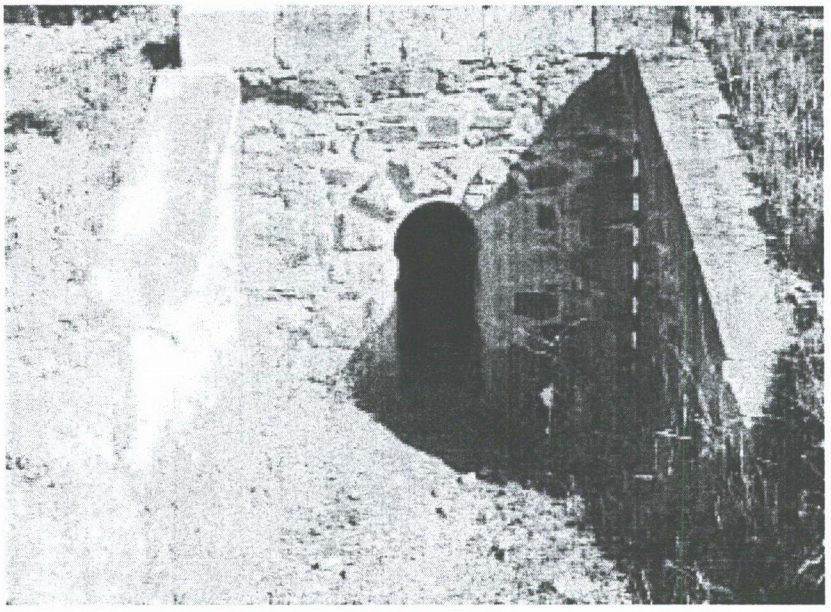


Figure 2.3: Culvert 1, view of east face. Arch height 1.12m and width 0.52m.

A site inspection conducted in June 2004 failed to locate Culvert 2 and this was initially attributed to the turn of events outlined by a member of the Towrang Stockade Trust. Prior to 2003 culvert 2 underwent a partial collapse following damage incurred around the arch through the actions of a burrowing wombat. Allegedly the culvert was subsequently removed by the RTA during the establishment of the Derrick Rest Area in 2003 (Doggart, letter 20/5/04). However, subsequent investigations outlined in **Appendix A** would seem to comprehensively indicate that the damaged and "removed" culvert 2 is in fact still extant as the restored culvert 1. The placement of the two culverts 1 and "2" in close proximity in **figure 2.2** is therefore deemed to be incorrect. The confusion surrounding the numbering system used for the culverts appears to be attributable to uncertainty in the past about the classification of Towrang Bridge as a bridge or culvert. In the latter instance it would form number 1 in the sequence of 7 culverts.

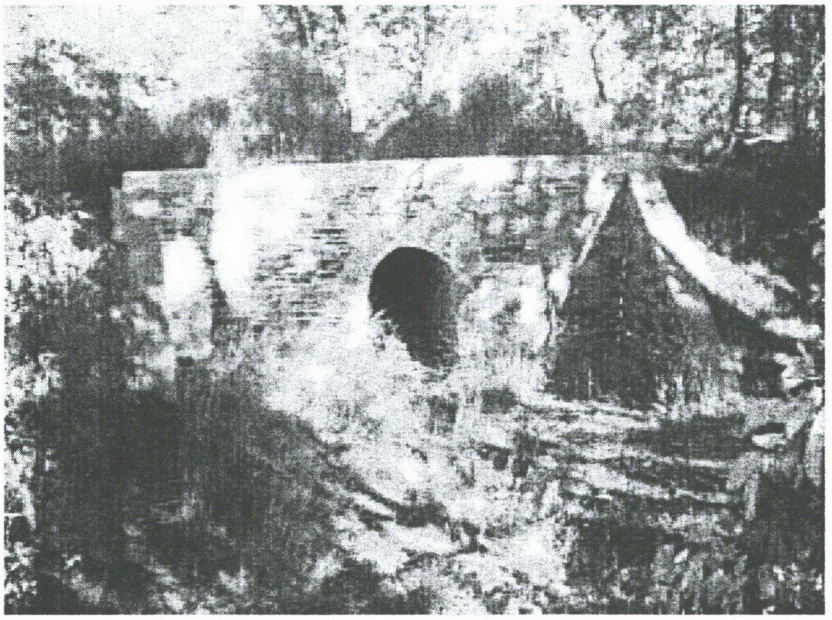


Figure 2.4: Culvert 3, looking southwest. Arch height 2.14m and width 1.61m.

Culvert 3 (site 3 in **Appendix**) is the most massive of the culverts and was built over the widest creek bed. It has received similar but more extensive refurbishment to culvert 1 (**figure 2.4**). Culvert 4 (site 4 in **Appendix**) is the only structure in the network located to the north of the existing Hume Highway, the realignment of which has resulted in the burial of its south face (**figures 2.5** and **2.6**).

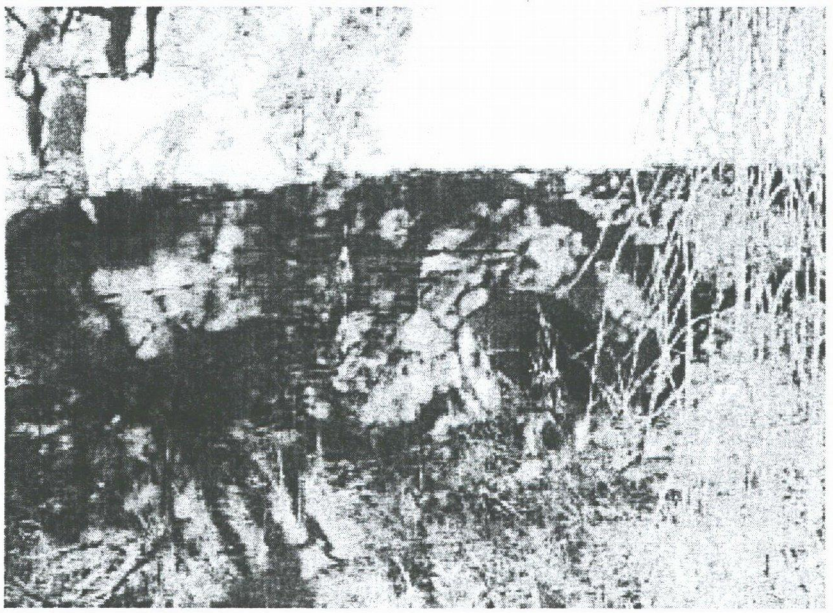


Figure 2.5: View of Culvert 4 looking southeast.

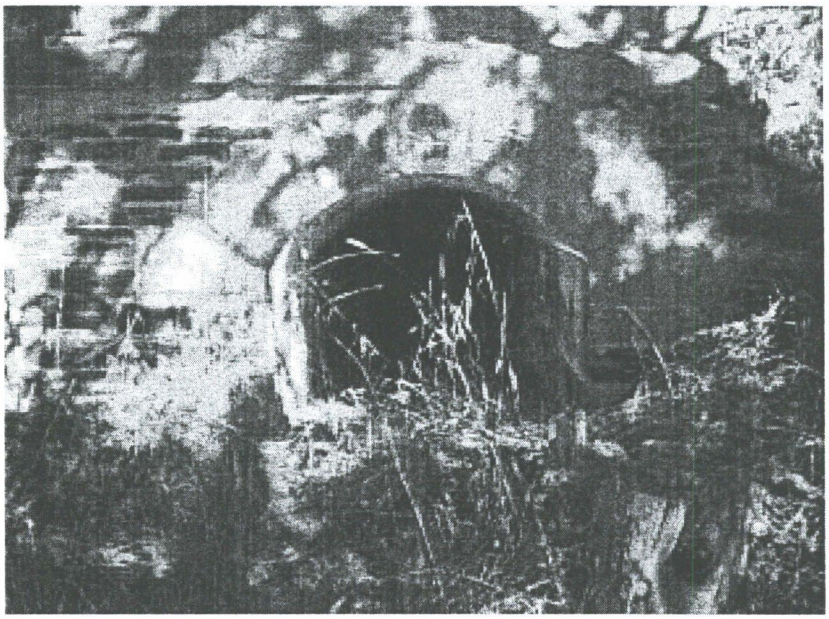


Figure 2.6: Culvert 4, detail of north face. Arch height 0.49m and width 0.61m.

Culverts 5, 6 and 7 in comparison were built to span deeper gullies and their tall elliptical arches, while less readily viewed by the public, have impressive landmark qualities in the undulating ground of Towrang.

Figure 2.7: Culvert 5, view of west face. Arch height 2.54m and width 1.04m.

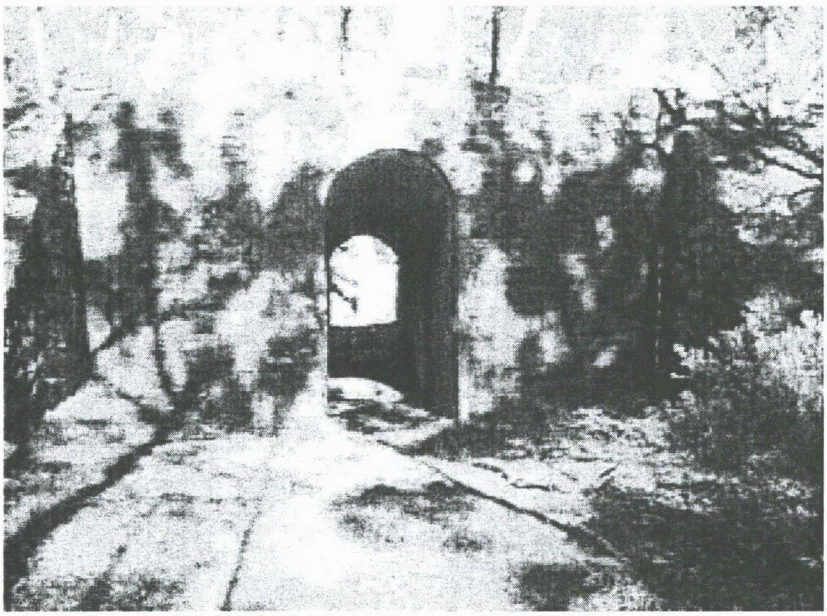


Figure 2.8: Culvert 6, view of north face. Arch height 3.67m and width 1.58m.

Figure 2.9: Culvert 7, view of north face. Arch height 1.39m and width 0.54m.

2.4 Description of the stockade and graves

The Towrang Convict Stockade was established in 1833 in order to house the labour force sent here to work on this section of Surveyor General Sir T L Mitchell's Great South Road which was being built between Sydney and Goulburn. In 1838 it was reported that Towrang housed 70 men in irons working on the road and 21 not in irons, and other sources state that the stockade held 250 convicts for most of its history. Towrang was the largest concentration of convicts in southern New South Wales at this time. The convicts were guarded by soldiers of various British regiments, including the 28th, 31st, 51st and 80th. The first commander of the stockade was Captain J Darley from 1833 to 1836, then came Lieutenant R Waddy, then in 1839 Lieutenant R Sherberras, in 1841 Captain W Houghton Tyssen, in 1842 Lieutenant W Cookson and in 1843, the last year of its operation, the stockade was commanded by Lieutenant Owen Gorman. The stockade consisted of a small cottage and a number of huts for the soldiers and their families, together with a garden tended by the military, and huts and boxes or timber cells about 4m square for the convicts. Some of the hearths and other rubble of the huts have been located and recorded through archaeological investigation (Winston-Gregson, 1987).

The cemetery still exists and there are three headstones: those of Private John Moxey of the 80th Regiment, Elizabeth Weiticker died 1841 aged thirty three, and Mary Brown died 1841 aged four (**figure 2.10**). The other major site is the powder magazine, which is partly excavated into the hillside above the Wollondilly River. It features sandstone and shale stonework and a vaulted passageway and originally it had an arch over the entrance that has now been replaced by a lintel. Archaeological work has also unearthed items including uniform buttons, pins, broken crockery, and hand forged tools, and the drainage lines of some of the huts have also been located.

Figure 2.10: View of graves east of Towrang creek and south of the junction with the Wollondilly River.

2.4.1 Description of the weir

The site described as remains of old stone bridge foundation (site 2 in **Appendix**) is more readily interpretable as a weir, directly associated with the function and establishment of the Towrang Stockade. While the weir was not described in the 1987 archaeological investigation (Winston-Gregson) which formed the basis for subsequent site descriptions, correspondence from the Towrang Trust would indicate that it is likely to have been one of the first structures built within the Towrang Stockade area as it was standard practice for a Garrison or a military unit to construct a weir on a slow moving creek once a permanent camp was decided on (Doggett, letter 20/5/04). While this practice has not been recorded at other substantial stockade sites such as Wingello or No.2 Stockade, Cox's River (Rosen, 1997), a substantially similar structure exists at Garrison Point on the Georges River in the Beatty Reserve at Georges Hall, Sydney. This latter stockade was established for the quarrying of stone used in the construction of the nearby Lansdowne Bridge in 1836.

The weir is partially overgrown with vegetation and is approximately 1.8 metres wide and 6 metres in length with distinct upward curves at the ends (**figures 2.11** and **2.12**). It consists of blocks of shale set randomly with a matrix of lime cement. It is intact and in good condition though soil erosion has altered it's setting considerably.

Figure 2.11: View along the weir looking west.

Figure 2.12: View across the weir looking south.

2.5 Statement of cultural significance of the bridge and culverts

The Towrang Bridge and culverts are historically very significant for their association with the convict era and with the building of the Great South Road and thus the development of Goulburn and the southern region of New South Wales. The structures provide insights into early road building methods and they have rarity value due to the many changes made to the line of this highway which have resulted in the loss of much of the original road. The bridge and culverts, having carried traffic over an extensive period, reflect a fine level of workmanship in stone (Source: Register of the National Estate, 1998).

2.6 Statement of cultural significance of the stockade and weir

The Towrang site is historically very significant for its association with the convict era and with the extension of the Great South Road and thus the development of Goulburn and the southern region of New South Wales. The vestigial remains of the stockade structures and the remains of the powder magazine provide insights into both the nature of convict life and labour and early road building methods (Source: Register of the National Estate, 1998). The weir, as a surviving stockade structure should be accorded the same level of significance.

2.7 Heritage listings of culverts, stockade and weir

Australian Heritage Council Register of the National Estate	Listed (Culverts and Stockade)
NSW Heritage Office State Heritage Register	Not listed
NSW National Trust Register	Listed (Stockade)
RTA s.170 Heritage and Conservation Register	Not listed
Mulwaree Local Environment Plan 1995	Not listed

Table1: Listings with statutory and non-statutory authorities.

2.7.1 Register of the National Estate

The Towrang Bridge and Culverts are listed as a historic item on the Register of the National Estate (RNE) (Database Number 1120), while the Towrang Stockade (Database Number 1121) and the Towrang Stockade Graves (Database Number 103545) have separate listings. No statutory obligations arise from these listings. However, consultation with Australian Heritage Council is advised if works that are likely to have a significant impact on any of these items is proposed. While the Weir is not included in the listing for the Stockade, this should be seen as an oversight on the part of the 1987 archaeological assessment (Winston-Gregson) and for the purposes of heritage management it should be considered as an integral part of the site's significance.

2.7.2 National Trust Register

Towrang Stockade is listed on the NSW National Trust's Historic Items Conservation Register. Whilst a National Trust listing confers no statutory or legal protection, it is an indication of community esteem. While the Weir is not included in the listing for the Stockade, this should be seen as an oversight on the part of the 1987 archaeological assessment (Winston-Gregson) and for the purposes of heritage management it should be considered as an integral part of the site's significance.

2.7.3 *NSW Heritage Act 1977* as amended

In addition to the statutory and non-statutory listings detailed below, the Towrang Bridge, culverts, Stockade and grave all have "relic" status under the *NSW Heritage Act 1977* as amended. As such, any excavation works in proximity to these items that may result in their disturbance, exposure, movement or damage cannot be undertaken without a Section 140 permit that has been specifically issued for the project.

3 Proposed works

3.1 Need for the Proposal

The Hume Highway links Australia's two largest cities, Sydney and Melbourne. It is a major interstate corridor, carrying road freight worth about $20 billion annually. Approximately 10 million people use the Highway every year. The Highway also is an important link to regional freight networks. Most of the Hume Highway, including all of the 294 km in Victoria, is built as a four-lane divided highway. About 100 km of the Hume Highway in New South Wales is not duplicated, including much of an 88 km section south of the Sturt Highway junction to Albury.

Daily traffic levels vary considerably, from around 80,000 vehicles per day (vpd) near "The Crossroads", south of Sydney, to a low of about 4700 vpd between Tarcutta and Holbrook in southern New South Wales, before rising again around Albury. Traffic levels on the Hume Highway in Victoria average 20,000 vpd, but 66,000 vpd north of Melbourne. Commercial and heavy transport vehicles comprise between 16 to 40 percent of the traffic stream, depending on the location.

The Hume Highway between Carrick Hill and Boxers Hill (near Boxers Creek) is the only section of the carriageway between Mittagong and Goulburn with a very narrow median. Southbound (to Goulburn) and northbound (to Mittagong) traffic is separated by a 2m wide painted median with wire rope safety barrier. Both Towrang Road and Carrick Road junctions are located within this section. This poses safety concerns for vehicles travelling at high speeds. In addition, sheltered right turn bays exist on the Highway for southbound traffic waiting to turn into Towrang and Carrick Roads, however, vehicles turning right out of these roads onto the Highway have restricted sight distance.

Safety concerns raised by the local community primarily relate to turning right onto the Highway (speed of traffic, reduced sight distance, narrow median in which to wait, no acceleration lane) and turning left off the Highway (short deceleration lane).

The Proposal has been put forward to improve motorists' safety along this section of the Highway.

The current proposal is to widen the highway and install traffic islands to separate the fast moving through traffic on the highway from the turning traffic. It is also proposed to extend the acceleration and deceleration lanes.

3.2 Options Considered

Several options have been considered for the improvements at Towrang and Carrick Roads:

1. U-turn facilities at Tiyces Lane and Boxers Creek Road, and close the median at Towrang and Carrick Roads.
2. 'Seagull' treatment at Towrang Road junction with no improvements to Carrack Road junction.

3. Close Towrang Road and connect with Carrick Road via new local road without any change to Carrick Road junction.

4. Close Towrang Road and connect with Carrick Road via new local road and 'seagull' treatment at Carrick Road junction.

5. Prohibit right turn out of Towrang Road; connect to Carrick Road with extra lane on the Highway and U-Turn in Carrick Road, and 'Seagull' treatments at Carrick Road junction.

6. Wider median separation over the full length between Towrang and Carrick Roads

7. Ultimate 4.6km deviation of the Highway.

Subsequently, three options were identified for community consultation and these were displayed at the (then) Mulwaree Shire Council office at Goulburn from 28 July to 15 August 2003 and an information session was held at Towrang on 9 August 2003. Of these **Option C** (see **Appendix**) was selected as the preferred option based on community response and road safety.

Culvert 4 is located in the existing road reserve and the Weir is proposed to be included in the new road reserve. The extent to which they would be indirectly impacted by these works may not become apparent until closer to the detailed design phase. None of the other culverts or features associated with the Towrang Stockade would be impacted by this proposal.

4 Statement of Heritage Impact

The following questions are presented in the *NSW Heritage Manual* document "Statements of Heritage Impact" as the minimum response required to properly address proposals on heritage items which would result in the alteration of the item. The option currently under review may involve the relocation of Culvert 4 (HO/DUAP 1996).

4.1 What aspects of the Proposal respect or enhance the heritage significance of Culvert 4?

Where the potentiality exists for the area occupied by the culvert and the weir to be avoided by the proposed works, such an option would be preferable from a heritage management perspective. The culverts as a group should be viewed as having exceptional value.

4.2 What aspects of the Proposal could have a detrimental effect on the heritage significance of Culvert 4?

There is the potential that the projected road widening works may take in the area currently occupied by the culvert. In this event every effort would need to be made to relocate the north face of the culvert so that it is integrated into the final design. The heritage impact would need to be assessed more fully when the proposal design is complete.

In order to ensure that the relocated north face conforms to the existing aesthetic qualities, archival photographic recording should be undertaken prior to the proposed works commencing. These photographic images would then act as a reference point to achieve that end. Experienced heritage stonemasons who have been endorsed by Heritage Design Services of the Department of Commerce would then be commissioned to undertake the disassembly and reassembly of the shale and dressed sandstone voussoirs and quoins. Provided that these measures were undertaken it is considered that the heritage impact would be acceptable.

4.3 Have more sympathetic solutions been considered and discounted? Why?

A range of options was investigated in the design of the localised widening of the Hume Highway that met National Highway design standards. **Option C** has been developed as the preferred option only after community consultation and environmental studies. Careful consideration was given to issues such as maintaining water quality; protecting native plants, animal habitats; limiting the loss of agricultural land; and conserving historic sites.

The preferred option selected would most effectively reduce the risk of accidents and meet all the project objectives. It also in part utilises the existing road corridor, thereby having the least impact on property and the environment where possible.

5 Conclusions and management recommendations

While Culvert 4 is located in the existing road reserve and the Weir is proposed to be included in the new road reserve of the proposed **Option C** (**Appendix B**), the extent to which they would be indirectly impacted by these works may not become apparent until closer to the detailed design phase. Should it become necessary to undertake works on these items the Australian Heritage Council would need to be advised of its specific nature and a Section 140 permit be obtained from the NSW Heritage Office prior to works commencing. It is recommended that all avenues be explored for their conservation *in situ*, and members of the Towrang Trust are included in further consultation in that regard.

Should it become necessary to relocate the north face of Culvert 4, archival recording should be undertaken of the structure prior to the disassembly and reassembly of the shale and dressed sandstone voussoirs and quoins. All work would be undertaken by experienced heritage stonemasons who have been endorsed by Heritage Design Services of the Department of Commerce. It is further recommended that the Towrang Bridge and culverts be placed on the RTA's Section 170 register.

6 References

Secondary Sources

Department of Main Roads 1948 "Development of the route of the Hume Highway", in *Main Roads*, Volume 13, number 4, pp.122-126

Heritage Office and Department of Urban Affairs and Planning 1996 *Regional Histories*, Heritage Office and Department of Urban Affairs and Planning

Heritage Office and Department of Urban Affairs and Planning 1996 *Statements of Heritage Impact*, Heritage Office and Department of Urban Affairs and Planning

Rosen, S. 1997 *The No.2 Stockade, Cox's River – Its Life and Times*, report for Environmental Services, Pacific Power

Tindale, N.B. 1974 *Aboriginal Tribes of Australia*. University of California Press, Berkeley

Towrang Stockade Trust 1999 *Towrang Stockade*

Winston-Gregson, J.H. 1987 *Towrang Stockade archaeological investigation*, report to the Towrang Stockade Trust

Appendix A:

Investigation into existence of Culvert "2"

The existence of culvert 2 as shown on Figure 2.2 is dubious. According to a letter dated 20/5/04 from Mr Charles Doggett to the RTA, Mr Doggett claimed that culvert 2 was removed by the RTA during the establishment of the Derrick VC rest area. However, based on the photo provided by Mr Doggett attached with the letter, there are significant evidences to indicate that the 'claimed culvert 2' was not destroyed and is the restored culvert 1 which is located nearby.

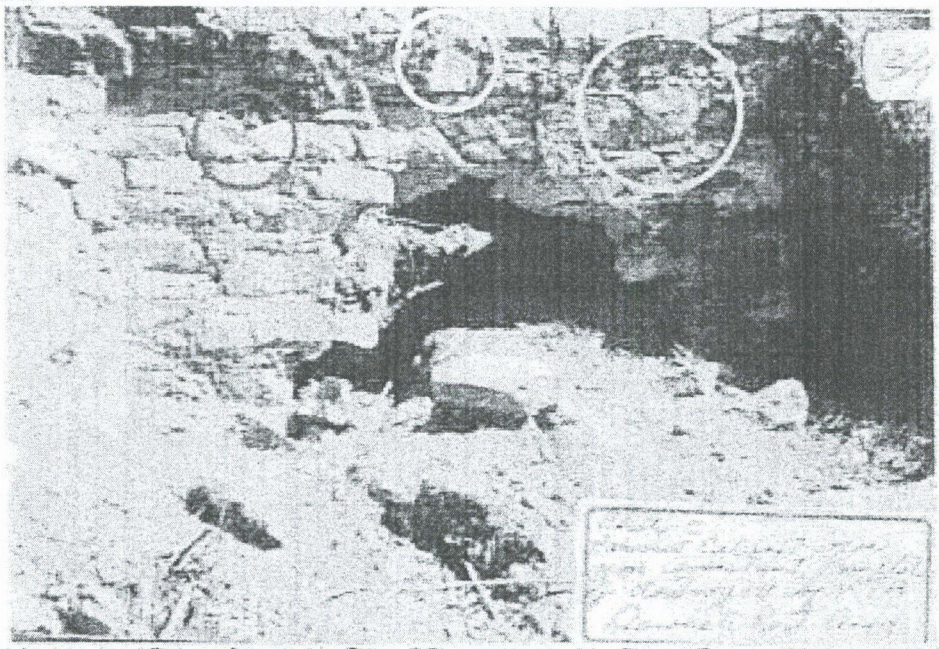


Photo of 'claimed culvert 2' (as referenced in Figure 2.2) provided by Mr Charles Doggett (via letter dated 20/5/04). Mr Doggett noted that the 'culvert now non existent completely destroyed by RTA Derrick Rest Area'. This is proved incorrect by comparing obvious features of the culvert with culvert 1 (see photo below).

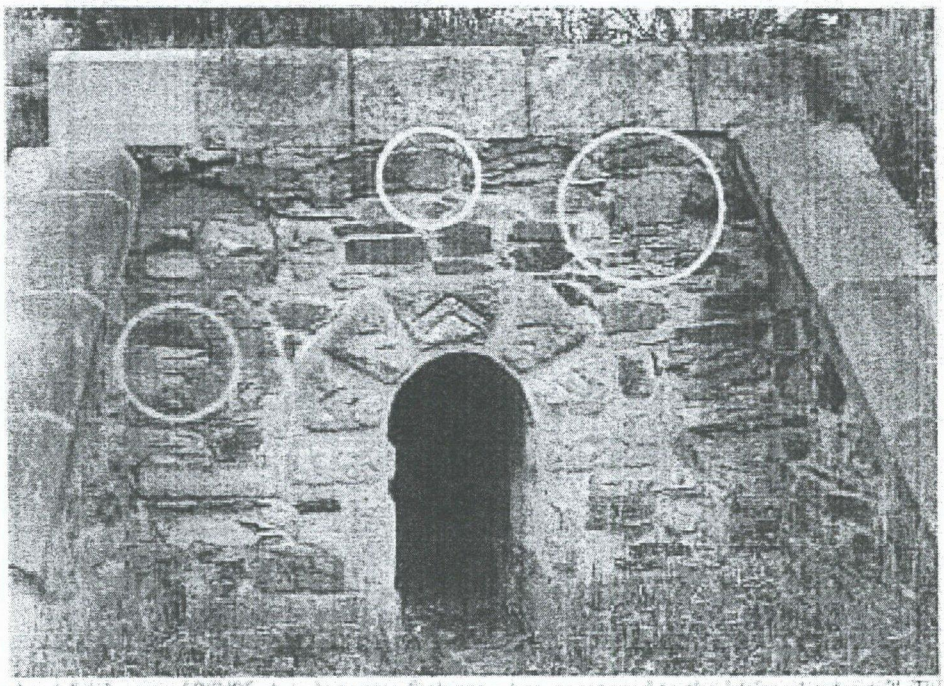
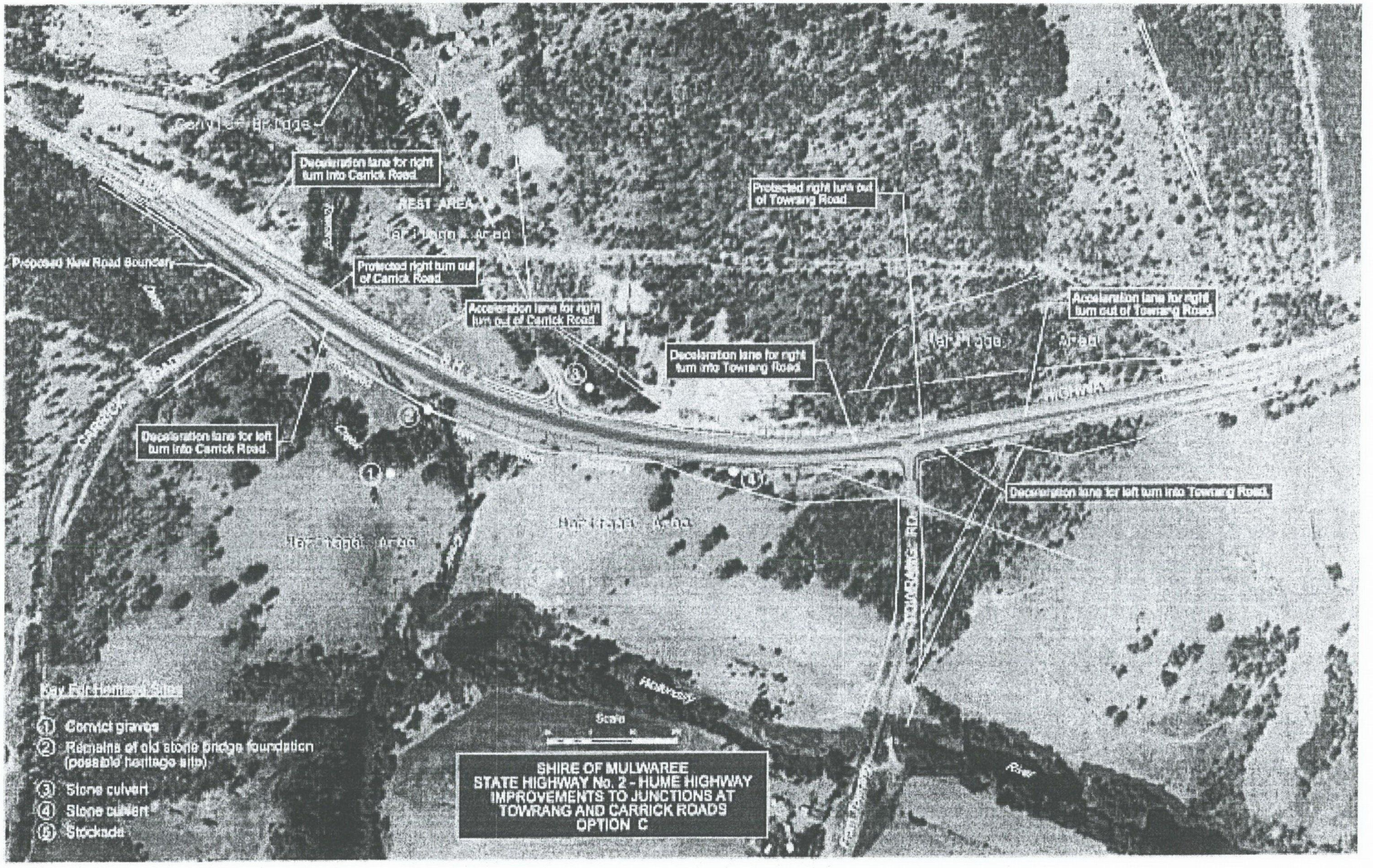


Photo of culvert 1 taken on 19/2/05 showing same features when compared to the 'claimed culvert 2'. This culvert was restored during the construction of the Derrick VC rest area.

14/2/05

Appendix B:
Plan of proposed works


Deceleration lane for right turn into Carrick Road.
REST AREA
Protected right turn out of Towrang Road.
Proposed New Road Boundary
Protected right turn out of Carrick Road.
Acceleration lane for right turn out of Carrick Road.
Acceleration lane for right turn out of Towrang Road.
Deceleration lane for right turn into Towrang Road.
Deceleration lane for left turn into Carrick Road.
Deceleration lane for left turn into Towrang Road.
Key For Heritage Sites
① Convict graves
② Remains of old stone bridge foundation (possible heritage site)
③ Stone culvert
④ Stone culvert
⑤ Stockade
Scale
SHIRE OF MULWAREE
STATE HIGHWAY No. 2 - HUME HIGHWAY
IMPROVEMENTS TO JUNCTIONS AT
TOWRANG AND CARRICK ROADS
OPTION C

Appendix G Indigenous Heritage Assessment

KAYANDEL

ARCHAEOLOGICAL SERVICES

Hume Highway Intersection Improvements at Towrang and Carrick Roads (north of Goulburn) NSW

Indigenous Cultural Heritage Assessment

February 2005

A Report to
RTA Environmental Technology

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CONTENTS

EXECUTIVE SUMMARY

The NSW Roads and Traffic Authority (RTA) propose to complete improvements to the Hume Highway at the intersections with Carrick Road and Towrang Road, north of Goulburn.

No previously recorded Aboriginal sites were listed on the DEC AHIMS register as occurring within the study area.

Five Aboriginal sites (open artefact scatters) and one area of Potential Archaeological Deposit (PAD) were identified during the course of the field survey conducted for the intersection upgrade proposal at Towrang and Carrick Roads.

The newly identified Aboriginal sites of TC1-1, TC1-3, TC1-4 and TCPAD1 will be partially impacted by the proposal in its current configuration.

All permits *(s.87 & s.90)* sought under Part 6 of the *National Parks and Wildlife Act 1974 (as amended)* will require the proponent to engage in further consultation with the Indigenous community. Please refer to the *Interim Community Consultation Requirements for Applicants* issued by the Department of Environment and Conservation for the correct methods and procedures required to be undertaken to comply with these guidelines.

It is recommended that:

- A *s.87 Preliminary Research Permit* be sought for the area of TCPAD1. To identify the presence of Aboriginal relics and their extent and significance to the local Aboriginal community.
- A *s.90 Heritage Impact Permit* (Partial Consent with Salvage) be sought for those portions of TC1-1, TC1-3, TC1-4 and TCPAD1 that are to be impacted by the proposal in its current form.
- A qualified surveyor be engaged to identify and flag the new road easement boundary to the north of the Hume Highway. Areas to the north of this identified perimeter are Aboriginal sites or PAD, access to these areas is to be restricted.
- The immediate area of TC1-5 along with an 50 m buffer zone or curtilage to avoid the associated PAD should be cordoned off to prevent inadvertent impact whilst the proposed works are carried out. A suitably qualified cultural heritage consultant and indigenous representative familiar with the site should supervise the installation of this barrier.

In addition it is recommended that:

- Construction materials are to be stockpiled only in the identified stockpile location, no other areas within the study area are to be utilised for this purpose without further prior investigation by a suitably qualified cultural heritage consultant and indigenous community representative.

- All contractors completing works associated with the construction of the proposed project should complete a Cultural Heritage component as part of a site induction program. A representative of the PLALC should be invited to attend and speak at the induction. The induction program should at a minimum include topics on heritage legislation (site protection and penalties), restricted areas within the study area, basics of Aboriginal site identification and cultural awareness.

- Should Aboriginal relics be found during the proposed works in those areas not previously sanctioned by a *s.90 Heritage Impact Permit*, work must stop and the DEC contacted to inspect the artefacts.

- Should the location(s) of the proposed impact(s) be modified to include areas beyond the existing study area, a cultural heritage consultant must be commissioned to survey the new impact area(s).

- Otherwise there are no archaeological constraints on the proposed development with regard to Aboriginal archaeological sites.

This archaeological assessment and the management recommendations contained herein will be independently reviewed by the Cultural Heritage Services Division of the NSW Department of Environment and Conservation (DEC) and the relevant Aboriginal community.

The DEC and the Aboriginal community will make consideration of the findings of the consultants report and the recommendations in relation to the management heritage places. Formal approval for all actions outlined should be sought from the relevant authority prior to the completion of any works. At no time should automatic approval of the management recommendations stated above be assumed.

1 INTRODUCTION

Kayandel Archaeological Services has been commissioned by RTA Environmental Technology in December 2004 to undertake an indigenous cultural heritage assessment for proposed improvements to the Hume Highway at Towrang and Carrick Roads (north east of Goulburn).

The study area is located between the city of Goulburn and the township of Marulan, approximately 10km East North East from Goulburn (Figure 1).

This report presents the findings of an archaeological field survey and assessment of Aboriginal archaeological sites within a 5km radius of the study area and provides an assessment of the potential for previously unidentified or unregistered Aboriginal sites to be present over the study area.

The study area is located on the Hume Highway in the vicinity of the Towrang Road and Carrick Road intersections, approximately 10km north east of Goulburn. Study area is estimated at 28.6 Ha. It extends for a length of approximately 1300m along the existing highway alignment. The western boundary of the study area is approximately 300m west of the intersection of Towrang Road and the Hume Highway. The eastern boundary of the study area is approximately 200m east of the intersection of Carrick Road and the Hume Highway. The study area is approximately 220m in width.

1.1 Project Personnel

This investigation was carried out and the report written by Kayandel Archaeological Services (KAS).

The field survey component of the study was undertaken by Lance Syme (KAS) and Justin Boney (Pejar Local Aboriginal Land Council).

Lance Syme and Kylie Felan undertook background research required for this project.

Maps and site plans were prepared by Lance Syme.

1.2 Proposed Works

The NSW Roads and Traffic Authority (RTA) propose to improve the existing intersections of the Hume Highway and both Towrang and Carrick Roads. These works would also involve the widening of the Highway easement to accommodate a wider median strip (see Figure 2).

The proposed works include the provision of:

- Deceleration lanes for right turn into both Carrick and Towrang Roads;
- Protected right turn out lanes of both Carrick and Towrang Roads;

- Acceleration lanes for right turn out of Carrick and Towrang Roads; and,
- Deceleration lanes for left turn into Carrick and Towrang Roads.

Figure 1: Locality Map – Towrang & District (Geoscience Australia 2003)

The Carrick Road intersection will also be reconfigured to accommodate the proposed changes.

The existing southbound alignment of the Hume Highway will remain relatively unchanged. The median strip will be expanded resulting in the repositioning of the present northbound alignment. The northbound alignment of the Hume Highway will be repositioned to a parallel position approximately 20–25 m further to the north.

Works anticipated to be undertaken during the construction of the proposed intersection improvements include:

- Clearing of vegetation, predominately pasture;
- Ripping and other necessary forms of earthworks;

- Asphalt pavement installation;
- Storm water management systems; and
- Landscaping works.

The results of this archaeological field survey and desktop analysis are reviewed in detail in Section 6.

1.3 The Consultancy Brief

The consultant was required to assess whether the proposed works would affect Aboriginal archaeological sites. As part of this process it is essential that the consultant:

- Reference the Department of Environment and Conservation [DEC] (formerly NSW National Parks and Wildlife Service) Aboriginal Heritage Information Management System [AHIMS];
- Consult reports and relevant literature in relation to listed Aboriginal archaeological sites located in and around Towrang, in the southern tablelands of New South Wales.
- Conduct a field survey in association with the relevant Aboriginal stake holders to identify the presence of Aboriginal sites within the study area;
- Assess the potential for Aboriginal sites to occur within the study area;
- Assess the potential of the proposed works to affect Aboriginal sites;
- Provide recommendations for further works where appropriate based upon statutory and legislative requirements;
- Prepare a report in accordance with DEC guidelines.

Figure 2: Location and description of the proposed works (Supplied by RTA Environmental Technology)

2 METHODOLOGY

The assessment reported here involved the completion of an archaeological pedestrian field survey and recording of the specified study area that will be impacted by the proposed development. A breakdown of the various tasks that have been undertaken to achieve the objectives of the consultancy brief (outlined in Section 2.2) is provided below.

2.1 Background Research

Prior to the assessment being completed, the following tasks were undertaken:

- A review of the relevant archaeological reports and site cards for the study area and surrounding region that are held within the DEC AHIMS Register.
- Interpretation of the topographic context and landform units of the study area.
- Plotting of known Aboriginal sites as identified by the AHIMS search onto the Towrang (8828-1-S) 1:25,000 Second Edition Topographic Map.

2.2 Field Survey

The study area was inspected utilising a pedestrian survey technique. The survey was completed over the whole of the study area.

The field survey was carried out on the 24th of December 2004 in excellent conditions. A previous inspection of the study area was completed by Nigel Robinson (RTA) during October 2004. Justin Boney representing the PLALC participated in both of the field surveys completed to date.

The details of the survey coverage are discussed in further detail in Section 6.

For the purpose of completing analysis of the survey coverage data, the study area has been separated into eight discrete survey units that relate to topography and levels of exposure.

The field survey strategy was designed to increase the potential to identify archaeological material. Assessments were also made on levels of disturbance from previous land use, survey variables (ground visibility and archaeological visibility) and the archaeological sensitivity of the area.

3 PARTNERSHIP WITH INDIGENOUS COMMUNITIES

The Department of Environment and Conservation (DEC), formerly NSW National Parks and Wildlife Service (NPWS) has adopted the following heritage management principles (NPWS 1997:8-10):

- DEC recognises that Aboriginal culture is living and unique and recognises the right of Aboriginal people to protect, preserve and promote their culture.
- DEC recognises that Aboriginal people are the rightful cultural owners of Aboriginal cultural heritage information and Aboriginal sites and objects.
- DEC encourages Aboriginal participation in assessment and salvage work and supports direct negotiation between Aboriginal communities and developers.
- DEC encourages Aboriginal communities to carry out their own assessments, including oral history and anthropology.

3.1 Project Participation

The study area is located within the boundaries of the Pejar Local Aboriginal Land Council (PLALC).

Consistent with the current policy of the NSW RTA a representative of the PLALC was invited to participate in the field survey of the area and provide feedback relating to the study area's Indigenous significance. Report from PLALC is provided in Appendix 1.

3.2 Native Title Claims

A search lodged with the National Native Title Tribunals revealed one existing claim over the study area and one additional claim extending to the vicinity of Goulburn. Gundungurra Tribal Council Aboriginal Corporation # 6 is an extensive claim that has been registered over the study area. Ngunawal People (NSW) is another extensive claim over lands and waters south of Goulburn. Claimant summaries for both the Gundungurra Tribal Council Aboriginal Corporation # 6 and Ngunawal People (NSW) claims are presented in Appendix 2.

4 ENVIRONMENTAL CONTEXT

4.1 Background

The natural environment of an area influences not only the availability of local resources such as food and raw materials for artefacts but also determines the likely presence and/or absence of various archaeological site types which may be encountered during a field investigation.

Resource distribution and availability (such as the presence of drinking water, plant and animal foods, raw materials of stone, wood and vegetable fibre used for tool production and maintenance) is strongly influenced by the nature of soils, the composition of vegetation cover and the climactic characteristics of a given region. The location of different site-types (such as rock-shelters, middens, open camp-sites, axe grinding grooves, engravings etc) are strongly influenced by factors such as these along with a range of other associated features which are specific to different land systems and bedrock geology.

Detailing the environmental context of a study region is an integral procedure that is necessary for modelling potential past Aboriginal land-use practices and/or predicting site distribution patterns within any given landscape. The information that is outlined below is considered to be pertinent to the assessment of site potential and site visibility within the specific contexts of the current study.

4.2 Climate

The climate of the Southern Tablelands is characterised by temperate to cold weather with frequent rain and fog.

The maximum average temperature for the district ranges from 11.1 C in July to 27.2 C in February. The yearly mean temperature is 19.5 C (Australian Bureau of Meteorology).

Precipitation in the district ranges from 600mm to 800 mm.

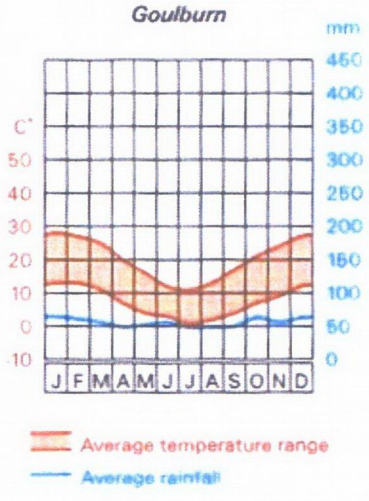


Figure 3: Climatic Data for Goulburn (Aust. Bureau of Meteorology)

The microclimate of an area is also influenced by factors such as rain shadows, aspect and topography, prevailing wind direction and frost hollows. These influences would seem particularly present in the terrain of the study area, resulting in frosts and localised temperatures and conditions often dependant on elevation. Whist the area may be cold this would not have provided a barrier to regular and prolonged occupation of the area by Aboriginal population in the past.

4.3 Topography, Geology and Soils

The Southern Tablelands occur as part of the Lachlan Fold Belt, which is considered by some to be the most complex geological province in NSW (Hird 1991:9). The province is characterised by Ordovician, Silurian and Devonian sedimentary units and Early Silurian volcanics that have subsequently been subject to periods of more orogenic activity and Quaternary sedimentary deposition has occurred in the Goulburn area of the Lachlan Fold Belt (Branagan & Packham 2000:6-20)

The study area consists of the basal slopes of Mount Towrang (871m) that is situated approximately 2.2 km south of the study area. The study area is characterised by a gentle slope (<10 degrees) and a northerly to north easterly aspect.

There are two watercourses present within the study area. Towrang Creek has a north to south orientation and drains in a northern direction to the Wollondilly River. Deep Creek merges with Towrang Creek just north of the Hume Highway and has an east to west orientation. Both creek lines are situated in the eastern portion of the study area.

Soils within the study show characteristics of the Midgee soil landscape of Yellow Earth Soils. There may also be a small occurrence of the Bullamalita soil landscape of Soloths Soils in the western extremity of the Study area. Midgee soil landscapes are associated with Ordovician and some Devonian and Lower Silurian sediments and metasediments in hilly terrain. They are commonly stony and acidic on nature (Hird 1991:124). Bullamalita soil landscapes are generally restricted to a small district around Goulburn. They are associated with Upper Silurian and Lower Devonian sediments wherever they occur in conjunction with foot slopes and valley floors (Hird 1991:43).

4.4 Existing Condition of the Study Area

The study area consists of a parcel of land estimated at 28.6 Ha. It is situated on the Hume Highway in the vicinity of the Towrang Road and Carrick Road intersections, approximately 10km north east of Goulburn.

The study area exhibits three distinct areas of present use:

1. The road easement;

2. Pastoralism to the north of the Hume Highway; and,

3. Road Verge and/or Rest Area to the south of the Hume Highway.

Topographically the study area is situated on the basal slopes of Mount Towrang and the creek flats associated with Towrang Creek, which flow a short distance to the north into the Wollondilly River.

4.5 Disturbance and Visibility

I. Disturbance

The land use history of the study area is generally one of relatively minimal impact with the exception of the construction of the Hume Highway. Some clearing of trees would have taken place to thin out woodlands early on. Watercourse modification and storage facilities (i.e. dams are not present within the study area) are customarily the largest single source of ground disturbance within a landscape.

Historically the study area was also utilised as part of the Towrang Stockade. The Towrang Stockade was the site for the restraint of convict labour associated with the construction of the Great Southern Road dating from the 1830's and 1840's. In the period after the stockade it is envisaged that the study area would have been utilised for pastoralism, predominantly being wool and livestock production.

Through the centre of the study area is the Hume Highway road easement that has considerable levels of disturbance associated with the construction of the Hume Highway. The most noticeable evidence of this is two hillside cuttings, areas of fill emplacement and a creek crossing over Towrang Creek. Beyond the major areas of disturbance the landscape is considered to have had minimal impact and be relatively natural in appearance.

II. Visibility

There are a number of factors to be considered when assessing visibility over a study area. These include but are not limited to, the time of day, aspect of the sun, vegetative cover, weather conditions and soil matrix.

On the day of the survey visibility within the study area was generally rated between moderate and low.

Moderate areas were characterised by areas of exposure associated with areas of exposure under established trees, exposure associated with previous earth works and areas of larger exposure within pasture.

Areas of low visibility were characterised by native and introduced species of grass cover.

See Table 1 for details of survey coverage.

5 ARCHAEOLOGICAL CONTEXT

5.1 Ethno-historic Context

According to Tindale (1974) at the time of European settlement the Goulburn-Marulan areas were on the boundary of several large Aboriginal groups, the Wandandian people to the south-east, the Gandangara to the north and the Ngun(n)awal to the south. Due to the similarities in language between the groups, there occurs considerable argument today as to which group actually occupied the region at the time of European contact.

Aboriginal occupation of the region appears to have focused along major water courses including the Shoalhaven River to the east and associated perennial and ephemeral tributaries. There is some evidence that movement between the groups occurred along ridge crests which are thought to have formed significant movement corridors throughout the region (du Cross cited in Haglund 1986:4).

Due to the rapid expansion of European settlement throughout the region, compounded by the effects of the often racist or ethnocentric attitudes of the early white settlers, there remains only scant documentation of traditional Aboriginal culture. However, on odd occasions accounts of large inter-'tribal' disputes were apparently newsworthy. An account of one such episode appeared in the Sydney Morning Herald on 18th January 1851 (Lloyd, 1999:1). The newspaper reported the movement of a large group of around 100 armed people belonging to the 'Lachlan Tribe' having moved into the Crookwell area to take revenge on the 'Crookwell Tribe' for the murder of a number of their group. The account mentioned their arrival in the Binda locality and of their return to Carcoar (in the central tablelands).

The first brief accounts of the local Aboriginal people in the region were documented by European explorers. According to John Wilson, who led an expedition which in 1798 reached Mount Towrang, approximately 9 kilometres north-east of the present day township of Goulburn (cited in Collins 1798-1802:87-91), there was no evidence of Aboriginal people in the area, and the absence of Aboriginal people throughout the region was further commented upon by numerous subsequent expedition leaders, although Wild (1820) and Throsby-Smith (1820) noted the presence of numerous 'native fires'. It would appear that the local Aboriginal groups successfully avoided early contact with European exploration parties.

Whilst Attenbrow (1976) distinguished between the inland and coastal groups with regard to their respective traditional economies and technologies, there is little reliable information regarding their traditional boundaries and it would seem that there was a considerable amount of interaction between the groups. Observations of Aboriginal people made by early European explorers in the upper Shoalhaven River catchment indicate that small inland family groups (up to 35 people) who focused their economies upon forest resource exploitation were most common (Sullivan cited in Haglund 1986:5).

Explorer Evans during 1815, whilst describing evidence of Aboriginal occupation in the upper Lachlan River to the north and west of the current survey area, recounted how the initial response on the part of local Aboriginals to the Europeans was that of avoidance and fear. However, the shyness and timidity of the local Aboriginal people quickly gave way to resistance to the European invasion. This culminated in the declaration of martial law by Governor Brisbane in 1823 in the Bathurst area (Read 1988:9).

Unfortunately, with the rapid expansion of European settlement throughout the Goulburn-Marulan region, avoidance of the new settlers could not continue indefinitely and the Aboriginal people of the region (and their culture) would soon suffer a similar fate to that which had been inflicted upon groups to the north around Sydney Cove.

5.2 Regional Context

The Sydney region has been inhabited by Aboriginal people for at least 20,000 years, and possibly longer (see Nanson et al 1987). Archaeological sites from the Blue Mountains and Hawkesbury/Nepean River System have provided the earliest evidence of occupation within the region. Stockton and Holland (1974) produced a radiocarbon date of c22,000 years BP from a site at Kings Tableland in the Blue Mountains. Excavation of the Greaves Creek rock shelter site of Walls Cave near Medlow Bath has produced a date of c.12,000 years BP (ibid). At Shaws Creek KII, a rock shelter on the west bank of the Nepean north of Penrith, a date of c13,000 BP is recorded (Kohen et al 1984).

Sites on the south coast of New South Wales, such as Burrill Lake (c20,000) and Bass Point (c17,000), provide complimentary dates (Lampert 1971, Bowdler 1970). At the time of these periods of occupation, both sites would have been located within hinterland areas some distance away from the sea. In the case of Burrill Lake, the sea would have been up to some 16 km further east than at present (McDonald 1992). There are no other Pleistocene sites recorded on the Sydney coast. There are however two sites located at Curracurrang and the Prince of Wales Hospital, which are dated to around 7,000 years ago.

It is very likely that a large number of coastal sites of a similar antiquity within the Sydney region have been submerged and/or destroyed by sea-level changes that have occurred in eastern Australia during the last 20,000 years.

On the basis of the available evidence it would appear that the initial occupation of the Shoalhaven and Illawarra regions was sporadic, and with low population densities. From around 5000 years ago an increasing and continued use of many sites which have been investigated through archaeology appears to have ensued. Evidence for the use and occupation of the Shoalhaven and Illawarra regions from this period is far more 'archaeologically visible' than for the previous periods.

In support of the likelihood that occupation of the region intensified around this time, the majority of rock shelter and open camp sites which have been investigated to-date contain archaeological deposits, features and artefacts which generally date to c.2,500 BP or less. Kohen (1986) suggests that there was a more intensive use of open sites in the region during the last 1,500 years. This researcher suggests that the majority of camp sites will therefore belong within this time frame.

During the 20,000 years of occupation in the region, and in particular the last 5,000 to 8,000 years, changes in excavated stone tool assemblages have been observed. A number of temporal markers have subsequently been established by archaeologists in an attempt to distinguish what are considered to be the more significant changes in tool types and tool kit composition (eg. McCarthy 1948, Megaw 1965, Lampert 1971 and Wright 1977).

At Contact, European observations of Aboriginal life around the Shoalhaven and Illawarra regions suggest that tool kits were fashioned largely on organic materials, such as wood, bark, palm leaves, shell and bone. The use of stone does not figure prominently within many of the early European descriptions.

5.3 The Aborigines of the Goulburn/Marulan Area.

Tindale (1974) has determined that Goulburn was situated at the boundary of two tribes - the Gandangara to the north and the Ngun(n)awal to the south. Early settlers describe large numbers of Aborigines (over 3,000) attending ceremonies in the Goulburn district (in Wyatt 1941:112). Large groups such as this would have collected from a number of neighbouring 'tribes' and the fact that Goulburn was the scene of the gathering suggests that it may have been centrally located between these tribes. However, early commentators often confused hordes or clan divisions, which were, in fact, more relevant to everyday life, with broad tribal groupings. Early ethnographers tended to describe any large groups of Aborigines as 'tribes'.

It is probable that tribal boundaries, clan estates and band ranges were fluid, varying over time. Consequently tribal boundaries delineated today must be regarded as approximations only, and relative to the period of, or immediately before European contact.

Tribal boundaries are based largely on linguistic evidence. It has been observed that the word lists recoded from both the Ngun(n)awal and Gandangara languages were virtually identical (Eades1976:6). 'This may indicate that the tribal division was inaccurately recorded by Mathews (1902, 1904,1908), or that the Aborigines to the north and south of Goulburn were linguistically related and had close social, and maternal kinship ties' (Koettig and Lance 1986:13)

The study area at Towrang was probably located within the boundaries of the Gandangara tribe. However taking into consideration the fluid nature of tribal

boundaries, the area may well have been within Ngun(n)awal territory, or within a sub-set of either of these 'tribes'.

The area today is located within the boundaries of the Pejar Local Aboriginal Land Council and the Wiradjuri Regional Aboriginal Land Council.

Estimated of the pre-European size of the Aboriginal population in the Goulburn/Marulan region cannot be confidently based on the inadequate ethno-historical sources for the area. By extrapolating Radcliffe-Brown's (1930:696) population estimate for the whole of Australia, and Tindale's (1940) tribe numbers, Flood estimated that the population density for the Southern Tablelands was about 1:36km^2. She admits, however, that 'it is of course impossible to estimate the population as a whole, but such an index can be useful in making comparisons with other tribal territories containing similarly unequal resource zones' (Flood 1980:43)

5.4 Model of Aboriginal Occupation of the Southern Tablelands

The various models of past Aboriginal occupation which have been developed for the region indicate that, as in virtually all other regions, sources of permanent or seasonally reliable water were not just a focus of past Aboriginal occupation but were a necessity for occupation to occur. Therefore it is expected that the greatest evidence of occupation would be found in association with reliable water sources such as creeks (and rivers where they occur).

However, whilst the presence of water has been identified as having been the over-riding factor in determining levels of past Aboriginal occupation in the southern tablelands region, the presence of suitable landforms for occupation to occur was also extremely important. Basically, landform determines the type of archaeological evidence which will be found or, in many instances, whether any evidence at all can be expected to occur.

From Koettig and Lance (1986) a general predictive model for the Southern Tablelands has been developed. Characteristics of this model include:

- Large sites are found on alluvial flats along major water courses. These sites probably represent focal points of Aboriginal activity and are large, dense and in close proximity to water sources;
- Smaller sites, which comprise the major proportion of sites in the region, are found on undulating hills;
- Site frequency and size decrease the further the distance from water; and,
- Sites also become fewer in number where ground is steeply sloping, such as on hillsides and ridge sides.

The current study area is situated on the lower slopes of Mount Towrang in close proximity to the Wollondilly River. The landform units present within the study area have the potential to contain Aboriginal sites, this potential is assessed to be high.

However, this assessment does not take into consideration the effects upon the archaeological record of often extreme surface and sub-surface disturbance resulting primarily from past non-indigenous land use.

5.5 Previous Investigations

I. AHIMS Results

Results supplied by DEC from a search of the AHIMS Register consisted of three identified Aboriginal sites within a 2,500m radius of the study area.

The known Aboriginal sites are all open artefact scatters.

Within 2.5km of the study area there are only a small number of identified Aboriginal Sites. All previously recorded sites were identified during the completion of surveys associated with linear developments. This field survey represents the first non-linear survey for the immediate region surrounding the study area.

Boxer Creek Tributary Approximately 1km to the north west of the present study area, this site was originally recorded in 1990 in response to a proposal to develop a crown road easement. The site was subsequently impacted under Permit Number 510006. At the time of original recording the site consisted of seven identifiable lithic pieces.

Goulburn 5 Situated 200m to the south of the present study area this site was identified as part of a proposal for an electricity line between Moss Vale and Goulburn in 1989. This site is an open artefact scatter and quarry site.

Wollondilly River 1 was identified during 1991 as part of the Powertel Sydney to Melbourne Optical Fibre Cable project. The site is quite large with the number of surface artefacts being estimated at 200.

These previously identified Aboriginal sites are not within the study area and were not relocated during the current project.

II. Previous Archaeological Research

Archaeological investigations within the Southern Tablelands have been carried out since the late 1970's. Broad scale regional studies include Witter's work on site prediction in Australia (1980) and Flood's early synthesis of the archaeology of the highlands of south-eastern New South Wales, which included the Goulburn district (1980). Koettig and Lance produced and Aboriginal Resources Planning Study for the City of Goulburn in 1986.

The majority of archaeological studies in the Southern Tablelands area have however, been small-scale surveys of areas that were under consideration for some form of development. Archaeological surveys conducted in the vicinity of Towrang are summarised below.

Brayshaw and Associates (1984) carried out an investigation of a proposed 60ha blue metal (andesite) quarry and plant and associated 800m haul road some 16km west of Marulan. The topography of the area was essentially gently undulating upland plains, with local relief varying from 630 to 720m AHD. No Aboriginal relics were located in the course of the survey, and this was attributed to 'the absence of a significant water course which could have provided a focus of occupation' (pp 8).

Haglund (1986) carried out a survey of particular areas within the Bungonia State Recreation Area. The S.R.A. is located approximately 10km south of Marulan. Fifteen sites were located in the course of this survey. Lithic material in these sites was typical of other Southern Tableland sites, i.e. silcrete, quartz and indurated mudstone.

Navin (1990) surveyed a 100 ha proposed hard rock quarry site and its surrounding environs located 2.5 km southwest of Marulan township. The area was located west of the Hume Highway.

Two sites (artefact scatters), and three isolated finds were located in the course of the survey. The sites were located on the lower slopes of a low spur line knoll and within 20m of a shallow drainage channel (MQ1) and on a low spur line (MQ2). Raw materials utilised include alluvial pebbles, quartz, chert/chalcedony and volcanics.

Officer and Navin (1996) surveyed approximately 22ha of undulating low gradient landscape comprising broad ridges and slopes, saddles and low spurs located adjacent to the Hume Highway about 3km south of Marulan. Three Aboriginal sites and three isolated finds were located in the course of the survey of the area. The sites comprised low density artefact scatters which were assessed as having low archaeological significance.

Sefton (1996) conducted a survey 2.5 km southwest of Marulan and east of the Hume Highway. Sefton located five artefact scatters and three isolated finds.

Navin (2002) surveyed 40 ha to the southwest of Marulan for utilisation as a Quarry Services Depot. Three open artefacts scatters and four isolated artefacts were identified during the survey. The sites were located on low spur lines, knolls or creek margins. Raw materials present consisted on chert, quartz and a range of silcretes. The sites comprised low density artefact scatters which were assessed as having low archaeological significance.

No previously recorded Aboriginal sites occur within the study area.

5.6 Site Type Predictions

Based upon analysis of information extracted from the DEC AHIMS, the local and regional archaeological and environmental contexts expressed above, the types of sites which could be expected to occur within the study area are outlined below.

Open Artefact Scatters or isolated finds of durable material of flaked or ground stone that have been discarded across the site may be in evidence. The potential for *manuports* to be present within the study area also needs to be considered. These items consist of raw materials of stone that generally do not naturally occur within the soil profiles of a given site or region and by inference are proposed to have been brought onto the site by Aboriginal people from sources elsewhere. These items are subsequently discarded before they have been utilised as flaked or ground stone tools.

Quarry (extraction) Sites are typically exposures of a geological raw material where evidence for human extraction and or preliminary processing has survived. Typically these involve the extraction of siliceous rock types for the manufacture of artefacts or the removal of ochre. McIntyre (1989) identified a quarry site 200 m south of the present study area, situated on the eastern bank of Towrang Creek.

Grinding Grooves are abrasions in the surface of rocks from the repeated use of the rock surface for sharpening implements consisting generally of stone but also bone and shell. Grinding grooves are generally situated near a water source and may consist of a single groove or a number of grooves on a sandstone slab. This site type is usually found in open contexts but has also been known to occur within rock shelters.

There were small outcrops of sandstone situated along Towrang Creek. These outcrops were boulderous rather than flat in nature and are not of a type consistent with grinding groove sites.

Scarred Trees are the result of the removal of bark and/or wood for the purpose of manufacturing shelters, canoes and shields and/or for designs carved into wood for a range of aesthetic, functional and ceremonial reasons which are currently not fully understood. Evidence for tree scarification is more likely to be observed on large and mature trees (depending upon the species). Unless the tree is at least 100 years old, scarring is unlikely to be of Aboriginal origin.

There existed a small number of mature trees on the northern side of the highway. These were all examined thoroughly and no evidence of scarring in any form was identified. The potential for scarred trees to be present over the remainder of the study area is considered to be low as a result of past clearing to facilitate farming over the study area.

Carved Trees are a much rarer site type than scarred trees, and are sometimes found in association with ceremonial and burial grounds. They characteristically include figurative and non-figurative motifs on the exposed wood created within a scar produced by bark removal.

Etheridge (1918) recorded a number of carved trees which had been located in the Goulburn district. One such tree was located on the site of the now abandoned Yarra Railway Station, approximately 6 km southeast of Goulburn. Two others were located at Mount Wayo, 16 km north of Goulburn and located near and Aboriginal grave (Koettig and Lance 1986:20). Mitchell (1828) recorded the presence of carved trees in the vicinity of Mount Marulan some five kilometres to the south east of the present study area.

Burials can take numbers of varying forms depending upon the customs of the indigenous inhabitants of the area. Common methods of burial practice used within Australia include, inhumation, cremation, desiccation and exposure. The entire burial process may involve a combination of the above procedures. This type of site is generally not located by field survey.

Historical records for the Goulburn area indicate that the preferred burial method utilised for the area involved 'placement in hollow tress, interment (sic) in soft soils or sand with a mound over the grave, or burial in rocky ground on hill tops' (Koettig and Lance 1986:20). Macalister (1907:84) makes reference to the practice of utilising an ant mound for a burial in 1849 along the Abercrombie River.

The terrain and sedimentary context of the study area are indicative of areas where burials do not occur. To the north nearer to the margins of the Wollondilly River is allocation more suitable for burials to occur.

Stone Arrangements are defined as any arrangement of placed rocks that can reasonably be assigned to Aboriginal activity. Typically these include rock cairns and alignments of single or grouped stones.

Bora Grounds (Earthen Circles) functioned as a prepared stage for initiation and other ceremonial activities believed to have held a key role in the teaching and maintenance of the complex social and religious framework within Aboriginal society. Bora grounds consist mostly of one or more circular rings defined by mounded earth, sand and/or rocks. There may also be an associated depression within the ring. A pathway generally connected two rings and was many hundreds of metres long. Typically one circle was associated with more public ceremonies and the second with restricted and sacred information.

Several bora ground are known to have existed within the region surrounding Goulburn. (Macalister (1907:85) notes that a bora ground site was located on a small hill near the present location of the Kenmore Hospital. Others are known to

have been located at Eastgrove and in the vicinity of the Goulburn Railway Station (Koettig and Lance (1986:20).

The physical characteristics of a Bora ground are fragile and quite easily disturbed beyond recognition by minimal agricultural and pastoral practises.

Rock Shelter Sites are rock overhangs, which have artefacts on the surface of the deposit or within the deposit itself. Other forms of archaeological evidence commonly found within shelter sites are occupation deposit (i.e. stone artefacts, bone, shell, charcoal and artwork. The topographic context is such that rock shelter sites are not anticipated to be situated within the study area.

Of the site types outlined above, only open artefact scatters and isolated finds have been recorded as occurring in the locality of the study area. It is considered that these site types are the most likely to occur or to have survived within the study area. This assessment is based on the level of agricultural and historic disturbance which has occurred in the area and local site location parameters.

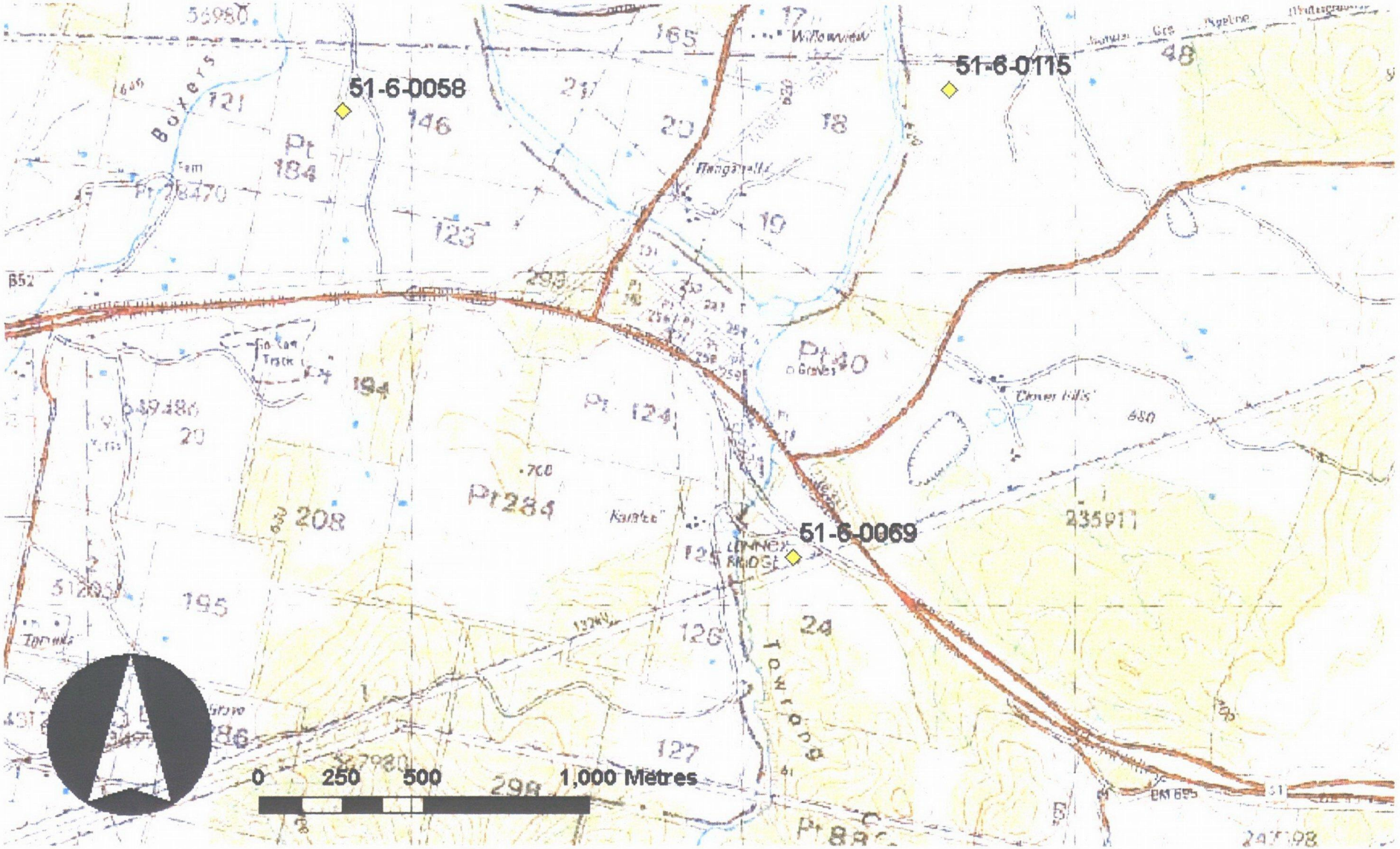


Figure 4: Previously Recorded Aboriginal Sites Plotted onto Towrang 1:25,000 Topographic Maps 2nd Edition (AHIMS Search Results)

6 SURVEY RESULTS

6.1 Survey Coverage and Visibility Variables

The effectiveness of an archaeological field survey is heavily reliant upon the obtrusiveness of the Aboriginal site being looked for and the incidence and quality of ground surface exposure. Visibility variables have been estimated for all areas where a comprehensive survey was carried out in the study area. This data provides a measurement with which to gauge and compare the effectiveness of the survey and the level of sampling conducted. They may also be utilised to determine the numbers and types of sites that may not have been identified by the survey.

Ground surface visibility is a measure of the bare ground visible to the archaeologist during the field survey. There are two variables used to assess ground surface visibility.

i. The frequency of exposures encountered by the archaeologist; and,

ii. The quality of visibility within those exposures.

The major factors affecting the quality of ground surface visibility within an area of exposure are the extent of vegetation and ground litter, the depth and origin of the exposure, the extent of recent sedimentary deposition and the level of visual interference from surface gravels. Two variables of ground surface visibility were estimated during the survey. These being:

i. A percentage estimate of the total area of ground inspected which contained useable exposures of bare ground;

ii. A percentage estimate of the average levels of ground surface visibility within those exposures. This is a net estimate and accounts for all visual and physical variables that have affected the visibility including the archaeological potential of any sediment or rock exposed.

Various Aboriginal site types exhibit different levels of prominence within the landscape. This is an important factor to consider when assessing the impact on visibility levels. Sites present upon or within rock exposures, such as grinding grooves, engravings and rock shelters, are more likely to be encountered than sites which are located on or within sedimentary contexts with little or no ground surface relief.

If you compare the obtrusive nature of a shelter site against the unobtrusive nature of a rock platform, the shelter sites will be located and inspected on 10 out of 10 occasions. Rock platforms on the other hand have their gross visual presence affected by factors such as obscuring ground litter, flood debris and sedimentation. Whilst these visibility factors may not affect the gross visual presence of the shelter

site, they can impinge upon the finer visual presence within the rock shelter and inhibit the ability of the recorder to locate stone artefacts etc.

Another factor affecting visibility is the presence of small rocks, pebbles and gravels in the exposure. If these particular raw materials are also suitable for stone artefact manufacture it may make stone artefact identification more onerous and difficult.

Due consideration should also be given to the natural occurrence of sandstone platforms suitable for grinding grooves or engravings in addition to the presence of remnant established trees. Both of these are central in identifying survey effectiveness and site patterning.

Table 1 provides a summary of the extent to which discrete landforms within the study area were examined and also includes the exposure incidence and average ground visibility present within each landform. A total of 89% of the ground surface area of the study area was inspected during the field survey, with 36% being considered useable archaeological exposure. The approximate location of each survey transect (A, B, C, D, E, F, G, H and I) achieved over the study area is shown in Figure 5 (below).

In view of the survey coverage, archaeologically useable exposures and visibility variables. The effective survey coverage (ESC) was 36.167%.

Figure 5: Indication of Transects surveyed during the field survey (Towrang 1:25,000 topographic map 2nd Edition)

Survey Unit	Landform	Survey Mode	Main Exposure Types	Unit Area (ha)	Percentage of Unit Surveyed	Exposure Incidence %	Average Exposure Visibility %	Net Effective Exposure (ha)	Effective Survey Coverage of Survey Unit %	Archaeologists Recordings
A	Spurline	Pedestrian	Tarmac, Graded	1.25	100%	30%	65%	0.24	19.500%	Nil
B	Spurline	Pedestrian	Bare patches under tree canopy, erosion	0.6	100%	45%	70%	0.19	31.500%	TC1-1
C	Creekflat	Pedestrian	Patches between	0.8	100%	45%	70%	0.25	31.500%	TC1-2
D	Creekflat, Confluence	Pedestrian	Erosion Scalds, patches between	0.825	100%	60%	70%	0.35	42.000%	TC1-4
E	Creek Flat	Pedestrian	Graded surfaces, erosion scalds	1.25	100%	75%	70%	0.66	52.500%	TC1-5
F	Lowerslope, Cutting	Pedestrian	Graded surfaces, erosion scalds,	1.65	100%	80%	80%	1.06	64.000%	Nil
G	Creek Flat	Pedestrian	Road verge	0.625	100%	65%	65%	0.26	42.250%	TCPAD1
H	Creek Flat	Pedestrian	Road verge	0.625	100%	65%	65%	0.26	42.250%	Nil
I	Creekflat, Confluence	Not Inspected	Pasture	0.45	0%	0%	0%	0.00	0.000%	TCPAD1
				8.075	**89%**	**51%**	**36%**	**3.27**	**36.167%**	

Table 1: Survey Coverage Data

6.2 Aboriginal Sites

The survey was successful in identifying a number of Aboriginal sites and evidence for Aboriginal cultural heritage within the study area. The newly identified Aboriginal sites are all open artefact scatters and may represent one site with a number of discrete areas of increased artefact density. The DEC site cards for each site are included in Appendix 3.

The five sites identified exist in varying but adjacent landform units. These changing landform units were chosen as the basis for establishing the boundaries of each discrete site area.

The potential for Aboriginal sites and/or relics to occur in the area to the south of Deep Creek is assessed to be high.

Site Name	Site Type	Environment	Dimensions	Contents	Condition
TC1-1	Open Artefact Scatter	Basal Slope, Spur line	60 x 50 m	Stone Artefacts	Low disturbance - pastoral
TC1-2	Open Artefact Scatter	Creek flat	60 x 40 m	Stone Artefacts	Low disturbance - pastoral
TC1-3	Open Artefact Scatter	Creek flat at confluence	40 x 40 m	Stone Artefacts	Relatively undisturbed
TC1-4	Open Artefact Scatter	Creek flat at confluence	15 x 10 m	Stone Artefacts	Relatively undisturbed
TC1-5	Open Artefact Scatter	Basal Slope	40 x 60 m	Stone Artefacts	Heavily disturbed, road verge.
TCPAD1	Potential Archaeological Deposit	Creek flat at confluence	80 X50 m	Unknown	Low Disturbance - Pastoral

Table 2: Overview of Aboriginal Sites and PAD located during present survey

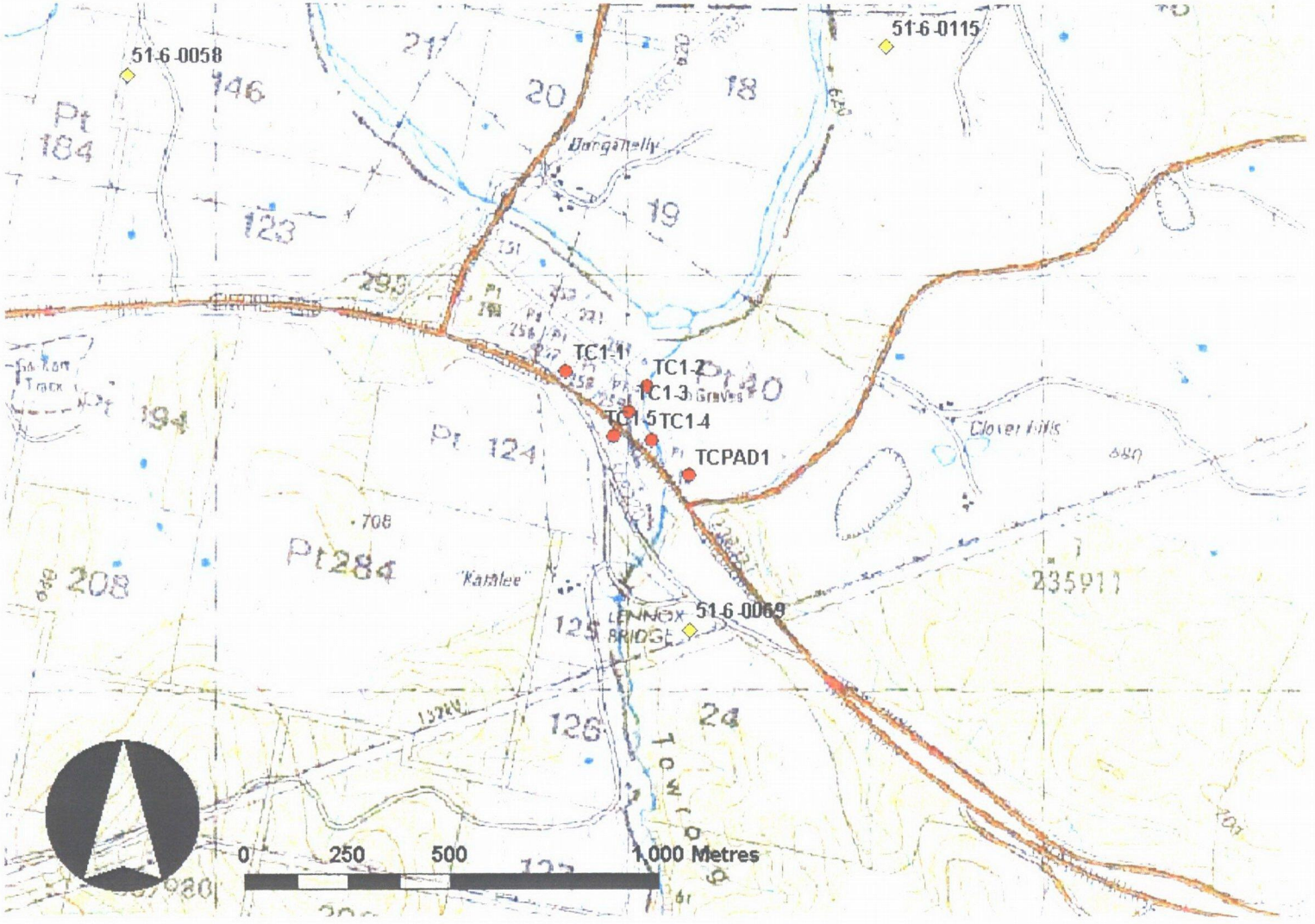


Figure 6: Locations of Aboriginal Sites identified during present study

I. Towrang Creek 1 Locale 1 (TC1-1)

AMG GRID Reference 55 758851 E 6152770 N

This site is an open artefact scatter situated to the north of the Hume Highway in an elevated position above the Wollondilly River to the north and Towrang Creek to the east. The site consists of a number of identifiable stone artefacts situated within bare patches of ground under some Ironbark trees and some small erosion scalds to the east. Eleven stone artefacts were recorded at the site. There is moderate potential for archaeological deposit to be present however the soil profile is anticipated to be shallow in this location.

Raw Material & Artefact Type	Dimensions (mm)	Features
Red Silcrete Flake	13 x 13 x 3	Focal Platform, 4 Dorsal Scars
Red-Grey Silcrete Flake	24 x 22 x 4	Evidence of Platform Preparation, Dorsal surface consists of 100% reef cortex, Left Hand Ventral Margin is broken
Grey-Pink Silcrete Flake	6 x 10 x 3	3 Dorsal Scars
Dark Grey Silcrete Flaked Piece	12 x 13 x 2	
Light grey Silcrete Broken Flake	10 x 8 x 4	Proximal portion, 4 Dorsal scars
White Silcrete Core/Flake		Single Platform, 3 negative flake scars
White Silcrete Broken Flake	19 x 9 x 4	Longitudinal snap, Right hand dorsal portion
Light Brown Fine Grain Siliceous (FGS) Broken Flake	10 x 7 x 3	Distal portion
Red White Mottled Silcrete Broken Flake	14 x 14 x 4	Proximal portion, 3 dorsal scars, focal platform
White Silcrete Core	28 x 10 x 7	Rotated Core, Bipolar, 90% Cortex
White Silcrete with Inclusions Broken Flake	7 x 9 x 5	Proximal end

II. Towrang Creek 1 Local 2(TC1-2)

AMG GRID Reference 55 759045 E 6152734 N

This site is an open artefact scatter is situated immediately upon the western bank of Towrang Creek. The site consists of seven identifiable stone artefacts. The depth of soil exhibited in an eroding profile in Towrang Creek suggest that there is moderate-high potential for archaeological deposit at this location.

Sampled stone artefacts include:

Raw Material & Artefact Type	Dimensions (mm)	Features
Red Silcrete Broken Flake	29 x 12 x 11	Longitudinal, Left hand dorsal
Banded Orange White Silcrete Flake	25 x 15 x 4	Focal platform, 2 Dorsal scars, edge damage to both margins
Grey Silcrete Flake	22 x 17 x 4	Hinge Termination
Grey Silcrete Flake	35 x 26 x 7	6 flake scars to dorsal surface, use wear to margins
Pink/Orange Silcrete Core	23 x 28 x 18	3 Platforms, 5 complete negative flake scars
Quartz Broken Flake	35 x 15 x 9	Longitudinal snap, Left hand dorsal
Quartz Flake	25 x 24 x 11	

III. Towrang Creek 1 Locale 3 (TC1-3)

AMG GRID Reference 55 759004 E 6152673 N

This site is an open artefact scatter situated to the north of the Hume Highway in an elevated position above the main channel of Towrang Creek and a small tributary of Towrang Creek. The site consists of seven identifiable stone artefacts, but has the potential for further surface artefacts. Depth of deposit is considered to be comparable to TC1-2. Hence the potential for archaeological deposit is considered to be moderate to high.

Sampled stone artefacts include:

Raw Material & Artefact Type	Dimensions (mm)	Features
Red Silcrete Flake	21 x 16 x 9	70% Cortex to dorsal surface
Quartzite Flake	15 x 14 x 5	
Quartzite Flake	26 x 19 x 7	Edge damage to left hand dorsal margin
Mottled Silcrete Core		2 platforms, 8 negative flake scars
White Silcrete Blade Core	35 x 15 x 17	1 Platform, 2 complete negative flake scars
White Silcrete Flake	24 x 14 x 12	
White Silcrete Quartz Flake	32 x 25 x 8	

IV. Towrang Creek 1 Locale 4 (TC1-4)

AMG GRID Reference 55 759058 E 6152604 N

This site is an open artefact scatter situated on a small terrace above Towrang Creek to the north of the Hume Highway, approximately 50 m east of TC1-3. The site consists of a single flake of white chalcedony. Depth of deposit is considered to be comparable to TC1-2 and TC1-3. Hence the potential for archaeological deposit is considered to be moderate to high.

Sampled stone artefacts include:

Raw Material & Artefact Type	Dimensions (mm)	Features
White Chalcedony Flake		Struck from a rotated core, retouch back to bulb

V. Towrang Creek 1 Locale 5 (TC1-5)

AMG GRID Reference 55 758966 E 6152612 N

This site is an open artefact scatter situated to the south of the Hume Highway in an elevated position above the Towrang Creek to the east. The access road to the Derrick VC Rest Area is immediately west of the site location. The site was impacted whilst unidentified by recently completed reconfiguration to the rest area access road. Six identifiable stone artefacts were recognised at the current location. There is a limited potential for the location to possess intact or relatively undisturbed archaeological deposit.

Raw Material & Artefact Type	Dimensions (mm)	Features
Grey Pink Silcrete Flake	22 x 22 x 6	Edge damage distal margin
Grey Silcrete with Inclusions Flake	33 x 39 x 11	
Pink/White Mottled Silcrete Flake	28 x 24 x 11	
Quartz Blade	29 x 16 x 9	
Quartz Flake	20 x 19 x 12	Bi-polar
Grey Silcrete Flake Core	24 x 24 x 14	1 platform, 1 negative flake scar

VI. Towrang Creek Potential Archaeological Deposit 1 (TCPAD1)

AMG GRID Reference 759148 E 6152518 N

The area of this PAD is defined by Deep Creek to the north, Towrang Creek to the west, Carrick Road to the East and the Hume Highway to the south. This area was not able to be adequately assessed during the present survey and has identical landscape and topological features as three sites identified during the current study. The area is assessed as being relatively undisturbed and has moderate to high potential to possess intact or relatively undisturbed archaeological deposit.

The consultant is satisfied that implementation of the recommendations made in section 9 would ensure that the Aboriginal archaeological resource (TC1-1, TC1-2, TC1-3, TC1-4, TC1-5 & TCPAD1) and the potential resource would not be adversely affected without due consideration.

6.3 Landscape Sensitivity Assessment

The archaeological sensitivity of the study area is assessed to be moderate to high. The local terrain generally exhibits characteristics of tableland and river flat topography. There is a permanent water source immediately to the north of the study area and an ephemeral water source within the study area.

The study area exhibits a range of soil types from shallow thin soils on the basal slopes to deep alluvial soils on the creek and river flats. Some portions of the study area, particularly those to the south of the Hume Highway have had the topsoil displaced completely. In comparison, those portions to the north of the Hume Highway are relatively undisturbed. Evidence is present over this portion of study area for a small degree of soil disturbance from vegetation clearing and pastoral utilisation. The potential for undisturbed cultural material to occur within local deposits is therefore considered to be moderate to high.

No sandstone outcrops exhibiting the essential characteristics for other Aboriginal site types, such as habitable rock shelters, grinding grooves or rock engravings were identified in the study area.

7 STATUTORY INFORMATION

7.1 Indigenous Heritage Statutory Controls

I. National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (as amended) affords automatic statutory protection to 'Aboriginal objects' where;

> *it is an offence to knowingly destroy, deface or damage, or knowingly cause or permit the destruction or defacement of or damage to, an Aboriginal object or Aboriginal place, without first obtaining the consent of the Director-General of the National Parks and Wildlife Service*

The Act defines an 'Aboriginal Object' as:

> *any deposit, object or material evidence (not being a handicraft made for sale) relating to Aboriginal habitation of the area that comprises New South Wales, being habitation before and concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.*

The Act defines an 'Aboriginal Place' as:

> *any place declared to be an Aboriginal place under section 84 of the Act.*

The *Aboriginal and Torres Strait Islander Heritage Protection Amendment Act* of 1987 is a federal act administered by the Aboriginal and Torres Strait Islander Commission, and provides blanket protection for Aboriginal heritage in circumstances where such protection is not available at a state level. This Act comes under Commonwealth jurisdiction, which means that it can override state and territory provisions (Pearson & Sullivan 1999: 52-53).

II. DEC Interim Community Consultation Guidelines

This project was commissioned and the field work and community liaison commenced during December 2004. This project is therefore eligible to be assessed under the transitional phase of the DEC Interim Guidelines for Community Consultation.

Were a proponent is eligible for transitional phase assessment but may have concerns that any DEC approval subsequently granted may be at risk of legal challenge, the proponent may elect to recommence the project and re-lodge their application in accordance with the provisions of the Interim Guidelines.

III. Environmental Planing and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* provides planning controls and requirements for environmental impact assessments. Preparation of an environmental impact assessment is part of the first stage in determining whether a development is granted approval or consent.

8 PRINCIPAL FINDINGS AND CONCLUSIONS

On the basis of the documentation compiled within this report the following conclusions have been drawn. The consultant is satisfied that the provided recommendations made below will ensure that the Aboriginal archaeological resource and the potential resource will not be adversely affected without prior consideration.

There are a number of identified areas of Aboriginal Heritage Sensitivity or Archaeological Potential within the study area.

The intersection improvements proposed to be undertaken by the RTA will result in extreme levels of disturbance to three Aboriginal sites (TC1-1, TC1-3 & TC1-4) and one area of PAD (TCPAD1). The proposed impacts will require a *s.90* Heritage Impact Permit prior to the commencement of earthworks in the vicinity of each site.

The Aboriginal site of TC1-2 is not located in any zone of impact for the current proposal and will remain unaffected by the current proposal.

TC1-5 has been previously impacted by earthworks associated with roadway construction and maintenance. The location of the site is not in an identified impact zone it should however be cordoned off to prevent any inadvertent impact during the construction phase of the proposal.

8.1 Assessment of Archaeological Potential

The following assessment of archaeological potential is made on the basis of landform context, assessed depositional context and the pattering of known Aboriginal sites in the surrounding region.

The study area is assessed to have medium to high potential for unidentified Aboriginal sites to be present in those areas identified as PAD.

9 RECOMMENDATIONS

All permits *(s.87 & s.90)* sought under Part 6 of the *National Parks and Wildlife Act 1974 (as amended)* will require the proponent to engage in further consultation with the Indigenous community. Please refer to the *Interim Community Consultation Requirements for Applicants* issued by the Department of Environment and Conservation for the correct methods and procedures required to be undertaken to comply with these guidelines.

The following recommendations are based on:

1. The legal requirements of the *National Parks and Wildlife Act 1974* whereby it is illegal to damage, deface or destroy an Aboriginal relic without first obtaining the written consent of the Director General of National Parks & Wildlife Service; and

2. The findings of the heritage study presented in this report.

It is recommended that:

- A *s.87 Preliminary Research Permit* be sought for the area of TCPAD1. To identify the presence of Aboriginal relics and their extent and significance to the local Aboriginal community.

- A *s.90 Heritage Impact Permit* (Partial Consent with Salvage) be sought for those portions of TC1-1, TC1-3, TC1-4 and TCPAD1 that are to be impacted by the proposal in its current form.

- A qualified surveyor be engaged to identify and flag the new road easement boundary to the north of the Hume Highway. Areas to the north of this identified perimeter are Aboriginal sites or PAD, access to these areas is to be restricted.

- The immediate area of TC1-5 along with a 50 m buffer zone or curtilage to avoid the associated PAD should be cordoned off to prevent inadvertent impact whilst the proposed works are carried out. A suitably qualified cultural heritage consultant and indigenous representative familiar with the site should supervise the installation of this barrier.

In addition it is recommended that:

- Construction materials are to be stockpiled only in the identified stockpile location, no other areas within the study area are to be utilised for this purpose without further prior investigation by a suitably qualified cultural heritage consultant and indigenous community representative.

- All contractors completing works associated with the construction of the proposed project should complete a Cultural Heritage component as part of a site induction program. A representative of the PLALC should be invited to attend and speak at the induction. The induction program should at a minimum include topics on

heritage legislation (site protection and penalties), restricted areas within the study area, basics of Aboriginal site identification and cultural awareness.

- Should Aboriginal relics be found during the proposed works in those areas not previously sanctioned by a *s.90 Heritage Impact Permit*, work must stop and the DEC contacted to inspect the artefacts.

- Should the location(s) of the proposed impact(s) be modified to include areas beyond the existing study area, a cultural heritage consultant must be commissioned to survey the new impact area(s).

- Otherwise there are no archaeological constraints on the proposed development with regard to Aboriginal archaeological sites.

9.1 Distribution of Report

- One Copy of this report be forwarded to the:

  The Sites Officer
  Pejar Local Aboriginal Land Council
  PO Box 289
  Goulburn, NSW 2250

- Three Copies of this report be forwarded to the:

  The Manager
  Southern Aboriginal Heritage Unit
  Department of Conservation
  PO Box 2115
  Queanbeyan, NSW 2620

9.2 Independent Review of Reports

This archaeological assessment and the management recommendations contained herein will be independently reviewed by the Cultural Heritage Services Division of the NSW Department of Environment and Conservation (DEC) and the relevant Aboriginal community.

The DEC and the Aboriginal community will make consideration of the findings of the consultants report and the recommendations in relation to the management heritage places. Formal approval for all actions outlined should be sought from the relevant authority prior to the completion of any works. At no time should automatic approval of the management recommendations stated above be assumed.

10 REFERENCES

Australian Bureau of Meteorology

Attenbrow, V. (1976). Aboriginal Subsistence Economy on the Far South Coast of NSW. Unpublished B.A. Hons. Thesis. University of Sydney.

Bowdler, S. 1970. Bass Point. The excavation of a south-east Australian shell midden, showing cultural and economic change. Unpublished B.A. (Hons) Thesis. Sydney University.

Branagan, D. F. & Packham, G. H. 2000. Filed Geology of New South Wales. Department of Mineral Resources New south Wales. Sydney.

Brayshaw, H. 1984. Archaeological Investigation near Goulburn. Brayshaw and Associates.

Collins, D. (1798-1802). An account of the English colony of New South Wales: with remarks on the dispositions, customs, manners etc of the native inhabitants of that country ... 2 vols. Cadell and Davies, London.

Eades, D. 1976. The Dharawal and Dhurga Languages of the New South Wales south Coast. AIAS. Canberra.

Ethridge, R. 1918. The dendroglyphs or carved trees of New South Wales. Memoirs of the Geological Survey of NEW, Ethnological Series No 3.

Flood, J. (1980). The Moth Hunters. AIAS, Canberra.

Geoscience Australia. 2003. NATMAP Raster Mosaic.

Haglund, L. (1986). Archaeological survey of Areas within Bungonia State Recreation Area Likely to Be Affected by Present and Future Recreational Activities and Associated Development. Report to Bungonia State Recreation Area Trust.

Hird, C. 1991. Soil Landscapes of the Goulburn 1:250,000 Sheet, Soil Conservation service of NSW, Sydney

Koettig, M and A. Lance. 1986. Aboriginal Resources Planning study for the City of Goulburn, NSW. Draft Report by Anutech to Goulburn City council.

Kohen, J.L. et al. 1984. Shaws Creek KII rock shelter: A prehistoric occupation site in the Blue Mountains piedmont, eastern New South Wales. Archaeology in Oceania. 19:57-93.

Kohen, J.L. 1986. Prehistoric settlement in the western Cumberland Plain: Resources, environment and technology. Unpublished PhD thesis. Macquarie University.

Lampert, R.J. 1971. Burril Lake and Currarong. Terra Australis 1. Department of Prehistory. RSPacStuds. ANU. Canberra.

Lampert, R. 1971. Burril Lake and Currarong. Coastal Sites in Southern NSW. Archaeology and Physical Anthropology in Oceania 9: 226-235

Lampert, R. J. 1971. Coastal Aborigines of South Eastern Australia. School of Geography. University of NSW.

Lloyd, H. (1999). Reids Flat On the Banks of the Lachlan John and David Lloyd Sydney.

Macalister, C. 1907. Old Pioneering Days in the Sunny South. Goulburn.

Mathews, R. H.1902. The Thoorga language. Transactions of the Royal Geographical Society of Australasia and Queensland.

Mathews, R. H.1904. The Wiradjuri and other languages of New South Wales. Journal of the Royal Anthropological Institute. 34: 294-305.

Mathews, R. H.1908. Vocabulary of the Ngarrugu tribe, New South Wales. Journal of the Royal Society of New South Wales. 42: 335-40.

McCarthy, F.D. 1948. The Lapstone Creek excavation: Two culture periods revealed in eastern NSW. Records of the Australian Museum. 22:1-34.

McDonald, J.J. 1992. The Archaeology of Angophora Reserve Rock Shelter. Environmental Heritage Monograph Series No 1. NPWS.

McDonald, J. and E. Rich. 1993. Archaeological Investigations for Rouse Hill Infrastructure Project [Stage 1] Works along Caddies, Smalls and Second Ponds Creek, Rouse Hill and Parklea, NSW. Final Report on Test Excavation Program. Volumes I and II. Report to the Rouse Hill Joint Venture.

McIntyre, S. 1989.

Megaw, J.V.S. 1965. Excavations at the Royal National Park, NSW. A first series of radiocarbon dates from the Sydney district. Oceania. 35[3]:202-207.

Mitchell, T. 1828-1830. Field Book M. L. C 42.

Nanson, G.C. et al. 1987. Chronology and paleoenvironment of the Cranebrook Terrace (near Sydney) containing artefacts more than 40,000 years old. Archaeology in Oceania. 22[2]:72-78.

Navin, K. (1990). Archaeological Survey of a Proposed Quarry Site near Marulan, NSW. Unpublished report to Quarry Technology Pty Ltd and NPWS.

Navin, K. 2002. Proposed Quarry Services Depot, Southwest of Marulan, NSW. Report to International Environmental Consultants.

New South Wales National Parks and Wildlife Service. 1997. Aboriginal cultural heritage standards and guidelines kit.

Officer, K. and K, Navin. 1990. Archaeological Survey for a Proposed Motel/ Conference Centre Development, South Marulan, NSW. Report to Perram and Partners.

Pearson, M & S. Sullivan 1999 Looking After Heritage Places, Melbourne University Press.

Radcliffe-Brown, A. R. 1930. Former Numbers and Distribution of Australian Aborigines. In Official Yearbook of the Commonwealth of Australia, No 23:687-96. Melbourne, Government Printer.

Read, P. (1988). A Hundred Years War. ANU Press. Canberra.

Stockton, E.D. & W.N. Holland. 1974. Cultural sites and their environment in the Blue Mountains. Archaeology and Physical Anthropology in Oceania. 9:36-64.

Throsby-Smith, C. (1820). Extract from a journal by C. Throsby-Smith, Dec. 1820. Throsby Papers, Mitchell Library, Sydney.

Tindale, N. 1974. Tribal Boundaries in Aboriginal Australia. Aust. Institute of Aboriginal Studies. Four Map series 1:2,500,000.

Wild, J. (1820). Letters to Charles Throsby. ms(A11941) Throsby Papers, Mitchell Library, Sydney.

Witter, D. (1980). 'Draft Research Design and Interim Report on the Development of a Predictive Approach to the Distribution of Archaeological Sites in Australia'. NPWS.

Wyatt, R. 1941. The History of Goulburn. The Municipality of Goulburn: Goulburn.

Wright, R.V.S. (ed.). 1977. Stone Tools as Cultural Markers: Change, Evolution and Complexity. Prehistory and Material Culture Series No. 12. AIAS. Canberra.

11 PLATES

Plate 1: View East along Transect A of proposed stockpile location

Plate 2: View east along end portion of Transect A of proposed stockpile location

Plate 3: Artefacts Recorded at TC1-1

Plate 4: View north along Transect B from TC1-1. Note the Wollondilly River can be identified by the trees in the background

Plate 5: View to the east from TC1-1

Plate 6: View to North from TC1-1 - Note exposure in foreground and Wollondilly River shown by the line of trees centre shot

Plate 7: View east from northern end of Transect B towards the Wollondilly River

Plate 8: View from northern end of Transect B towards TC1-1 (left Ironbark)

Plate 9: Soil profile of Towrang Creek at TC1-2

Plate 10: View to the north east of TC1-2

Plate 11: View to TC1-1 from the beginning of Transect D

Plate 12: View from the midpoint of Transect D north east. TC1-3 in foreground and TC1-2 in background

Plate 13: Selected artefacts at TC1-3

Plate 14: View to the west of TC1-3 (foreground) and TC1-1 (background)

Plate 15: View to the east along Transect D. TC1-4 at grassed area

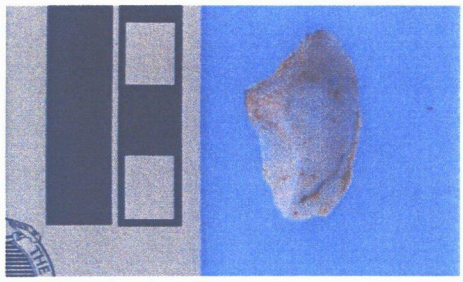


Plate 16: Artefact at TC1-4

Plate 17: View along southern alignment of Hume Hwy, from Towrang Creek to the west.

Plate 18: Selected artefacts from TC1-5

Plate 19: Selected artefacts from TC1-5

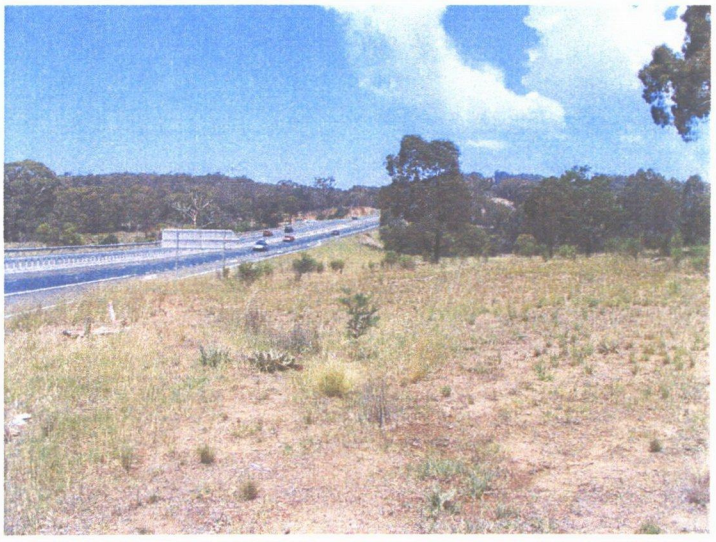


Plate 20: View east from TC1-5 towards Towrang Creek

Plate 21: Previous location of Hume Hwy. Utilised as access road for Derrick VC Rest Area prior to intersection reconfiguration

Plate 22: View west along southern alignment of Hume Hwy. Note the heavy modification and disturbance

Plate 23: View east along southern alignment of Hume Hwy. Note the heavy modification and disturbance

Plate 24: View west along southern alignment of Hume Hwy. Towrang Road intersection at right margin

Plate 25: View north to proposed stockpile location (Transect A) from southern side of Hume Hwy

Plate 26: View west along southern alignment of Hume Hwy from opposite Towrang Road intersection showing existing batter to road verge

Plate 27: Towrang Road from intersection with Hume Hwy

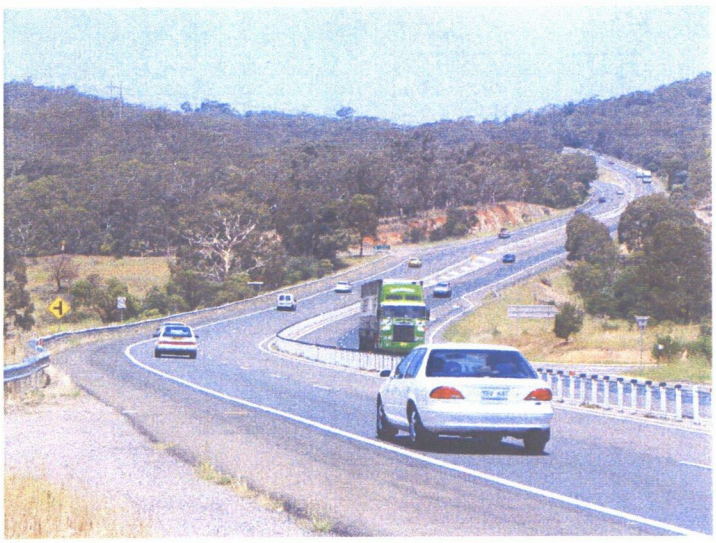


Plate 28: Existing Hwy alignment from the northern end of Transect A

Plate 29: View west along northern alignment of Hume Hwy of east end of Transect A and proposed stockpile location

Plate 30: View of Transect G looking north

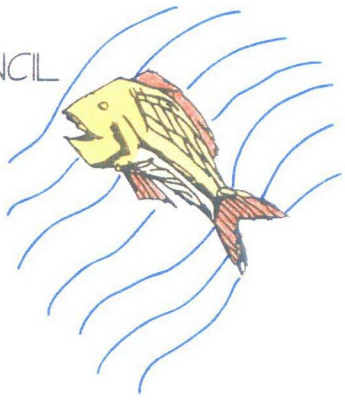
Plate 31: Deep Creek channel from Carrick Road. TCPAD1 is shown at left margin

Plate 32: Western bank of Towrang Creek on southern side of Hwy. Amenities of Derrick VC Rest Area in background

Plate 33: Eastern bank of Towrang Creek on southern side of Hwy.

12 APPENDIX 1: REPORT FROM PEJAR LOCAL ABORIGINAL LAND COUNCIL

PEJAR LOCAL ABORIGINAL LAND COUNCIL
PO Box 289 Goulburn NSW 2580
Phone (02) 4822 3552 • Fax (02) 4822 3551
email address: pejar@goulburn.net.au
ABN: 72 662 632 151



RECORD OF SITE INSPECTON AND/OR ASSESSMENT

Aboriginal Protocol Policy

Pejar LALC Representative: Justin Boney

Owner/Developer/Council or other Representative: Lance Syme

Date	30 March 2004	**Comments**
DA Number		Survey conducted in January/February 2004
Lot Number		
DP Number		
REF Number		
Other	Hume Highway – Towrang and Carrick Rds	

Has a Site Assessment been carried out by Pejar LALC? **Yes** No

Aboriginal Heritage Identified during Pejar LALC inspection **Yes** No didn't inspect

Comments: Recommendations following.

Archaeological Assessment Required: Yes No

Existing Archaeological Report: (Kayandel Archaeological Services **Yes** No Unsure

Aboriginal Protocol Condition to be applied to DA: **Yes** No

Condition:
That a Pejar LALC representative is on site before and during any work, at least 7 days notice in writing will be required and a fee will be charged to the developer/owner or their representative of $100 per hour plus GST.

Authorised Pejar LALC Representative Signature: Delsie Fearman

Recommendations:

In reference to the above proposal the Pejar LALC recommend that the Aboriginal Objects that were identified be avoided from impact if possible.

If there is no way to avoid impact, then a section 90 with consent to salvage be obtained.

The Pejar LALC to obtain care and Control of the objects collected, if and when they are salvaged.

13 APPENDIX 2: NATIVE TITLE CLAIM INFORMATION

13.1 Gundungurra Tribal Council Aboriginal Corporation #6

NATIONAL NATIVE
TITLE TRIBUNAL

Claimant Application Summary

Application numbers	Federal Court number: NG6060/98 NNTT number: NC97/7
Application name	Gundungurra Tribal Council Aboriginal Corporation #6
Name of body where application lodged	National Native Title Tribunal
Date application lodged	29/04/1997
irrent stage(s)	Notification Complete, In Mediation
Applicants	Ms Elsie Stockwell, Ms Pamela Stockwell
Address for service	Mr Eduard Neumann Craddock Murray and Neumann Level 2 255 Castlereagh Street SYDNEY NSW 2000 Phone: 02 9283 4755 Fax: 02 9283 4180
Persons claiming to hold native title	The members of the Gundungurra Tribal Council Aboriginal Corporation
Native title rights and interests claimed	1. Subject to (2) - (5) 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: a. A right to possess, occupy, use and enjoy the claim area; b. A right to make decisions about the use and enjoyment of the claim area; c. A right of access to the claimed area; d. A right to control the access of others to the claimed area; e. The right to control the use and enjoyment of others or resources of the claimed area; f. The right to trade in resources of the claimed area; g. The right to receive a portion of any resources taken by others from the claimed area; h. The right to maintain, protect and prevent the misuse of cultural knowledge of the common law holders associated with the claimed area. 2. 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 area set out in (1) are claimed subject to the rights and interests created in the 'non exclusive possession act' which are not inconsistent with the rights and interests claimed, subject to any suspension of the native title rights and interests which those inconsistent rights and interests cause. 3. With respect to those parts of the area the subject of the application which are, or have been, the subject of:

Document Prepared: 21/07/2004 11:52 NC97/7 - 1 -

	a. a category B intermediate period act within the meaning of s232C of the Native Title Act 1993; b. a category C intermediate period act within the meaning of s232D of the Native Title Act 1993; c. a category D intermediate period act within the meaning of s232E of the Native Title Act 1993; the native title rights and interests claimed are those set out in (1) above 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 suspension of the native title rights and interests which those inconsistent rights and interests cause. 4. With respect to those parts of the area of the application which are, or have been, the subject of: a. a category B past act within the meaning of s230 of the Native Title Act 1993; b. a category C past act within the meaning of s231 of the Native Title Act 1993; c. a category D past act within the meaning of s232 of the Native Title Act 1993; the native title rights and interests claimed area those set out in (1) above 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 extend to ownership of any minerals, petroleum or gas which are wholly owned by the Crown. 6. The native title rights and interests identified above do not include a claim for exclusive occupation and use of offshore areas as defined by s253 of the Native Title Act 1993.
Area	**Jurisdiction:** New South Wales **Location:** Land and waters in the area from the Blue Mountains south to Goulburn, following the Lachlan River west to Newbridge and then north to Mt Davidson. **Local government region(s):** Bathurst City Council, Blayney Shire Council, Blue Mountains City Council, Boorowa Shire Council, Camden Council, Campbelltown City Council, Cowra Shire Council, Upper Lachlan Council, Evans Shire Council, Goulburn City Council, Lithgow City Council, Gunning Shire Council, Liverpool City Council, Mulwaree Shire Council, Oberon Council, Penrith City Council, Tallaganda Shire Council, Wingecarribee Shire Council, Wollondilly Shire Council **ATSIC region(s):** Binaal Billa Regional Council, Sydney Regional Council, Queanbeyan 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) Commencing at 150.52997 east longitude and 34.591636 south latitude, approximately 15.5 kilometres east south east of Moss Vale, the application traverses clockwise starting in a south-westerly direction, passing through points 2 to 36,765 of the following geographic coordinates. They are in decimal degrees and referenced to Australian Geodetic Datum 1984 (AGD84). These coordinates are based on the position of spatial reference data sourced by Land Information Centre, Department of Information Management and Technology, New South Wales as of 18 May 1999. (b) Subject to clauses (d) and (e) the area covered by the application excludes any land or waters covered by:

	(i) a scheduled interest; (ii) 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) residential lease; (vi) a community purposes lease; (vii) a lease dissected from a mining lease as referred to in s23B(2)(vii); (viii) any lease (other than a mining lease) that confers a right of exclusive use over particular land or waters; which was validly vested or granted on or before 23 December 1996. (c) Subject to clauses (d) and (e) 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. (d) Where the act specified in (b) and (c) falls within the provisions of (i) s23B(9) - Exclusion of acts benefiting Aboriginal peoples or Torres Strait Islanders; (ii) s23B (9A) - Establishment of a national or state park; (iii) s23B (9B) - Acts where legislation provides for non-extinguishment; (iv) s23B (9C) - Exclusion of Crown to Crown grants; and (v) s23B (10) - Exclusion by regulation, the area covered by the act is not excluded from this application. (e) Where an act referred to in clauses (b) and (c) covers land or waters referred to in: s47 - Pastoral leases held by native title claimants; s47A - Reserves etc covered by claimant applications; and s47B - Vacant crown land covered by claimant applications, the area covered by the act is not excluded from the application. (f) Where an area is covered by a previous non-exclusive possession act (s 23F) the native title claim group does not claim possession, occupation, use and enjoyment to the exclusion of all others. (g) The area covered by the application excludes land where native title has been extinguished at common law. (h) The area covered by the application excludes areas covered by prior Gundungurra claims filed with the National Native Title Tribunal being NC96/7, NC96/27, NC96/30, NC96/36 and 97/4.

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:** 29/04/1997 **Registration test status:** Accepted for registration **Registration history:** Registered from 29/04/1997.
Attachments	1. Plan of Application Area, Attachment A of the Application, 1 page - A4, Attached 29/04/1997.

NNTT contact details	Case manager:	Nicole Maher
	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:	NG6060/98 NC97/7
Application name:	Gundungurra #6	
Registration history:	Registered from 29/04/1997.	

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

Application lodged with:	National Native Title Tribunal
Date application lodged:	29/04/1997
Date claim entered on Register:	29/04/1997
Applicants:	Ms Elsie Stockwell, Ms Pamela Stockwell
Address for service:	Mr Eduard Neumann Craddock Murray and Neumann Level 2 255 Castlereagh Street SYDNEY NSW 2000 Phone: 02 9283 4755 Fax: 02 9283 4180

Area covered by the claim:

(a) Commencing at 150.52997 east longitude and 34.591636 south latitude, approximately 15.5 kilometres east south east of Moss Vale, the application traverses clockwise starting in a south-westerly direction, passing through points 2 to 36,765 of the following geographic coordinates [forming part of Attachment "B" of the application]. They are in decimal degrees and referenced to Australian Geodetic Datum 1984 (AGD84). These coordinates are based on the position of spatial reference data sourced by Land

Information Centre, Department of Information Management and Technology, New South Wales as of 18 May 1999.

(b) Subject to clauses (d) and (e) the area covered by the application excludes any land or waters covered by:

(i) a scheduled interest;
(ii) 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) residential lease;
(vi) a community purposes lease;
(vii) a lease dissected from a mining lease as referred to in s23B(2)(vii);
(viii) any lease (other than a mining lease) that confers a right of exclusive use over particular land or waters;

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

(c) Subject to clauses (d) and (e) 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.

(d) Where the act specified in (b) and (c) falls within the provisions of

(i) s23B(9) - Exclusion of acts benefiting Aboriginal peoples or Torres Strait Islanders;
(ii) s23B (9A) - Establishment of a national or state park;
(iii) s23B (9B) - Acts where legislation provides for non-extinguishment;
(iv) s23B (9C) - Exclusion of Crown to Crown grants; and
(v) s23B (10) - Exclusion by regulation,

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

(e) Where an act referred to in clauses (b) and (c) covers land or waters referred to in:

s47 - Pastoral leases held by native title claimants;
s47A - Reserves etc covered by claimant applications; and
s47B - Vacant crown land covered by claimant applications,

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

(f) Where an area is covered by a previous non-exclusive possession act (s 23F) the native title claim group does not claim possession, occupation, use and enjoyment to the exclusion of all others.

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

(h) The area covered by the application excludes areas covered by prior Gundungurra claims filed with the National Native Title Tribunal being NC96/7, NC96/27, NC96/30, NC96/36 and 97/4.

Persons claiming to hold native title:

The members of the Gundungurra Tribal Council Aboriginal Corporation

Registered native title rights and interests:

The following Native Title Rights & Interests were entered on the Register on 23/06/2000:
1. Subject to (2) - (5) 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:

a. A right to possess, occupy, use and enjoy the claim area;

b. A right to make decisions about the use and enjoyment of the claim area;

c. A right of access to the claimed area;

d. A right to control the access of others to the claimed area;

e. The right to control the use and enjoyment of others of resources of the claimed area.

2. 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 area set out in (1) are claimed 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 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 interests cause.

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

a. a category B intermediate period act within the meaning of s232C of the Native Title Act 1993;

b. a category C intermediate period act within the meaning of s232D of the Native Title Act 1993;

c. a category D intermediate period act within the meaning of s232E of the Native Title Act 1993;

the native title rights and interests claimed are those set out in (1) above 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 suspension of the native title rights and interests which those inconsistent rights and interests cause.

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

a. a category B past act within the meaning of s230 of the Native Title Act 1993;

b. a category C past act within the meaning of s231 of the Native Title Act 1993;

c. a category D past act within the meaning of s232 of the Native Title Act 1993;

the native title rights and interests claimed area those set out in (1) above 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 extend to ownership of any minerals, petroleum or gas which are wholly owned by the Crown.

6. The native title rights and interests identified above do not include a claim for exclusive occupation and use of offshore areas as defined by s253 of the Native Title Act 1993.

Register attachments:

1. Attachment "A" : Map of Application Area, 1 page - A4, Attached 23/06/2000.

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

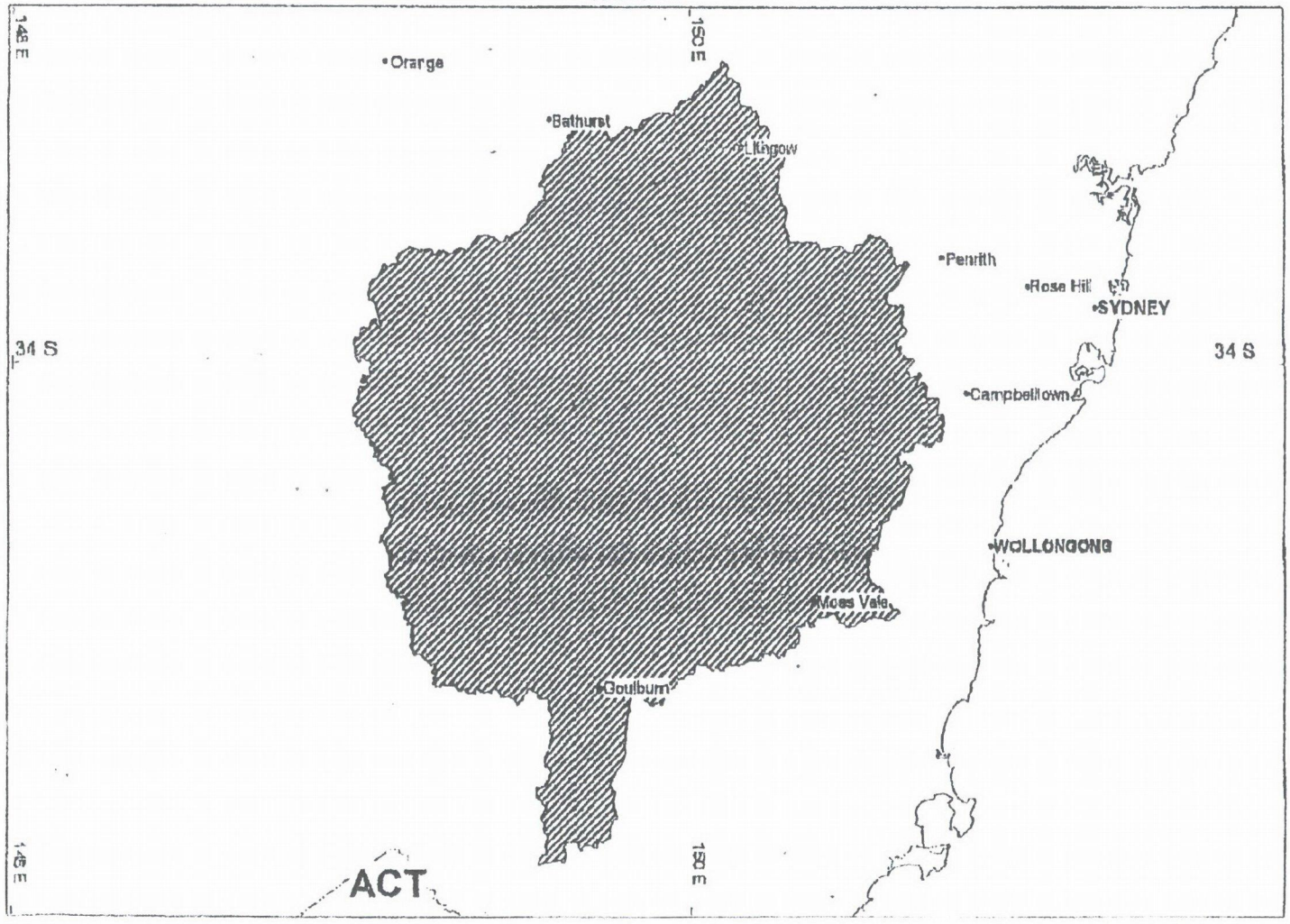
as at 18/05/1999

Map created from data sourced from Land Information Centre, DIM&T, NSW
by Geospatial Information Unit, National Native Title Tribunal

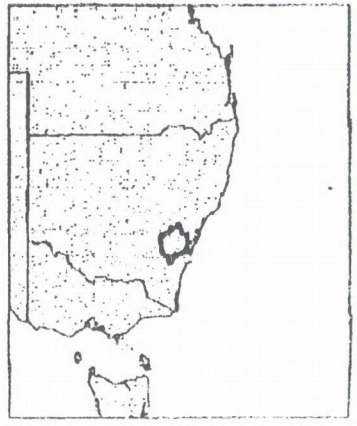
0 60
KILOMETRES
Latitude and Longitude based on Australian Geodetic Datum 1984

NORTH

NC97/007 (NG6060/98)
Gundungurra #6
Application Area = 18682.37 sqkm



Location of NC97/007
Within New South Wales & ACT



KAYANDEL
ARCHAEOLOGICAL SERVICES

13.2 Ngunawal People (NSW)

NATIONAL NATIVE TITLE TRIBUNAL

Claimant Application Summary

Application numbers	Federal Court number: NG001/00 NNTT number: NC00/1
Application name	Donald Thomas Bell on Behalf of the Ngunawal People (Ngunawal People (NSW))
Name of body where application filed	Federal Court of Australia
Date application filed	02/03/2000
Current stage(s)	Notification Complete, In Mediation
Applicants	Mr Donald Thomas Bell
Address for service	Dean Bell 11 Berger Street SOUTH WINDSOR NSW 2756
Persons claiming to hold native title	The claim is brought on behalf of the people listed below and their children:, Donald Thomas Bell, Erin Bell, Dean Bell, Merekai Bell, Danicka Bell, Tiara Biggs, Raymond Brydon, Caitlin Brydon, Darrell Brydon, Robert Brydon, Emily Brydon, Leesa Brydon, Jacob Brydon, Jordanne Brydon, Jeremy Brydon, Joshua Brydon, Samantha Brydon, Dawn Brydon, Deborah Brydon, Gavin Brydon, Angela Brydon, Brett Brydon, Andrew Brydon, Amanda Brydon, Malcolm Brydon, Dorothy Carroll, Darroll Charles Tighe, Phyllis Gertrude Carroll, Nicole Hall, Mitchell Hall, Barry Honeysett, Pamela Honeysett, Kaziah Honeysett, Curtis Honeysett, Darryl Honeysett, Lucille Honeysett, Dean Honeysett, Donna Honeysett, Dwayne Honeysett, James Honeysett, Angela Honeysett, Gordon Honeysett, Colleen Honeysett, Lyle Honeysett, Isobella Honeysett, Hilary Honeysett, Annika Honeysett, Teresa Honeysett, Shaun Honeysett, Jessica Honeysett, Maxine Honeysett, Wayne Honeysett, Letisha Honeysett, Shiana Honeysett, Cameron Honeysett, Rhiana Honeysett, Craig Honeysett, Damien James Denny, Tyronne James Bell, Rebecca Jane Denny, Akina Jasmine Button Young, Phillip John Young, Ruth Josephine Bell, Tegan Marree Denny, Karen Rebecca Denny, Wayne Taylor, Nicholas Taylor, Jasmin Taylor, Nicollette Taylor, Lucianna Taylor, Pamela Tighe, Darroll Tighe Jnr, Aaron Tighe, Alex Tighe, Evelyn Tighe, Craig Vincent Honeysett, Pamela Young
Native title rights and interests claimed	The native title rights and interests claimed are the rights to the possession, occupation, use and enjoyment as against the whole world (subject to any native title rights and interests which may be shared with any others who establish that they are native title holders) of the area, and in particular comprise: a) rights to possess, occupy, use and enjoy the area; b) the right to make decisions about the use and enjoyment of the area; c) the right of access to the area; d) the right to control the access of others to the area; e) the right to use and enjoy resources of the area; f) the right to control the use and enjoyment of others of resources of the area; g) the right to trade in resources of the area; i) the right to maintain and protect places of importance under traditional laws, customs and practices in the area; and j) the right to maintain, protect and prevent the misuse of cultural knowledge of the common law holders associated with the area. Subject to: 1. To the extent that any minerals, petroleum or gas within the area of the claim are

	wholly owned by the Crown in the right of the Commonwealth or the state of New South Wales, they are not claimed by the applicants. 2. The claim area does not include any offshore place. 3. The applicants do not make a claim to native title rights and interests which confer possession, occupation, use and enjoyment to the exclusion of all others in respect of any areas in relation to which a previous non-exclusive possession act, as defined in s.23F of the NTA, was done in relation to an area, and, either the act was an act attributable to the Commonwealth, or the act was attributable to the state of New South Wales and a law of that State has made provision as mentioned in s.231 in relation to the act; 4. Paragraph 3 above is subject to such of the provisions of s.47, s47A and s.47B of the Act as apply to any part of the area contained within this application, particulars o which will be provided prior to the hearing. 5. The said native title rights and interests are not claimed to the exclusion of any other rights or interests validly created by or pursuant to the common law, a law of the State or a law of the Commonwealth.

Area	**Jurisdiction:** New South Wales **Local government region(s):** Boorowa Shire Council, Cooma-Monaro Shire Council, Cootamundra Shire Council, Upper Lachlan Council, Goulburn City Council, Gundagai Shire Council, Gunning Shire Council, Harden Shire Council, Mulwaree Shire Council, Queanbeyan City Council, Snowy River Shire Council, Tallaganda Shire Council, Yarrowlumla Shire Council, Yass Shire Council **ATSIC region(s):** Binaal Billa Regional Council, Queanbeyan 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):** EXTERNAL BOUNDARY Commencing at Longitude 149.371904 east, Latitude 36.182838 south being a point approximately 3km north west of Umaralla Mountain, the application boundary traverses generally north westerly, crossing the Monard Highway and the Reynolds Barkersdale Creek until Longitude 148.726600 east, Latitude 35.783503 south, being a point approximately 6km to the east of the southern end of the Tantangara Reservoir. Points 1 to 22 reference this section of the boundary as listed on Attachment "B" - Geographic Coordinates. From here the boundary traverses generally northerly through the Kosciusco National Park until Longitude 148.694374 east, Latitude 35.234315 south, then traverses generally north westerly until Longitude 148.543060 east, Latitude 35.090910 south, being a point south of the Bungongo State Forest. The boundary then traverses generally westerly, south of Paddy's Rock Hill, across the Serpentine Ridge and the Tumut River until Longitude 148.161500 east, Latitude 35.039421 south. From this point the boundary traverses generally north westerly until Longitude 148.144685 east, Latitude 35.030631 south being a point approximately located on the Murrumbidgee River. From here the boundary traverses northerly over the Murrumbidgee River again, until Latitude 148.132133 east, Longitude 34.977345 south, being a point approximately on the northern side of the Hume Highway. The boundary then traverses generally north easterly to the east of Nimby until Longitude 148.376766 east, Latitude 34.548290 south, being a point approximately on the eastern side of the town of Harden. Points 23 - 50 reference this section of the boundary as listed on Attachment "B" Geographic Coordinates. From here the boundary traverses generally east south easterly crossing the Galong Boorowa Railway, then through the Midgee Range until Longitude 149.145529 east, Latitude 34.667445 south. From here the boundary traverses generally north easterly crossing the Lachlan River until Longitude 149.374453 east, Latitude 34.530503 south. From this point the boundary traverses generally south easterly, north of Lake Sooley and across the Oberon Goulbourn Road until Longitude 149.742200 east, Latitude 34.737239 south, being a point approximately on the north eastern outskirts of Goulbourn. From here the boundary traverses generally southerly, approximately 2.75km to the west of Blacks Peak until Longitude 149.806458 east, Latitude 35.505121 south, approximately 7km south of Braidwood. From here the boundary traverses generally south westerly through the Bedland, Tallaganda and Badja State Forests back to the commencement point. Points 51-116 reference this section of the boundary as listed on Attachment "B" - Geographic

	Coordinates. Geographic coordinates are referenced to Australian Geodetic Datum (AGD) 84, in decimal degrees and area based on the spatial reference data acquired from the various custodians at the time. Use of Coordinates: Where coordinates are used within the description to represent cadastral or topographic boundaries or the intersection with such, they are intended as a guide only. As an outcome to the custodians of cadastral and topographic data continuously recalculation of 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 detailed ground survey. INTERNAL BOUNDARIES 1. The application excludes the area covered by the Australian Capital Territory. 2. The applicants exclude from the claim any areas covered by valid acts on or before 23 December, 1996, comprising such of the following as are included as extinguishing acts within the Native Title Act 1993, as amended, or the Native Title (New South Wales) Act 1994, as amended, at the time of the Registrar's consideration: i) Category "A" Past Acts, as defined in NTA s.228 and s.229; ii) Category "A" Intermediate Period Acts in NTA s.232A and s.232B. 3. The applicants exclude from the claim any areas in relation to which a previous exclusive possession act, as defined in section 23B of the NTA, was done in relation to an area, and, either the act was an act attributable to the Commonwealth or the state of New South Wales and a law of that State has made provision as mentioned in section 23E in relation to the act. 4. The applicants exclude from the claim areas in relation to which native title rights and interests have otherwise been extinguished, including areas subject to:- a) an act authorised by legislation which demonstrates the exercise of permanent adverse dominion in relation to native title; or b) actual use made by the holder of a tenure other than native title which is permanently inconsistent with the continued existence of native title. To avoid any uncertainty, the applicants exclude from the claim area any of the areas contained within the following descriptions or tenures which have been validly granted, set out in Schedule B1. == SCHEDULE B1-- B1.1) Any former or current unqualified grant of an estate in fee simple and all other freehold land. B1.2) A permanent public work and "the land or waters on which a public work is constructed, established or situated" within the meaning given to that phrase by the Native Title Act 1993 (Cth) s.251D. B1.3) An existing public road or street used by the public, or dedicated road. 5. Paragraphs 2 to 4 above are subject to such of the provisions of sections 47, 47A and 47B of the Act as apply to any part of the area contained within this application, particulars of which will be provided prior to the hearing but which include such areas as may be listed in Schedule L.

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:** 04/07/2000 **Registration test status:** Accepted for registration **Registration history:** Registered from 04/07/2000.

Attachments	1. Map of Claim Area showing External Boundary, Attachment A of the Application, 1 page - A0, Attached 02/03/2000. 2. Table of Geographical Co-ordintates of the External Boundary, Attachment B of the Application, 4 pages - A4, Attached 02/03/2000. NNTT map attached.

NNTT contact details	**Case manager:**	Nicole Maher
	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:	N6001/2000 NC00/1
Application name:	Donald Thomas Bell on Behalf of the Ngunawal People (Ngunawal People (NSW))	
Registration history:	Registered from 04/07/2000.	

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

Application filed with:	Federal Court of Australia
Date application filed:	02/03/2000
Date claim entered on Register:	04/07/2000
Applicants:	Mr Donald Thomas Bell
Address for service:	Dean Bell 11 Berger Street SOUTH WINDSOR NSW 2756

Area covered by the claim:

EXTERNAL BOUNDARY

Commencing at Longitude 149.371904 east, Latitude 36.182838 south being a point approximately 3km north west of Umaralla Mountain, the application boundary traverses generally north westerly, crossing the Monard Highway and the Reynolds Barkersdale Creek until Longitude 148.726600 east, Latitude 35.783503 south, being a point approximately 6km to the east of the southern end of the Tantangara Reservoir. Points 1 to 22 reference this section of the boundary as listed on Attachment "B" - Geographic Coordinates.

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Geographic coordinates are referenced to Australian Geodetic Datum (AGD) 84, in decimal degrees and area based on the spatial reference data acquired from the various custodians at the time.

Use of Coordinates: Where coordinates are used within the description to represent cadastral or topographic boundaries or the intersection with such, they are intended as a guide only. As an outcome to the custodians of cadastral and topographic data continuously recalculation of 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 detailed ground survey.

INTERNAL BOUNDARIES

1. The application excludes the area covered by the Australian Capital Territory.
2. The applicants exclude from the claim any areas covered by valid acts on or before 23 December, 1996, comprising such of the following as are included as extinguishing acts within the Native Title Act 1993, as amended, or the Native Title (New South Wales) Act 1994, as amended, at the time of the Registrar's consideration:

i) Category "A" Past Acts, as defined in NTA s.228 and s.229;
ii) Category "A" Intermediate Period Acts in NTA s.232A and s.232B.

3. The applicants exclude from the claim any areas in relation to which a previous exclusive possession act, as defined in section 23B of the NTA, was done in relation to an area, and, either the act was an act attributable to the Commonwealth or the state of New South Wales and a law of that State has made provision as mentioned in section 23E in relation to the act.

4. The applicants exclude from the claim areas in relation to which native title rights and interests have otherwise been extinguished, including areas subject to:-

a) an act authorised by legislation which demonstrates the exercise of permanent adverse dominion in relation to native title; or
b) actual use made by the holder of a tenure other than native title which is permanently inconsistent with the continued existence of native title.

To avoid any uncertainty, the applicants exclude from the claim area any of the areas contained within the following descriptions or tenures which have been validly granted, set out in Schedule B1.

== SCHEDULE B1==

B1.1) Any former or current unqualified grant of an estate in fee simple and all other freehold land.
B1.2) A permanent public work and "the land or waters on which a public work is constructed, established or situated" within the meaning given to that phrase by the Native Title Act 1993 (Cth) s.251D.
B1.3) An existing public road or street used by the public, or dedicated road.

5. Paragraphs 2 to 4 above are subject to such of the provisions of sections 47, 47A and 47B of the Act as apply to any part of the area contained within this application, particulars of which will be provided prior to the hearing but which include such areas as may be listed in Schedule L.

Persons claiming to hold native title:

The claim is brought on behalf of the people listed below and their children:, Donald Thomas Bell, Erin Bell, Dean Bell, Merekai Bell, Danicka Bell, Tiara Biggs, Raymond Brydon, Caitlin Brydon, Darrell Brydon, Robert Brydon, Emily Brydon, Leesa Brydon, Jacob Brydon, Jordanne Brydon, Jeremy Brydon, Joshua Brydon, Samantha Brydon, Dawn Brydon, Deborah Brydon, Gavin Brydon, Angela Brydon, Brett Brydon, Andrew Brydon, Amanda Brydon, Malcolm Brydon, Dorothy Carroll, Darroll Charles Tighe, Phyllis Gertrude Carroll, Nicole Hall, Mitchell Hall, Barry Honeysett, Pamela Honeysett, Kaziah Honeysett, Curtis Honeysett, Darryl Honeysett, Lucille Honeysett, Dean Honeysett, Donna Honeysett, Dwayne Honeysett, James Honeysett, Angela Honeysett, Gordon Honeysett, Colleen Honeysett, Lyle Honeysett, Isobella Honeysett, Hilary Honeysett, Annika Honeysett, Teresa Honeysett, Shaun Honeysett, Jessica Honeysett, Maxine Honeysett, Wayne Honeysett, Letisha Honeysett, Shiana Honeysett, Cameron Honeysett, Rhiana Honeysett, Craig Honeysett, Damien James Denny, Tyronne James Bell, Rebecca Jane Denny, Akina Jasmine Button Young, Phillip John Young, Ruth Josephine Bell, Tegan Marree Denny, Karen Rebecca Denny, Wayne Taylor, Nicholas Taylor, Jasmin Taylor, Nicollette Taylor, Lucianna Taylor, Pamela Tighe, Darroll Tighe Jnr, Aaron Tighe, Alex Tighe, Evelyn Tighe, Craig Vincent Honeysett, Pamela Young

Registered native title rights and interests:

The following Native Title Rights & Interests were entered on the Register on 04/07/2000:
The native title rights and interests claimed are the rights to the possession, occupation, use and enjoyment as against the whole world (subject to any native title rights and interesrs which may be shared with any others who establish that they are native title holders) of the area, and in particular comprise:
a) rights to possess, occupy, use and enjoy the area;
b) the right to make decisions about the use and enjoyment of the area;
c) the right of access to the area;
d) the right to control the access of others to the area;
e) the right to use and enjoy resources of the area;
f) the right to control the use and enjoyment of others of resources of the area;
g) the right to trade in resources of the area;

i) the right to maintain and protect places of importance under traditional laws, customs and practices in the area; and
j) the right to maintain, protect and prevent the misuse of cultural knowledge of the common law holders associated with the area.
Subject to:

1. To the extent that any minerals, petroleum or gas within the area of the claim are wholly owned by the Crown in the right of the Commonwealth or the state of New South Wales, they are not claimed by the applicants.

2. The claim area does not include any offshore place.

3. The applicants do not make a claim to native title rights and interests which confer possession, occupation, use and enjoyment to the exclusion of all others in respect of any areas in relation to which a previous non-exclusive possession act, as defined in s.23F of the NTA, was done in relation to an area, and, either the act was an act attributable to the Commonwealth, or the act was attributable to the state of New South Wales and a law of that State has made provision as mentioned in s.231 in relation to the act;

4. Paragraph 3 above is subject to such of the provisions of s.47, s47A and s.47B of the Act as apply to any part of the area contained within this application, particulars of which will be provided prior to the hearing.

5. The said native title rights and interests are not claimed to the exclusion of any other rights or interests validly created by or pursuant to the common law, a law of the State or a law of the Commonwealth.

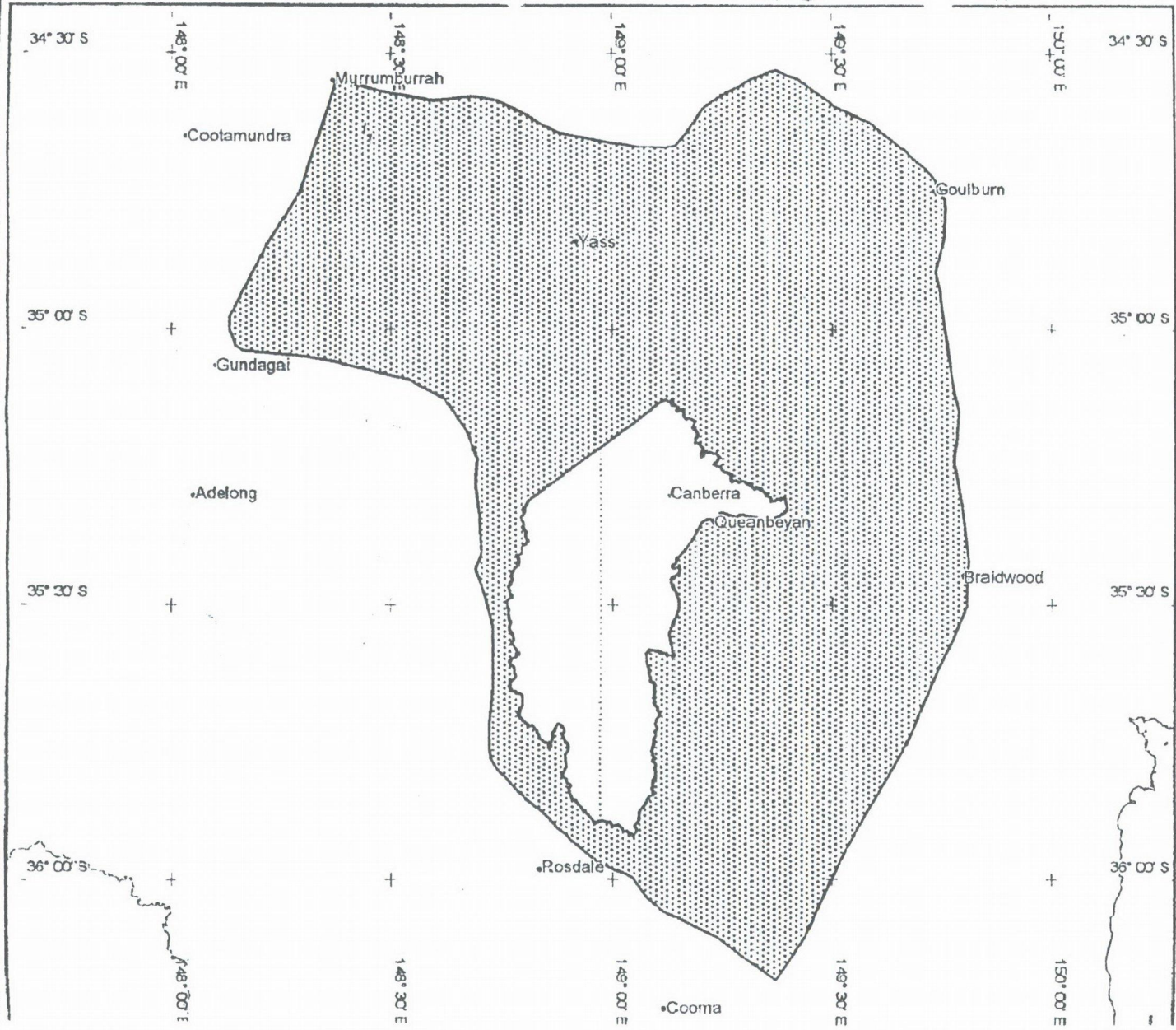
Register attachments:

1. Table of Geographical Co-ordintates of the External Boundary, Attachment B of the Application, 4 pages - A4, Attached 02/03/2000.

There is an AO size map of the application area which is too large to be included. This map can be viewed at the Sydney Registry of the National Native Title Tribunal.

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 CLAIMANT APPLI[illegible]ATION: NC00/001 (Ngunawal ([illegible]SW)) N6001/2000



Area of Application (geographic extent) = 14,437 sq km

NOTE: 1
To determine areas subject to claim, and rights and interests sought within the external boundary, reference to the application description is necessary.

NOTE 2
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 for, and give no undertakings, guarantees or warranties concerning the accuracy, completeness or fitness for purpose of the map.

Map created by:
Geospatial Analysis & Mapping Branch,
National Native Title Tribunal (08/08/2000)

Application boundary data compiled by NNTT and referenced to spatial data sourced from AUSLIG

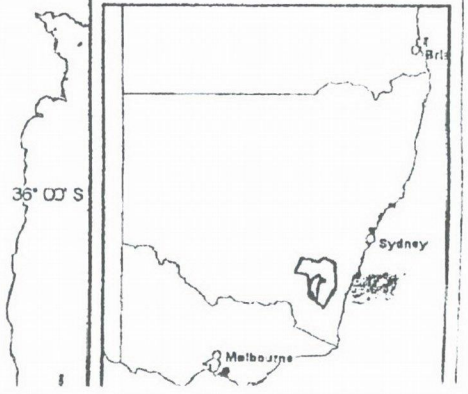
NORTH

0 50
KILOMETRES

Latitude and Longitude based on Australian Geodetic Datum 1984

P:\Geo_info\projects\assistance to case managers\nsw\nc00_001\nc00_001_A4l.wor

Location of NC00/001 within New South Wales



14 Appendix 3 DEC Site Cards

14.1 TC1-1

AHIMS Aboriginal Heritage Information Management System

National Parks and Wildlife Service
Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number

Date received / / Date entered into system / / Date catalogued / /

Entered by (I.D.)

Information Access

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

Office Use Only

For Further Information Contact:

☐ **Nominated Trustee**

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Client on system ☐

☒ **Knowledge Holder**

Title	Surname	First Name	Initials

Organisation: Pejar Local Aboriginal Land Council

Address: 81 Bourke Street, Goulburn NSW 258

Phone number: 02 4822 3552 Fax: 02 4822 3551

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name: TC1-1 (Towrang Creek 1 - Locale 1)

Easting: 758851 Northing: 6152770 ☒ AMG ☐ GDA

Mapsheet: Towrang 8828-1-S 2nd Edition

Zone: ☐ 54 ☒ 55 ☐ 56

☒ 1:25k topographic map ☐ 1:50k topographic map ☐ 1:100k topographic map

☐ Non differential GPS ☒ Differential GPS ☐ Engineering survey plan or map ☐ Client GIS or CAD system

Primary Recorder

Title	Surname	First Name	Initials
Mr	Syme	Lance	

Organisation: Kayandel Archaeological Services

Address: PO Box 440 Picton NSW 2571

Phone number: 02 4677 0446 Fax: 02 4677 0454

Date recorded: 24 / 12 / 05

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

[ ] CLOSED SITE [X] OPEN SITE

Site Context

Landform

- [ ] Mountainous
- [ ] Plain
- [X] Rolling hills
- [ ] Steep hills
- [ ] Undulating plain

Landform Unit

- [ ] Beach
- [ ] Coastal rock platform
- [ ] Dune
- [ ] Intertidal flat
- [ ] Lagoon
- [ ] Tidal Creek
- [ ] Tidal Flat
- [ ] Cliff
- [ ] Crest
- [ ] Flat
- [X] Lower slope
- [ ] Mid slope
- [ ] Upper slope
- [ ] Plain
- [ ] Ridge
- [ ] Tor
- [X] Valley flat
- [ ] Levy
- [ ] Stream bank
- [ ] Stream channel
- [ ] Swamp
- [ ] Terrace
- [ ] Terrace flat

Slope

[<10] degrees

Vegetation

- [ ] Closed forest
- [X] Grasslands
- [X] Isolated clumps of trees
- [ ] Open forest
- [ ] Open woodland
- [ ] Scrub
- [ ] Woodland
- [ ] Cleared
- [ ] Revegetated
- [ ] N/A

Land use

- [ ] Conservation
- [ ] Established urban
- [ ] Farming-intensive
- [ ] Farming-low intensity
- [ ] Forestry
- [ ] Industrial
- [ ] Mining
- [X] Pastoral/grazing
- [ ] Recreation
- [ ] Semi-rural
- [ ] Service corridor
- [ ] Transport corridor
- [ ] Urban expansion
- [ ] N/A

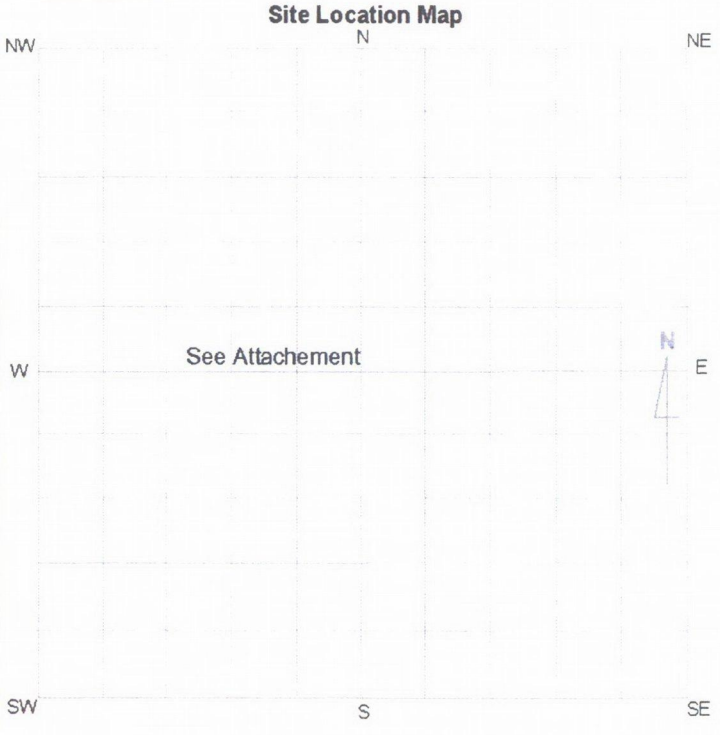
Water

Distance to permanent water source	230 metres
Distance to temporary water source	75 metres
Name of nearest permanent water source	Wollondilly River
Name of nearest temporary water	Towang Creek

Directions for Relocation

There is a log step-over at the Highway easement boundary
The site is over the step-over and in a cluster of Iron Barks
20m to the north.

Site Location Map



Current Land Tenure

- [X] Public — National Park / other Government Dept.
- [X] Private — RTA

Primary report **I.D.** [ ] (I.D. Office Use only)

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation

- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition

- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Condition of Ceiling

- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Shelter Aspect

- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

Open Site

Site Orientation

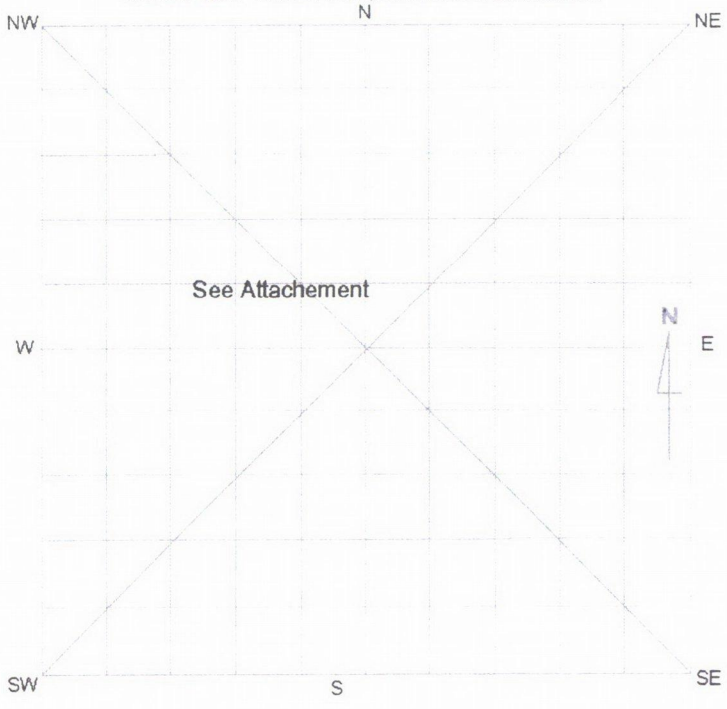
- [ ] N-S
- [ ] NE-SW
- [ ] E-W
- [ ] SE-NW
- [X] N/A

Features

- [ ] 1. Aboriginal Ceremony & Dreaming
- [ ] 2. Aboriginal Resource & Gathering
- [ ] 3. Art
- [X] 4. Artefact
- [ ] 5. Burial
- [ ] 6. Ceremonial Ring
- [ ] 7. Conflict
- [ ] 8. Earth Mound
- [ ] 9. Fish Trap
- [ ] 10. Grinding Groove
- [ ] 11. Habitation Structure
- [ ] 12. Hearth
- [ ] 13. Non Human Bone & Organic Material
- [ ] 14. Ochre quarry
- [X] 15. Potential Archaeological Deposit
- [ ] 16. Stone Quarry
- [ ] 17. Shell
- [ ] 18. Stone Arrangement
- [ ] 19. Modified Tree
- [ ] 20. Water Hole

Site Plan

Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

	Internal length
	Internal width
	Shelter height
	Shelter floor area

Open Site Dimensions (m)

30	Total length of visible site
40	Average width of visible site
600sqm	Estimated area of visible site
80 x 80m	Length of assessed site area

NPWS Aboriginal Site Recording Form - Site Interpretation and Community Statement

Aboriginal Community Interpretation and Management Recommendations

This site is significant to the local Aboriginal community as it represents a link with the past.

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

The southern portion of this site will be impact by the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. A S 90 Partial consent with slavage will be sought for those portions of the site to be impacted by the intersection upgrade proposal. All remaing areas are to be preserved.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Attachments (No.)

- [X] A4 location map
- [ ] B/W photographs
- [X] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [X] Site plans, drawings
- [ ] Recording tables
- [ ] Other
- [ ] Feature inserts-No.

Comments

Site identified during the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. A large artefact scatter in an elevated position to the south of the Wollondilly River and west of Towrang Creek to the north of the Hume Hwy. The site can be easily identified by a cluster of Ironbark tree.

14.2 TC1-2

AHIMS Aboriginal Heritage Information Management System

National Parks and Wildlife Service
Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number

Date received / / Date entered into system / / Date catalogued / /

Entered by (I.D.)

Information Access

Office Use Only

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

For Further Information Contact:

☐ **Nominated Trustee**

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Client on system ☐

☒ **Knowledge Holder**

Title	Surname	First Name	Initials

Organisation: Pejar Local Aboriginal Land Council

Address: 81 Bourke Street, Goulburn NSW 258

Phone number: 02 4822 3552 Fax: 02 4822 3551

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name: TC1-2 (Towrang Creek 1 - Locale 2)

Easting: 759045 Northing: 6152734 ☒ AMG ☐ GDA

Mapsheet: Towrang 8828-1-S 2nd Edition

Zone ☐ 54 ☒ 55 ☐ 56

☒ 1:25k topographic map ☐ 1:50k topographic map ☐ 1:100k topographic map

☐ Non differential GPS ☒ Differential GPS ☐ Engineering survey plan or map ☐ Client GIS or CAD system

Primary Recorder

Title	Surname	First Name	Initials
Mr	Syme	Lance	

Organisation: Kayandel Archaeological Services

Address: PO Box 440 Picton NSW 2571

Phone number: 02 4677 0446 Fax: 02 4677 0454

Date recorded: 24 / 12 / 05

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

☐ CLOSED SITE ☒ OPEN SITE

Site Context

Landform

- ☐ Mountainous
- ☐ Plain
- ☒ Rolling hills
- ☐ Steep hills
- ☐ Undulating plain

Landform Unit

- ☐ Beach
- ☐ Coastal rock platform
- ☐ Dune
- ☐ Intertidal flat
- ☐ Lagoon
- ☐ Tidal Creek
- ☐ Tidal Flat
- ☐ Cliff
- ☐ Crest
- ☐ Flat
- ☐ Lower slope
- ☐ Mid slope
- ☐ Upper slope
- ☐ Plain
- ☐ Ridge
- ☐ Tor
- ☒ Valley flat
- ☐ Levy
- ☒ Stream bank
- ☐ Stream channel
- ☐ Swamp
- ☐ Terrace
- ☐ Terrace flat

Slope

1 degrees

Vegetation

- ☐ Closed forest
- ☒ Grasslands
- ☒ Isolated clumps of trees
- ☐ Open forest
- ☐ Open woodland
- ☐ Scrub
- ☐ Woodland
- ☐ Cleared
- ☐ Revegetated
- ☐ N/A

Land use

- ☐ Conservation
- ☐ Established urban
- ☐ Farming-intensive
- ☐ Farming-low intensity
- ☐ Forestry
- ☐ Industrial
- ☐ Mining
- ☒ Pastoral/grazing
- ☐ Recreation
- ☐ Semi-rural
- ☐ Service corridor
- ☐ Transport corridor
- ☐ Urban expansion
- ☐ N/A

Water

Distance to permanent water source	230 metres
Distance to temporary water source	75 metres
Name of nearest permanent water source	Wollondilly River
Name of nearest temporary water	Towang Creek

Directions for Relocation

The site is located on the western bank of Towrang Creek to the north of the first tributary on Towrang Creek south of the Wollondilly River.

Site Location Map

NW N NE

See Attachement

W E

SW S SE

Current Land Tenure

- ☐ Public — National Park / other Government Dept.
- ☒ Private — Unknown

Primary report I.D. ☐ (I.D. Office Use only)

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation

- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition

- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Condition of Ceiling

- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Shelter Aspect

- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

Open Site

Site Orientation

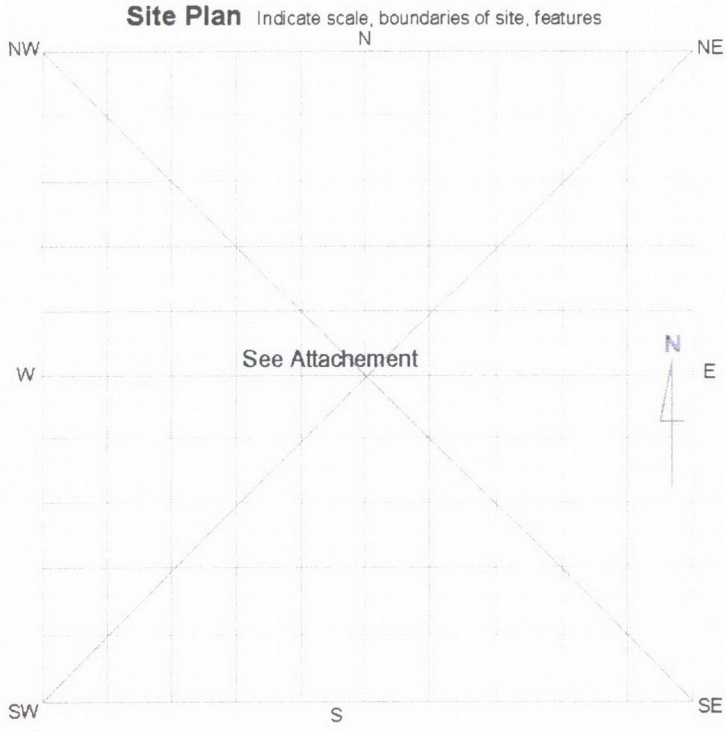
- [ ] N-S
- [ ] NE-SW
- [ ] E-W
- [ ] SE-NW
- [X] N/A

Features

- [ ] 1. Aboriginal Ceremony & Dreaming
- [ ] 2. Aboriginal Resource & Gathering
- [ ] 3. Art
- [X] 4. Artefact
- [ ] 5. Burial
- [ ] 6. Ceremonial Ring
- [ ] 7. Conflict
- [ ] 8. Earth Mound
- [ ] 9. Fish Trap
- [ ] 10. Grinding Groove
- [ ] 11. Habitation Structure
- [ ] 12. Hearth
- [ ] 13. Non Human Bone & Organic Material
- [ ] 14. Ochre quarry
- [X] 15. Potential Archaeological Deposit
- [ ] 16. Stone Quarry
- [ ] 17. Shell
- [ ] 18. Stone Arrangement
- [ ] 19. Modified Tree
- [ ] 20. Water Hole

Site Plan

Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

	Internal length
	Internal width
	Shelter height
	Shelter floor area

Open Site Dimensions (m)

30	Total length of visible site
40	Average width of visible site
600sqm	Estimated area of visible site
80x 80m	Length of assessed site area

NPWS Aboriginal Site Recording Form - Site Interpretation and Community Statement

Aboriginal Community Interpretation and Management Recommendations

This site is significant as it represents a link with the past.

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

Preservation and Conservation.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Attachments (No.)

- [X] A4 location map
- [ ] B/W photographs
- [X] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [X] Site plans, drawings
- [ ] Recording tables
- [ ] Other
- [ ] Feature inserts-No. ☐

Comments

Site identified during the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. The site is a relatively large surface scatter of artfaces with potetial for sub-material to be present within the site.

14.3 TC1-3

AHIMS Aboriginal Heritage Information Management System

National Parks and Wildlife Service
Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number

Date received / / Date entered into system / / Date catalogued / /

Entered by (I.D.)

Information Access

Office Use Only

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

For Further Information Contact:

☐ **Nominated Trustee**

Title | Surname | First Name | Initials

Organisation

Address

Phone number | Fax

Client on system ☐

☒ **Knowledge Holder**

Title | Surname | First Name | Initials

Organisation: Peiar Local Aboriginal Land Council

Address: 81 Bourke Street, Goulburn NSW 258

Phone number: 02 4822 3552 | Fax: 02 4822 3551

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name: TC1-3 (Towrang Creek 1 - Locale 3)

Easting: 759004 Northing: 6152673 ☒ AMG ☐ GDA

Mapsheet: Towrang 8828-1-S 2nd Edition

Zone: ☐ 54 ☒ 55 ☐ 56

☒ 1:25k topographic map ☐ 1:50k topographic map ☐ 1:100k topographic map

☐ Non differential GPS ☒ Differential GPS ☐ Engineering survey plan or map ☐ Client GIS or CAD system

Primary Recorder

Title | Surname | First Name | Initials

Mr | Syme | Lance

Organisation: Kayandel Archaeological Services

Address: PO Box 440 Picton NSW 2571

Phone number: 02 4677 0446 | Fax: 02 4677 0454

Date recorded: 24 / 12 / 05

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

[ ] CLOSED SITE [X] OPEN SITE

Site Context

Landform

- [ ] Mountainous
- [ ] Plain
- [X] Rolling hills
- [ ] Steep hills
- [ ] Undulating plain

Landform Unit

- [ ] Beach
- [ ] Coastal rock platform
- [ ] Dune
- [ ] Intertidal flat
- [ ] Lagoon
- [ ] Tidal Creek
- [ ] Tidal Flat
- [ ] Cliff
- [ ] Crest
- [ ] Flat
- [ ] Lower slope
- [ ] Mid slope
- [ ] Upper slope
- [ ] Plain
- [ ] Ridge
- [ ] Tor
- [X] Valley flat
- [ ] Levy
- [X] Stream bank
- [ ] Stream channel
- [ ] Swamp
- [ ] Terrace
- [ ] Terrace flat

Slope

[<10] degrees

Vegetation

- [ ] Closed forest
- [X] Grasslands
- [X] Isolated clumps of trees
- [ ] Open forest
- [ ] Open woodland
- [ ] Scrub
- [ ] Woodland
- [ ] Cleared
- [ ] Revegetated
- [ ] N/A

Land use

- [ ] Conservation
- [ ] Established urban
- [ ] Farming-intensive
- [ ] Farming-low intensity
- [ ] Forestry
- [ ] Industrial
- [ ] Mining
- [X] Pastoral/grazing
- [ ] Recreation
- [ ] Semi-rural
- [ ] Service corridor
- [ ] Transport corridor
- [ ] Urban expansion
- [ ] N/A

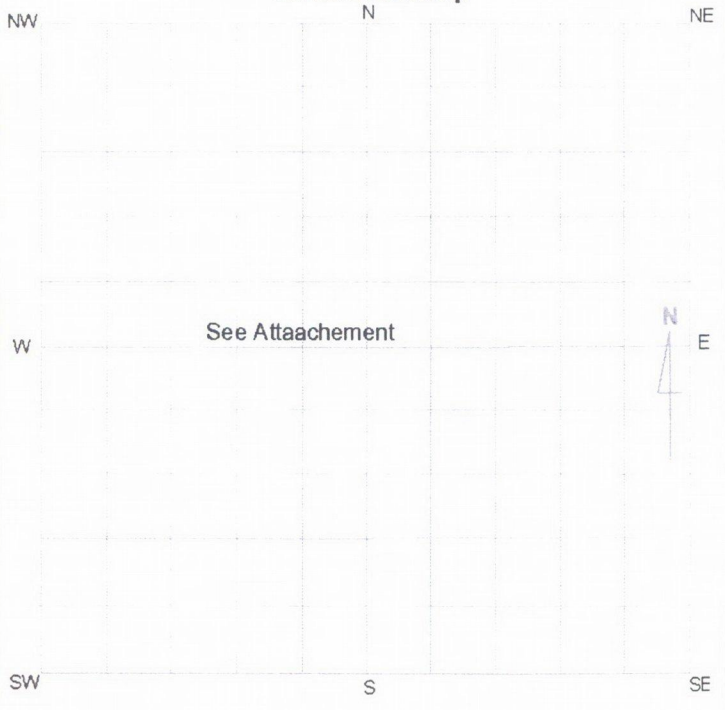
Water

Distance to permanent water source	220 metres
Distance to temporary water source	10 metres
Name of nearest permanent water source	Wollondilly River
Name of nearest temporary water	Towang Creek

Directions for Relocation

The site is located on the western bank of Towrang Creek to the south of the first tributary on Towrang Creek south of the Wollondilly River.

Site Location Map



Current Land Tenure

- [X] Public — National Park / other Government Dept.
- [X] Private — RTA

Primary report I.D. [ ] (I.D. Office Use only)

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation
- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Condition of Ceiling
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

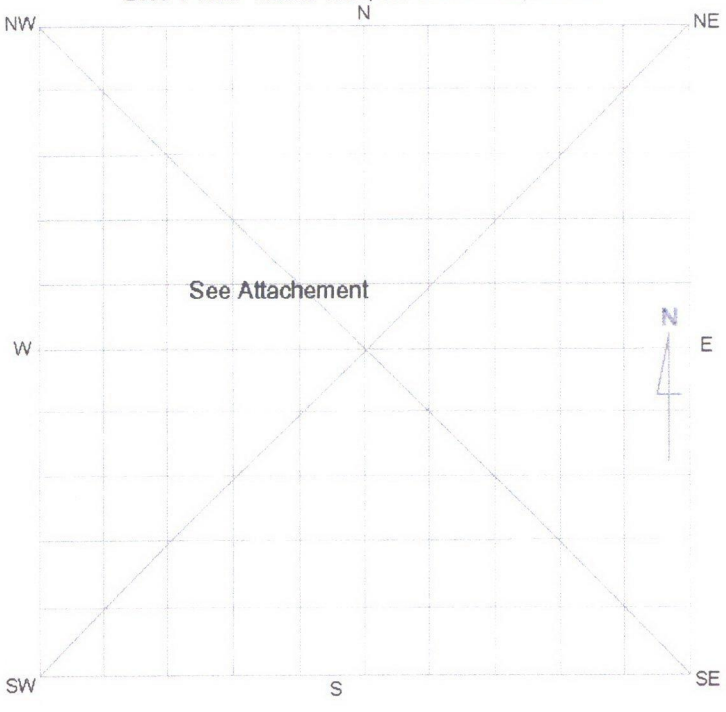
Shelter Aspect
- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

Open Site

Site Orientation
- [ ] N-S
- [ ] NE-SW
- [ ] E-W
- [ ] SE-NW
- [X] N/A

Features
- [ ] 1. Aboriginal Ceremony & Dreaming
- [ ] 2. Aboriginal Resource & Gathering
- [ ] 3. Art
- [X] 4. Artefact
- [ ] 5. Burial
- [ ] 6. Ceremonial Ring
- [ ] 7. Conflict
- [ ] 8. Earth Mound
- [ ] 9. Fish Trap
- [ ] 10. Grinding Groove
- [ ] 11. Habitation Structure
- [ ] 12. Hearth
- [ ] 13. Non Human Bone & Organic Material
- [ ] 14. Ochre quarry
- [X] 15. Potential Archaeological Deposit
- [ ] 16. Stone Quarry
- [ ] 17. Shell
- [ ] 18. Stone Arrangement
- [ ] 19. Modified Tree
- [ ] 20. Water Hole

Site Plan
Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

	Internal length
	Internal width
	Shelter height
	Shelter floor area

Open Site Dimensions (m)

30	Total length of visible site
40	Average width of visible site
600sqm	Estimated area of visible site
80 x 80m	Length of assessed site area

NPWS Aboriginal Site Recording Form - Site Interpretation and Community Statement

Aboriginal Community Interpretation and Management Recommendations

This site is significant to the local Aboriginal community as it represents alink with the past. The proximity to the Wollondilly River (a peranent water source) is also considered important. The community would like the site preserved.

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

Conservation and Preservation

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Attachments (No.)

- [X] A4 location map
- [ ] B/W photographs
- [X] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [X] Site plans, drawings
- [ ] Recording tables
- [ ] Other
- [ ] Feature inserts-No. [ ]

Comments

Site identified during the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. A fiarly large artefact scatter eroding from the creek bank and flats to the west of Towrang Creek. There is potential for insitu artefacts at this site.

14.4 TC1-4

National Parks and Wildlife Service
Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number

Date received / / Date entered into system / / Date catalogued / /

Entered by (I.D.)

Information Access

Office Use Only

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

For Further Information Contact:

☐ **Nominated Trustee**

Title	Surname	First Name	Initials

Organisation
Address
Phone number Fax

Client on system ☐

☒ **Knowledge Holder**

Title	Surname	First Name	Initials

Organisation: Pejar Local Aboriginal Land Council
Address: 81 Bourke Street, Goulburn NSW 258
Phone number: 02 4822 3552 Fax: 02 4822 3551

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name: TC1-4 (Towrang Creek 1 - Locale 4)
Easting: 759058 Northing: 6152604 ☒ AMG ☐ GDA
Mapsheet: Towrang 8828-1-S 2nd Edition

Zone: ☐ 54 ☒ 55 ☐ 56

☒ 1:25k topographic map
☐ 1:50k topographic map
☐ 1:100k topographic map

☐ Non differential GPS
☒ Differential GPS
☐ Engineering survey plan or map
☐ Client GIS or CAD system

Primary Recorder

Title	Surname	First Name	Initials
Mr	Syme	Lance	

Organisation: Kayandel Archaeological Services
Address: PO Box 440, Picton NSW 2571
Phone number: 02 4677 0446 Fax: 02 4677 0454
Date recorded: 24 / 12 / 05

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

[ ] CLOSED SITE [X] OPEN SITE

Site Context

Landform

- [ ] Mountainous
- [ ] Plain
- [X] Rolling hills
- [ ] Steep hills
- [ ] Undulating plain

Landform Unit

- [ ] Beach
- [ ] Coastal rock platform
- [ ] Dune
- [ ] Intertidal flat
- [ ] Lagoon
- [ ] Tidal Creek
- [ ] Tidal Flat
- [ ] Cliff
- [ ] Crest
- [ ] Flat
- [X] Lower slope
- [ ] Mid slope
- [ ] Upper slope
- [ ] Plain
- [ ] Ridge
- [ ] Tor
- [X] Valley flat
- [ ] Levy
- [X] Stream bank
- [ ] Stream channel
- [ ] Swamp
- [ ] Terrace
- [ ] Terrace flat

Slope

[<10] degrees

Vegetation

- [ ] Closed forest
- [X] Grasslands
- [X] Isolated clumps of trees
- [ ] Open forest
- [ ] Open woodland
- [ ] Scrub
- [ ] Woodland
- [ ] Cleared
- [ ] Revegetated
- [ ] N/A

Land use

- [ ] Conservation
- [ ] Established urban
- [ ] Farming-intensive
- [ ] Farming-low intensity
- [ ] Forestry
- [ ] Industrial
- [ ] Mining
- [X] Pastoral/grazing
- [ ] Recreation
- [ ] Semi-rural
- [ ] Service corridor
- [ ] Transport corridor
- [ ] Urban expansion
- [ ] N/A

Water

Distance to permanent water source	260 metres
Distance to temporary water source	10 metres
Name of nearest permanent water source	Wollondilly River
Name of nearest temporary water	Towang Creek

Directions for Relocation

This site is situated on the western side of Towrang Creek on the southern side of the first tributary south of the Wollondilly river

Site Location Map

NW N NE

See Attachement

W E

SW S SE

Current Land Tenure

- [X] Public — National Park / other Government Dept.
- [X] Private — RTA

Primary report **I.D.** [ ] (I.D. Office Use only)

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation

- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition

- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Condition of Ceiling

- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Shelter Aspect

- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

Open Site

Site Orientation

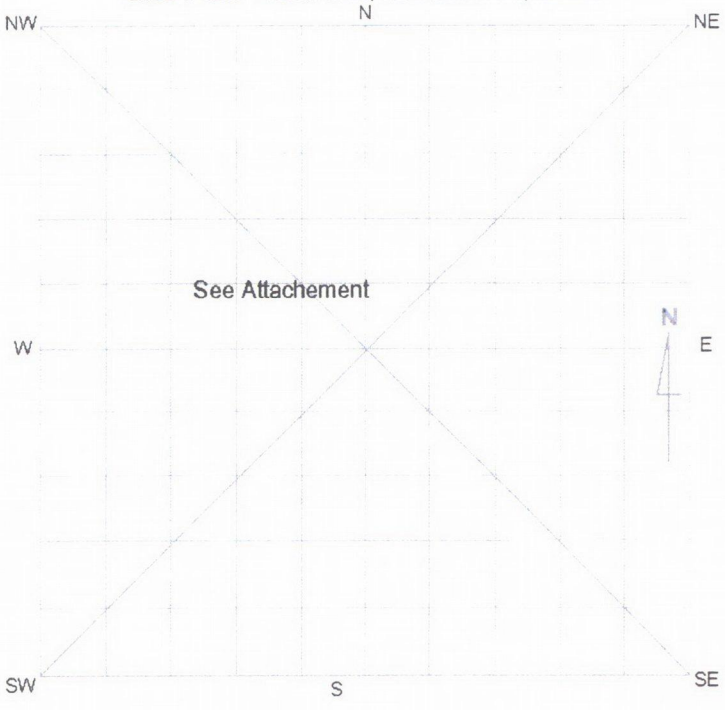
- [ ] N-S
- [ ] NE-SW
- [ ] E-W
- [ ] SE-NW
- [X] N/A

Features

- [ ] 1. Aboriginal Ceremony & Dreaming
- [ ] 2. Aboriginal Resource & Gathering
- [ ] 3. Art
- [X] 4. Artefact
- [ ] 5. Burial
- [ ] 6. Ceremonial Ring
- [ ] 7. Conflict
- [ ] 8. Earth Mound
- [ ] 9. Fish Trap
- [ ] 10. Grinding Groove
- [ ] 11. Habitation Structure
- [ ] 12. Hearth
- [ ] 13. Non Human Bone & Organic Material
- [ ] 14. Ochre quarry
- [X] 15. Potential Archaeological Deposit
- [ ] 16. Stone Quarry
- [ ] 17. Shell
- [ ] 18. Stone Arrangement
- [ ] 19. Modified Tree
- [ ] 20. Water Hole

Site Plan

Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

	Internal length
	Internal width
	Shelter height
	Shelter floor area

Open Site Dimensions (m)

30	Total length of visible site
40	Average width of visible site
600sqm	Estimated area of visible site
80 x 80m	Length of assessed site area

NPWS Aboriginal Site Recording Form - Site Interpretation and Community Statement *page 4*

Aboriginal Community Interpretation and Management Recommendations

This site is significant to the local Aboriginal community as it represents a link with the past. All portions of this site not directly impacted by the propose works are to be conserved.

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

Section 90 Partial Consent with Salvage for those portions of the site impacted by the proposed intersection improvements at Towrang and Carrick Roads. All remaining portions to be preserved and conserved.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Attachments (No.)

- [X] A4 location map
- [ ] B/W photographs
- [X] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [X] Site plans, drawings
- [ ] Recording tables
- [ ] Other
- [ ] Feature inserts-No. ☐

Comments

Site identified during the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. A large artefact scatter in an elevated position to the south of the Wollondilly River and west of Towrang Creek to the north of the Hume Hwy. The site can be easily identified by a cluster of Ironbark tree.

14.5 TC1-5

National Parks and Wildlife Service
Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number

Date received / / Date entered into system / / Date catalogued / /

Entered by (I.D.)

Information Access

Office Use Only

☐ Gender/male ☐ Gender/female ☐ Location restriction ☒ General restriction ☐ No access

For Further Information Contact:

☐ **Nominated Trustee**

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Client on system ☐

☒ **Knowledge Holder**

Title	Surname	First Name	Initials

Organisation Pejar Local Aboriginal Land Council

Address 81 Bourke Street, Goulburn NSW 258

Phone number 02 4822 3552 Fax 02 4822 3551

Client on system ☐

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name TC1-5 (Towrang Creek 1 - Locale 5)

Easting 758966 Northing 6152612 ☒ AMG ☐ GDA

Mapsheet Towrang 8828-1-S 2nd Edition

Zone ☐ 54 ☒ 55 ☐ 56

☒ 1:25k topographic map ☐ 1:50k topographic map ☐ 1:100k topographic map

☐ Non differential GPS ☒ Differential GPS ☐ Engineering survey plan or map ☐ Client GIS or CAD system

Primary Recorder

Title	Surname	First Name	Initials
Mr	Syme	Lance	

Organisation Kayandel Archaeological Services

Address PO Box 440 Picton NSW 2571

Phone number 02 4677 0446 Fax 02 4677 0454

Date recorded 24 / 12 / 05

Client on system ☐

NPWS Aboriginal Site Recording Form - Site Information

[ ] CLOSED SITE [X] OPEN SITE

Site Context

Landform

- [ ] Mountainous
- [ ] Plain
- [X] Rolling hills
- [ ] Steep hills
- [ ] Undulating plain

Landform Unit

- [ ] Beach
- [ ] Coastal rock platform
- [ ] Dune
- [ ] Intertidal flat
- [ ] Lagoon
- [ ] Tidal Creek
- [ ] Tidal Flat
- [ ] Cliff
- [ ] Crest
- [ ] Flat
- [X] Lower slope
- [ ] Mid slope
- [ ] Upper slope
- [ ] Plain
- [ ] Ridge
- [ ] Tor
- [X] Valley flat
- [ ] Levy
- [ ] Stream bank
- [ ] Stream channel
- [ ] Swamp
- [ ] Terrace
- [ ] Terrace flat

Slope

[<10] degrees

Vegetation

- [ ] Closed forest
- [X] Grasslands
- [X] Isolated clumps of trees
- [ ] Open forest
- [ ] Open woodland
- [ ] Scrub
- [ ] Woodland
- [ ] Cleared
- [ ] Revegetated
- [ ] N/A

Land use

- [ ] Conservation
- [ ] Established urban
- [ ] Farming-intensive
- [ ] Farming-low intensity
- [ ] Forestry
- [ ] Industrial
- [ ] Mining
- [X] Pastoral/grazing
- [ ] Recreation
- [ ] Semi-rural
- [ ] Service corridor
- [ ] Transport corridor
- [ ] Urban expansion
- [ ] N/A

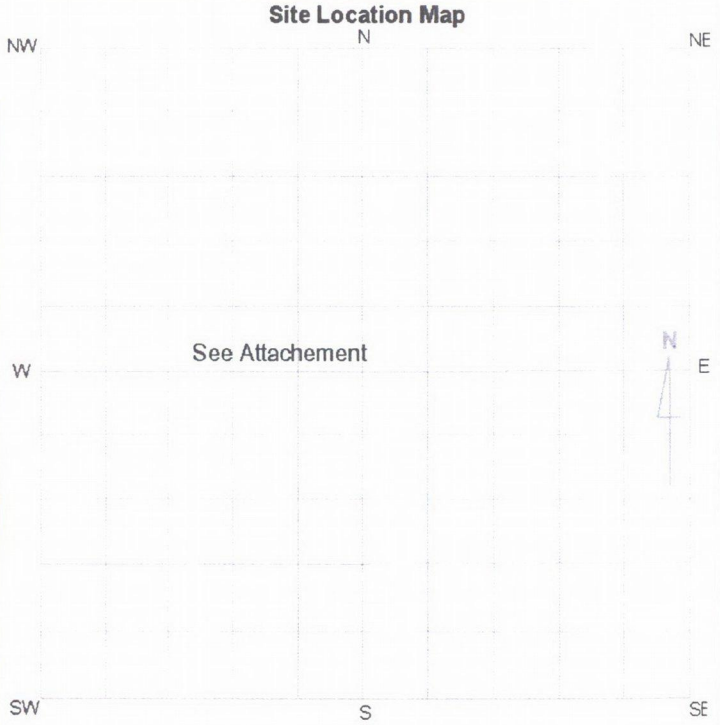
Water

Distance to permanent water source	260 metres
Distance to temporary water source	70 metres
Name of nearest permanent water source	Wollondilly River
Name of nearest temporary water	Towang Creek

Directions for Relocation

This site is situated on to the east of the Derrick VC Rest Area access road on the southern side of the Hume Hwy

Site Location Map



Current Land Tenure

- [X] Public — National Park / other Government Dept.
- [X] Private — RTA

Primary report I.D. [ ] (I.D. Office Use only)

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

Closed Site

Shelter/Cave Formation
- [ ] Boulder
- [ ] Wind erosion
- [ ] Water erosion
- [ ] Rock collapse

Rock Surface Condition
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

Condition of Ceiling
- [ ] Boulder
- [ ] Sandstone platform
- [ ] Silica gloss
- [ ] Tessellated
- [ ] Weathered
- [ ] Other platform

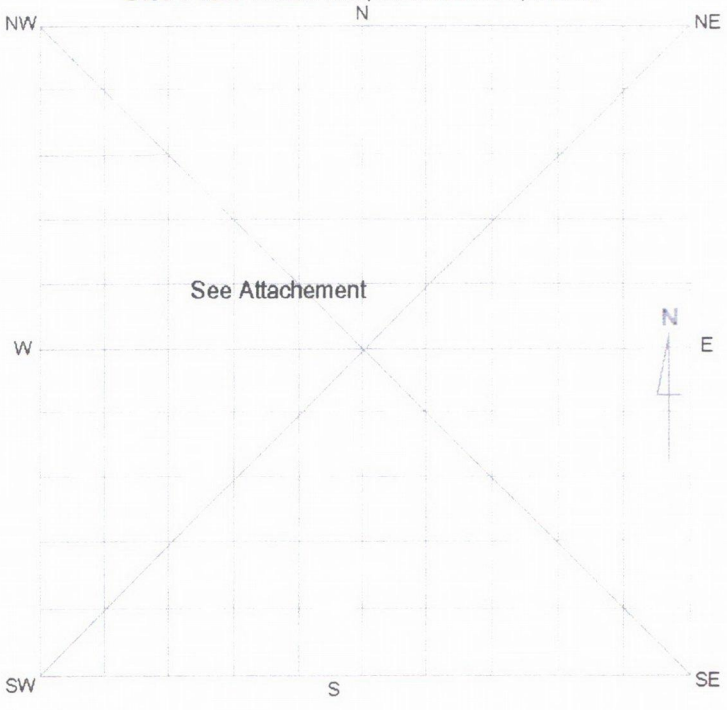
Shelter Aspect
- [ ] North
- [ ] North East
- [ ] East
- [ ] South East
- [ ] South
- [ ] South West
- [ ] West
- [ ] North West

Open Site

Site Orientation
- [ ] N-S
- [ ] NE-SW
- [ ] E-W
- [ ] SE-NW
- [X] N/A

Features
- [ ] 1. Aboriginal Ceremony & Dreaming
- [ ] 2. Aboriginal Resource & Gathering
- [ ] 3. Art
- [X] 4. Artefact
- [ ] 5. Burial
- [ ] 6. Ceremonial Ring
- [ ] 7. Conflict
- [ ] 8. Earth Mound
- [ ] 9. Fish Trap
- [ ] 10. Grinding Groove
- [ ] 11. Habitation Structure
- [ ] 12. Hearth
- [ ] 13. Non Human Bone & Organic Material
- [ ] 14. Ochre quarry
- [X] 15. Potential Archaeological Deposit
- [ ] 16. Stone Quarry
- [ ] 17. Shell
- [ ] 18. Stone Arrangement
- [ ] 19. Modified Tree
- [ ] 20. Water Hole

Site Plan
Indicate scale, boundaries of site, features



Site Dimensions

Closed Site Dimensions (m)

	Internal length
	Internal width
	Shelter height
	Shelter floor area

Open Site Dimensions (m)

30	Total length of visible site
40	Average width of visible site
600sqm	Estimated area of visible site
80 x 80m	Length of assessed site area

NPWS Aboriginal Site Recording Form - Site Interpretation and Community Statement

Aboriginal Community Interpretation and Management Recommendations

This site is significant to the local Aboriginal community as it represents a link with the past.

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

Preservation and conservation

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Attachments (No.)

- [X] A4 location map
- [ ] B/W photographs
- [X] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [X] Site plans, drawings
- [ ] Recording tables
- [ ] Other
- [ ] Feature inserts-No. ☐

Comments

Site identified during the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. A small artefact scatter in a area of recent grading associated with the acces road to the Derreck VC Rest Area.

14.6 TCPAD1

AHIMS Aboriginal Heritage Information Management System

National Parks and Wildlife Service
Aboriginal Site Recording Form

AHIMS Registrar
PO Box 1967, Hurstville NSW 2220

Office Use Only

Site Number [| | - | | - | | | | |]

Date received [/ /] Date entered into system [/ /] Date catalogued [/ /]

Entered by (I.D.) [ ]

Information Access

Office Use Only

[ ] Gender/male [ ] Gender/female [ ] Location restriction [X] General restriction [ ] No access

For Further Information Contact:

[ ] **Nominated Trustee**

Title	Surname	First Name	Initials

Organisation
Address
Phone number Fax

Client on system [ ]

[X] **Knowledge Holder**

Title	Surname	First Name	Initials

Organisation: Pejar Local Aboriginal Land Council
Address: 81 Bourke Street, Goulburn NSW 258
Phone number: 02 4822 3552 Fax: 02 4822 3551

Client on system [ ]

Aboriginal Heritage Unit or Cultural Heritage Division Contacts

Geographic Location

Site Name: TCPAD1 (Towrang Creek PAD 1)
Easting: 759148 Northing: 6152518 [X] AMG [ ] GDA
Mapsheet: Towrang 8828-1-S 2nd Edition

Zone: [ ] 54 [X] 55 [ ] 56

[X] 1:25k topographic map
[ ] 1:50k topographic map
[ ] 1:100k topographic map

[ ] Non differential GPS
[X] Differential GPS
[ ] Engineering survey plan or map
[ ] Client GIS or CAD system

Primary Recorder

Title	Surname	First Name	Initials
Mr	Syme	Lance	

Organisation: Kayandel Archaeological Services
Address: PO Box 440, Picton NSW 2571
Phone number: 02 4677 0446 Fax: 02 4677 0454
Date recorded: 24 / 12 / 05

Client on system [ ]

NPWS Aboriginal Site Recording Form - Site Information

[ ] CLOSED SITE [X] OPEN SITE

Site Context

Landform

- [ ] Mountainous
- [ ] Plain
- [X] Rolling hills
- [ ] Steep hills
- [ ] Undulating plain

Landform Unit

- [ ] Beach
- [ ] Coastal rock platform
- [ ] Dune
- [ ] Intertidal flat
- [ ] Lagoon
- [ ] Tidal Creek
- [ ] Tidal Flat
- [ ] Cliff
- [ ] Crest
- [ ] Flat
- [X] Lower slope
- [ ] Mid slope
- [ ] Upper slope
- [ ] Plain
- [ ] Ridge
- [ ] Tor
- [X] Valley flat
- [ ] Levy
- [X] Stream bank
- [ ] Stream channel
- [ ] Swamp
- [ ] Terrace
- [ ] Terrace flat

Slope

[<10] degrees

Vegetation

- [ ] Closed forest
- [X] Grasslands
- [X] Isolated clumps of trees
- [ ] Open forest
- [ ] Open woodland
- [ ] Scrub
- [ ] Woodland
- [ ] Cleared
- [ ] Revegetated
- [ ] N/A

Land use

- [ ] Conservation
- [ ] Established urban
- [ ] Farming-intensive
- [ ] Farming-low intensity
- [ ] Forestry
- [ ] Industrial
- [ ] Mining
- [X] Pastoral/grazing
- [ ] Recreation
- [ ] Semi-rural
- [ ] Service corridor
- [ ] Transport corridor
- [ ] Urban expansion
- [ ] N/A

Water

Distance to permanent water source	320 metres
Distance to temporary water source	5 metres
Name of nearest permanent water source	Wollondilly River
Name of nearest temporary water	Towang Creek

Directions for Relocation

This site is situated on the eastern of Towrang Creek on the southern side of the confluence with Deep Creek.

Site Location Map

NW N NE

See Attachement

W E

SW S SE

Current Land Tenure

- [X] Public — National Park / other Government Dept.
- [X] Private — RTA

Primary report I.D. [ ] (I.D. Office Use only)

NPWS Aboriginal Site Recording Form - Site Information

General Site Information

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- [ ] E-W
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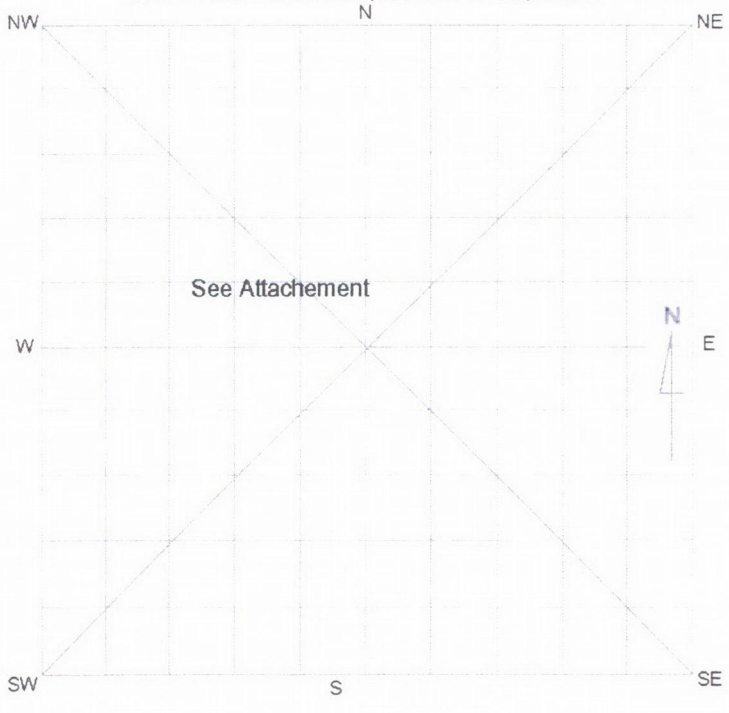

Site Dimensions

Closed Site Dimensions (m)
- [ ] Internal length
- [ ] Internal width
- [ ] Shelter height
- [ ] Shelter floor area

Open Site Dimensions (m)
- [100] Total length of visible site
- [100] Average width of visible site
- [ ] Estimated area of visible site
- [100 x 100m] Length of assessed site area

NPWS Aboriginal Site Recording Form - Site Interpretation and Community Statement

Aboriginal Community Interpretation and Management Recommendations

Preliminary Site Assessment

Site Cultural & Scientific Analysis and Preliminary Management Recommendations

Section 90 Partial Consent with Salvage for those portions of the site impacted by the proposed intersection improvements at Towrang and Carrick Roads. All remaining portions to be preserved and conserved.

This section should only be filled in by the Endorsees

Endorsed by: ☐ Knowledge Holder ☐ Nominated Trustee ☐ Native Title Holder ☐ Community Consensus

Title	Surname	First Name	Initials

Organisation

Address

Phone number Fax

Attachments (No.)

- [X] A4 location map
- [ ] B/W photographs
- [X] Colour photographs
- [ ] Slides
- [ ] Aerial photographs
- [X] Site plans, drawings
- [ ] Recording tables
- [ ] Other
- [ ] Feature inserts-No. ☐

Comments

Site identified during the "Hume Highway Intersection Improvements at Towrang and Carrick Roads" Project. due to heavy grass cover no exposure was noted in this area at the time of survey. The area has been assessed as PAD.