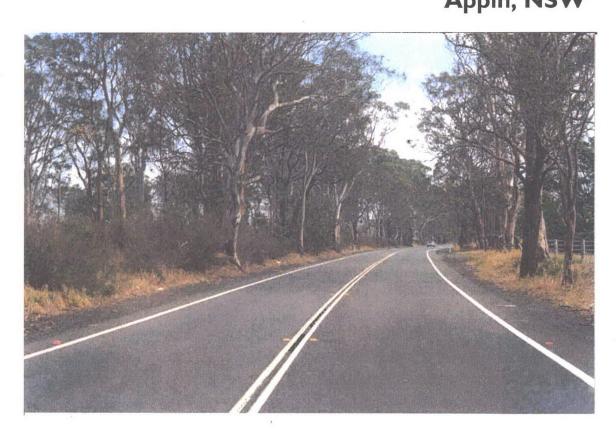


RTA.250

Review of Environmental Factors

Proposed Passing Lane on Appin Road (State Road (SR) 177), Approximately 3.2 km to 4.1km North of Appin, NSW





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May 2002

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Business Unit	Environmental Technology Branch		
Project No.	000541 (H/36331)		
Document description	REF: Proposed passing lane on Appin Road (State Road (SR) 177), approximately 3.2km to 4.1km North of Appin, NSW		(SR) 177),
	Name	Şigned	Date
Approving Manager	Belinda Randall	N. Frens per B. Rang	ON 18/6/02

Person managing this document	Person(s) writing this document
Nigel Bosworth	Nigel Bosworth & Jesse Death

Location	File(s)
G:\Ops\Environ\PROJECTS\Proj0102\0541 -H36331Appin Rd REF\REF\Appin REF Draft 3 comments.doc	IM1090

Client Reference	Document Status	Date	
	final	17 June 2002	

Roads and Traffic Authority
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I Proposal Identification

Name of Proposal: Proposed passing lane on Appin Road (State Road (SR) 177), approximately 3.2km to 4.1km North of Appin, NSW.

Region: Sydney Region.

Local Government Area(s): Wollondilly and Campbelltown.

2 Introduction and Background

2.1 Introduction

This Proforma 2 Review of Environmental Factors (REF) has been prepared by Environmental Technology Branch – RTA Operations, on behalf of the NSW Roads and Traffic Authority (RTA). The design was prepared by Project Design Technical Services with input on the design and construction components provided by Traffic Projects, Blacktown. The REF has been prepared to assess the potential impacts of the proposed widening Appin Road, 3.2km to 4.1km north of Appin (The Proposal).

For the purpose of these works, the RTA is the proponent and the determining authority under Part 5 of the Environmental Planning and Assessment Act, 1979. The REF describes the proposed works and the associated environmental impacts in the context of Clause 228(2) of the Environmental 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 fulfils 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.

The REF has been prepared in accordance with the RTA's Proforma 2 detailed in the RTA's Environmental Impact Assessment Policy, Guidelines and Procedures, 1998.

The findings of the REF will be considered when assessing:

- Whether the Proposal is likely to have any significant impact on the environment and therefore the necessity for an EIS under Section 112 of the EP&A Act;
- The significance of any impact on threatened species as defined by the Threatened Species Conservation Act 1995, and the Fisheries Management Act, 1994 in accordance with Section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS); and
- Whether the Proposal under section 20 of the Environment Protection and Biodiversity Conservation Act 1999 is a "Controlled Action", thereby requiring referral to the Federal Minister for the Environment.

2.2 Background to the Proposal

Project Design Technical Services was requested by Mr Len Hvass from Traffic Projects, Blacktown, to prepare a concept proposal for the widening of SR177 Appin Road, 3.2km to 4.1km north of Appin. A Strategic Concept Design Report (0177.076.SD.000) was prepared, which considered three locations, namely; northbound north of Kellerman Drive, southbound north of Kellerman Drive, and northbound north of the entrance to Ingham's Enterprises. Widening south of Kellerman Road was not considered desirable as it is in the approach to the single lane Kellerman Drive roundabout. It was determined that a passing lane here would serve no benefit. The site to the north of Ingham's

Enterprises was adopted as the preferred option as it is at the commencement of the posted accident zone area along Appin Road.

The proposal has been refined during the consultation and concept design preparation stage to a southbound overtaking lane to the north of the entrance to Ingham's Enterprises.

2.3 Methodology

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

- A site visit was undertaken with by Environment Technology to assess the site.
- Consultation was undertaken with the following authorities and RTA personnel:

NSW Environment Protection Authority (EPA)

NSW Department of Land and Water Conservation (DLWC)

Campbelltown and Wollondilly Local Councils

Nigel Robinson - Aboriginal Program Consultant (APC), RTA Sydney Region

Claire Everett, RTA Heritage and Archaeology Specialist

A search was conducted on the following databases to identify any potential issues:

Australian Heritage Commission Register of National Estate

NSW Heritage Office State Heritage Register

RTA Heritage and Conservation Register

Council Heritage Listings

NPWS Aboriginal Sites Register

National Native Title Tribunal

NPWS Wildlife Atlas flora records

NPWS Wildlife Atlas fauna records

Environment Australia EPBC Database

 A literature review and review of documentation was undertaken to determine issues relating to:

Acid sulphate soils.

Local Environment Plan zoning

State Environmental Planning Policies

Known sensitive sites

Regional Environmental Plans

• Specialist consultants were commissioned to undertake site specific studies of:

Flora and Fauna.

Indigenous Archaeology / Cultural Heritage.

Noise and Vibration.

Assessment was undertaken in line with the Environmental Impact Assessment Policy, Guidelines and Procedures (RTA, April 2001) and current RTA policies.

REF: Proposed Passing Lane on Appin Road Environmental Technology - RTA Operations.

3 Proposal Description

3.1 Location

The Proposal is located 3.2km to 4.1km north of Appin on Appin Road. Refer to Figure 1, below for site location.

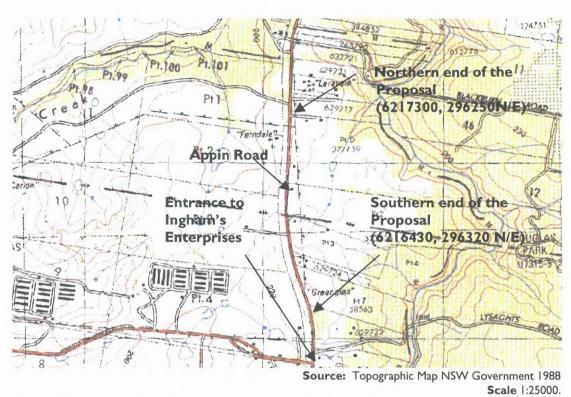


Figure 1: Location Map showing parameters of the Proposal within the Study Area.

3.2 Description of the site and Surroundings

The site is located at an elevation of approximately 220m, to the north of the town of Appin. Native vegetation has generally been cleared from the locality with considerable areas now under cultivation or occupied by grasses. The road corridor has been planted with trees.

The Georges River passes south to north approximately 500m east of the proposal. The road is a two lane single carriageway, with a posted speed of 90km/hr. Appin Road is the main route between Appin and Campbelltown.

Refer to **Appendix A** for photographs of the study area, and **Appendix B** for concept design drawings outlining the Proposal.

3.3 General Description of the Proposed Works

The Proposal involves the construction of an additional lane, including shoulder works on the western side of Appin Road for approximately 870m, 3.2km to 4.1km north of Appin. This would require the acquisition of an additional strip of land on the western side of the road, for the length of the works, varying in scope to a maximum width of 7.4m.

Approximately 60 large trees on the western side of the existing road would require removal to facilitate the Proposal. Approximately 10 additional trees on the eastern side of the existing road (at the southern end of the Proposal) would also require removal.

As the major length of the work is in cutting (up to 1.5m) stormwater run-off from the road would be collected in a type SO concrete drain.

The Proposal involves the construction of an additional lane, including shoulder works on the western side of Appin Road for approximately 870m at the location described in Section 3.1 of this document and illustrated as **Figure 1**. Further information on design considerations is located in **section 8.4** of this REF.

3.3.1 Costs

Based on the design described in this REF, the total cost of the Proposal on completion has been strategically estimated at \$1.5 million.

3.3.2 Timing

Works are anticipated to commence once approval is granted and would be carried out over approximately six months.

4 Statutory Requirements

4.1 Local Environmental Plan

The Proposal lies within Campbelltown and Wollondilly LGAs. Appin Road, (MR 177) is classified as a state road.

The land within and adjacent to the Proposal that falls within:

- Campbelltown Council LGA is zoned Non Urban (Zone 1).
- Wollondilly Shire Council LGA is zoned (A1) "Rural A1" Zone.

Both these zoning requires council consent for the development of roads.

However, as the Proposal is for the purposes of a classified road, Clause IIC of State Environmental Planning Policy (SEPP) 4 applies, which allows development where works are for the purposes of a classified road or tollway to proceed under Part 5 of the EP&A Act without obtaining development consent.

4.2 Regional Environmental Plans

The Georges River Catchment Regional Environmental Plan 1999 is applicable to the Proposal. The general aims and objectives of this plan are as follows:

- (a) to maintain and improve the water quality and river flows of the Georges River and its tributaries and ensure that development is managed in a manner that is in keeping with the national, State, regional and local significance of the Catchment,
- (b) to protect and enhance the environmental quality of the Catchment for the benefit of all users through the management and use of the resources in the Catchment in an ecologically sustainable manner,
- (c) to ensure consistency with local environmental plans and also in the delivery of the principles of ecologically sustainable development in the assessment of development within the Catchment where there is potential to impact adversely on groundwater and on the water quality and river flows within the Georges River or its tributaries,
- (d) to establish a consistent and coordinated approach to environmental planning and assessment for land along the Georges River and its tributaries and to promote integrated catchment management policies and programs in the planning and management of the Catchment.
- (e) to encourage more effective consultation between Local Government and State Government agencies in executing the responsibility for environmental planning within the Catchment,
- (f) to provide a mechanism that assists in achieving the water quality objectives and river flow objectives agreed under the Water Reform Package.

With the implementation of controls as outlined in **Section 8** of this REF, the objectives of the Proposal are consistent with the aims and objectives of the Georges River Catchment REP.

4.3 State Environmental Planning Policies

State Environmental Planning Policy No. 4 (SEPP 4) — Development without consent applies to this Proposal. SEPP 4 allows relatively simple or minor changes of land or building use and certain types of development by public authorities without the need for formal development applications. SEPP 4 applies to this Proposal as it is for the purposes of a classified road.

State Environmental Planning Policy No. 44 (SEPP 44) - Koala Habitat Protection applies to this LGA. Although the RTA is not bound by the provisions of SEPP 44 for a Part 5 assessment, SEPP 44 is applicable to both the Wollondilly and Campbelltown LGAs and the provisions of this SEPP have been referred to within the ecological assessment of the study area (Refer to **Section 9.6** of this REF).

4.4 Protection of the Environment Operations Act, 1997

The Protection of the Environment Operations Act (PoEO) 1997, has repealed the following five Acts: Clean Air Act 1961, Clean Waters Act 1970, Pollution Control Act 1970, Noise Control Act 1975, and the Environmental Offences and Penalties Act 1989. The PoEO Act consolidates the above Acts and also incorporates the major regulatory and enforcement provisions of the Waste Minimisation and Management Act, 1995.

4.5 Commonwealth Environment Protection and Biodiversity Conservation Act, 1999

The Commonwealth Environmental assessment process is conducted under the provisions of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Under this legislation, any action that:

- · has a significant impact on a matter of national environmental significance (an NES matter); or
- · has a significant impact on Commonwealth land,

requires Commonwealth environmental impact assessment and approval. If an action does not have one of these effects, it does not trigger the EPBC Act and assessment and approval is undertaken under NSW provisions only.

This assessment has been undertaken in accordance with the EPBC Act and shows that the Proposal would not have or is unlikely to have any impact (direct or indirect) on Commonwealth land or on an NES matter. Therefore indicating that the Proposal would not require referral to the Minister for the Environment, and approval would proceed under the NSW EP&A Act only.

4.6 Confirmation of Part 5 Position

For the purposes of these works, the RTA is the proponent of the activity, as outlined in **Section 4.1**, above. The RTA is a determining authority in accordance with Part 5 of the EP&A Act for all parts of the Proposal.

Referral to Environment Australia under the EPBC Act is unlikely to be required.

5 Specialist Studies and Community and Stakeholder Involvement

5.1 Specialist Studies

An Indigenous and Non-indigenous Archaeological & Cultural Heritage assessment was undertaken by Environmental Resource Management Australia (ERM) in March, 2002. A summary of that study is given in **Section 9.2.** The full report is included as **Appendix C**.

A flora / fauna assessment was undertaken by Landscope Environmental in February, 2002. A summary of that study is given in **Sections 9.3** and **9.4**. The full flora / fauna report is included at **Appendix D**.

A specialist Noise Report was undertaken by members of the RTA's Environmental Technology Branch, Environmental Monitoring Section in February, 2002. A summary of that study is given in **Section 9.8**. The full Noise report is included at **Appendix E**.

5.2 Consultation with Government Authorities

Table 5.1, below lists public authorities and government agencies that were contacted for the purposes of the environmental assessment of the Proposal. Where a response was received, it is listed in column 2, while column 3 identifies the section in the REF where authority responses have been addressed.

Table 5.1:	Government	Authority	Responses

Authority	Response	Section in REF where Addressed
Campbelltown City Council	Campbelltown City Council did not reply to the Invitation to Comment.	
Wollondilly Shire Council	Wollondilly Shire Council did not reply to the Invitation to Comment.	
EPA	The EPA offered the following points for consideration: Noise and Vibration Issues The primary objective is the maintenance of residential amenity. "The assessment of likely impacts and discussion of mitigation measures should address both the construction and operational phases. An assessment of the impacts of maximum	9.8
	noise levels and the likely frequency of such events should be included." The EPA then refer to the Environmental Noise Control Manual (ENCM) as the fundamental guideline for this aspect of the REF.	
	Soils and Geology	9.2
	The EPA refer to the DLWC Acid Sulfate Soil Probability Maps. Air Quality Issues The EPA discuss air quality issues during the construction phase, in particular dust generating activities and sources, as	9.4
	well as ensuring equipment is properly maintained to minimise emissions. The EPA also discuss operational phase air quality:	f

	"In relation to the operational phase information should be included on the projected changes in traffic volume and traffic type on the proposed road and the adjacent road network and likely changes to the existing air quality at various locations along the	
	proposed route." Water Issues The EPA require that the REF "identify, describe and quantitatively assess the potential impacts of the development on water quality and the aquatic environment both during the construction and operational phase, and describe measures to	9.5
	avoid or minimise these impacts." The EPA also referred to their Managing Urban Stormwater series of guidelines, as well as the "Blue Book" published by the NSW Dept of Housing. The EPA then list a series of relevant issues for consideration.	
	Hazards Issues The EPA request consideration of the need for a Hazard Management Plan, and consideration in the REF of the need for spill containment facilities.	10.1
	Waste Management The EPA refers to waste classification and disposal off site, tree removal and reuse, construction materials and the use of recycling facilities.	9.12
	Spoil Management The EPA state that the REF should "fully investigate the cost of treatment and disposal prior to commencement of works so that	9.12
,	adequate resources are allocated". Flora and Fauna The EPA request that the REF "include a detailed assessment of the likely impact of the proposal on both terrestrial and aquatic communities and individual species."	9.6, 9.7
	communities and individual species." Environmental Management Plan The EPA strongly recommends the preparation of and EMP to guide environmental performance during the project	10.1
DLWC	The DLWC response referred to the <i>Native Vegetation</i> Conservation Act 1997, noting that as the road is a classified road the Act does not apply.	Noted
LALC	Tharwal LALC participated in the field investigation on the 20th March 2002. Comments from Tharwal LALC were incorporated in the Indigenous and Historic Heritage Assessment prepared by ERM Australia.	9.9

5.3 Community Involvement

Affected landowners would be consulted prior to any construction works taking place. No general community involvement was sought for this Proposal as only minor short term impacts are anticipated as a result of the proposed works. However, the local community would be informed prior to commencement of construction as to the duration of the works and scheduled road closures. The RTA would also provide a contact number.

6 Strategic Stage

6.1 General

Appin Road, between Appin and Campbelltown, is a well known Accident Zone. The introduction of an overtaking lane along this stretch of road would provide a safe location for overtaking and hence increase road safety in the area.

This activity would be undertaken in line with the RTA's mission to "manage road related transport infrastructure and provide safe and efficient access to the road network for the people of NSW".

Further, the Proposal incorporates RTA's environmental policy (June 2001) which states that:

The RTA will demonstrate due diligence in the provision of its services, manage its work activities in a manner that is consistent with the principles of ecologically sustainable development, and will deliver continuous improvement in environmental performance.

6.2 Justification and Need for the Proposal

An independent road safety audit of Appin Road was undertaken in late 2000. One of its findings was:

Further investigation is required towards the construction of a few strategically placed overtaking lanes to permit the overtaking of slow moving vehicles in the section north of Appin."

The location of the current Proposal was selected to provide the best overtaking opportunity on Appin Road between Appin and Campbelltown. The proposed work is also in an identified accident zone where most of the accidents involve vehicles hitting trees.

7 Concept Stage

7.1 Objectives of the Proposal

The objectives of the Proposal are to:

- Improve safety on Appin Road by providing a strategically placed overtaking lane; and
- Maintain access during construction.

7.2 Options Considered

The section of Appin Road from the southern end of the Campbelltown residential area to the township of Appin was investigated for possible sites for the provision of an overtaking lane. Three options for the location of a passing lane on Appin Road were explored in the Strategic Concept Report (0177.076.SD.000), with another option (Option 4) developed during the concept design stage:

Option I - Site A

A northbound passing lane located south of Kellerman Drive.

Option 2 - Site B

A southbound passing lane located south of Kellerman Drive.

Option 3 - Site C

A northbound lane north of the entrance to Ingham's Enterprises.

Option 4 - (Developed during the design process)

A southbound lane north of the entrance to Ingham's Enterprises.

Option 5 - Do nothing

This option does not address the RTA's responsibilities to maintain road safety in accordance with the Proposal's objectives.

7.2.1 The Preferred Option

Option I and 2 were discarded in the Strategic Concept Report as they are in the approach to the single lane Kellerman Drive Roundabout. It was determined that a passing lane here would serve no benefit.

Option 3 was the preferred option of the Strategic Concept Report as it is at the commencement of the posted Accident Zone area along Appin Road.

The project was initially developed as a northbound overtaking lane consistent with the initial project concept. However a safety audit on the concept design raised serious concerns, as it was on a 3% downhill grade and there were 5 residential accesses on the eastern side of the road for which northbound vehicles would need to access them from the proposed passing lane.

Accordingly, the concept was adjusted to re-orientate the Proposal as a southbound overtaking lane. This allowed for an improved Project, providing better access for adjoining properties on the eastern side of the road on a 3% ascending grade. As result, the final design (Option 4) was developed.

Option 4 provises a refined during the concept design phase as a southbound overtaking lane provided better access for properties on the eastern side of the road than Option 3. Option 4 is the preferred option and the subject of this REF.

REF: Proposed Passing Lane on Appin Road Environmental Technology - RTA Operations.

8 Design Considerations

8.1 Existing and Forecast Traffic

A vehicle count taken in 2000 estimated the Average Annual Daily Traffic (AADT) as 8906 vehicles/day.

8.2 Design Considerations

Based on the Strategic Concept Design Report (0177.076.SD.000), the design criteria are as follows:

- Adopted design speed 90km/h; and
- Length of the work is approximately 870m including tapers.

The cross section comprises a 3.5m wide lane with a 2.5m wide shoulder.

8.3 Existing Road

The existing road is a two lane single carriageway, with a posted speed of 90km/hr. Appin Road is the main route between Appin and Campbelltown.

8.4 Visual Landscape

The roadway is bordered by a linear band of native remnant vegetation between the road and a private property fenceline as well as a linear section of adjacent clear farm pastures with scattered native trees. Further information regarding visual landscape is located in **Section 9.12** of this REF.

8.5 Construction Compound and Stockpile Sites

Selection of a suitable compound site would be the responsibility of the Contractor and would relate to the final design and work methods to be adopted. The compounds would be used for storage of mobile plant and for stockpiling of excavated materials and other work materials. The preferred location of the compound site would be within the strip of land to be acquired at the northern end of the proposed works. This location would not require any additional tree clearance. The location of the compound site would be within the project / study area and would therefore not require any additional environmental assessment. Should the compound site not be located at this site, the environmental adviser would be contacted regarding the need for further environmental assessment.

The compound would require up to 1000 m² of land and would be fenced for security and safety. Initial site works would involve site clearing and installation of environmental controls. Hard-standing areas would be provided for parking, storage and access. Portable toilets would be used.

Parameters governing the location of the Compound site would include the following: **Environmental Criteria:**

- More than 50 metres from waterways;
- · Low conservation significance for flora, fauna and indigenous or non-indigenous heritage;
- · No substantial clearing of native vegetation required; and
- More than 250m from residential uses or other activities that may be affected by operational noise or other impacts of the plant.

Construction requirements:

- Easy and safe access to the work site;
- · Relatively level ground with good drainage but allowing containment and treatment of runoff;
- Water, electricity and phone services would be available or able to be provided without additional environmental impacts; and
- Preferably within existing road reservation boundaries.

8.6 Design Parameters

Design parameters for this Proposal would include the following:

• Introduction of an additional lane, including shoulder works on the western side of Appin Road for approximately 870m, 3.2km to 4.1km north of Appin.

8.7 Design Outcomes

The outcomes for this Proposal would be:

 An additional lane on the western side of Appin Road for approximately 870m, 3.2km to 4.1km north of Appin.

8.8 Constraints

The Proposal has the following constraints:

- · Allocated funding for development, pre-construction and construction activities;
- Statutory environmental obligations; and
- Development and pre-construction activities to be completed within the approved schedule.

8.9 Construction Activities

The proposal is required to introduce a formalised overtaking lane at the strategic location described in **Section 3.1**. The proposal would involve the following activities:

- Introduction of mitigative measures as outlined in the CEMP and ESCP;
- Construction of new property boundary fencing and removal of old fencing on the western side of the roadworks;
- · Adjust public utilities as required;
- · Removal of trees, clearing of area and stockpiling topsoil;
- Installation of temporary erosion, sediment and drainage controls;
- Prepare the existing shoulder plus areas of formation widening and the batter surface;
- Generally excavate to 500mm (minimum) below finished surface level, install subsoil drains and compact subgrade on accordance with the plans;
- Place and compact pavement materials as shown on the plans and install edge drain;
- Place and compact wearing surface as shown on the plans;
- · Install linemarking, pavement markers and signposting; and
- Suitable traffic management controls would be implemented during the construction period and traffic would use the existing roadway.

There may be some variation to this sequence and the preferred method of undertaking particular works. The construction method would be required to comply with the construction concepts and environmental management requirements presented in this REF, the Decision Report and the Environmental Management Plan (EMP) for the works.

8.10 Construction Equipment

It is anticipated that equipment used during construction of the Proposal would include:

- Woodchippers
- Stump grinders
- Backhoes
- Excavators
- Static Rollers

- Bulldozers
- Concrete Agitator Trucks
- Vibrating Rollers
- Paving Machines
- Graders

9 Environmental Assessment

9.1 Background Searches

Background searches were undertaken as part of the specialist studies commissioned for Indigenous and Historic Heritage Assessment Report by ERM Australia (Section 9.9 and Appendix C) and the Flora and Fauna Survey by Landscope Environmental (Sections 9.6 and 9.7 and Appendix D).

Register of the National Estate

Eight items are listed on the Register of the National Estate Database (11/04/2002) at or near Appin. They are:

- Cataract Dam Appin Road, Appin Indicative Place 13km from the proposal.
- Indigenous Place Appin Registered.
- Indigenous Place Appin Registered.
- Indigenous Place Appin Registered.
- O'Hares Creek Catchment Bulli Road, Appin Registered.
- St Bedes Catholic Church and Graveyard King Street, Appin Registered.
- St Mark the Evangelist Anglican Church Church Street, Appin Registered.
- Upper Nepean Water Catchment Mount Kiera Rd, Mount Kiera Indicative Place.

NSW Heritage Office State Heritage Register

Beulah House, Outbuilding, timber Bridge and gazebo was the single statutory listed item identified (11/04/02).

RTA s.170 Heritage and Conservation Register

One Item, Victoria Bridge over Stonequarry Creek, Picton, Wollondilly LGA, is listed on the RTA s.170 Heritage and Conservation Register in the Southern Region of the RTA. The bridge is not located in the study area and as such would not be directly affected by the Proposal. No items are listed for Campbelltown LGA.

Campbelltown City Council and Wollondilly Council LEP Heritage List

The Heritage Assessment undertaken by ERM (**Appendix C**) investigated the Wollondilly Council LEP list.

National Native Title Tribunal

A native title search request was lodged with the National Native Title Tribunal (18/3/2002). As of 20/3/2002 there were no Native Title applications registered or in the process of registration which affect the study area.

NSW NPWS Aboriginal Sites Register

A search of the NSW NPWS Aboriginal Sites Register identified no archaeological sites within the study area, but lists 29 recorded Aboriginal sites within 2.5km of the study area. This indicates that parts of the region are well surveyed and that the region has a high potential for Aboriginal sites. Further information on Aboriginal Sites and their location is located in **Section 9.9** and **Appendix C** of this REF.

NPWS Atlas of Wildlife - Flora Records

The Flora and Fauna Survey undertaken by Landscope Environmental searched the Environment Australia Online Database (Environment Australia 2001), the National Parks and Wildlife Service's Atlas of New South Wales Wildlife Database (NPWS June 2001), the Western Sydney Urban

Bushland Biodiversity Survey (NPWS 1997) Wollondilly Shire Council's State of The Environment Report (2001) and Campbelltown City Council's State of The Environment Report (1999/2000). Twenty-six (26) plant species of national conservation significance were identified as having been recorded in the Wollondilly and Campbelltown local government areas. For reference, these are listed in the Flora and Fauna Report presented in **Appendix D**.

NPWS Atlas of Wildlife - Fauna Records

The studies and reports referred to in the Flora and Fauna Survey undertaken by Landscope Environmental include:

- Campbelltown City Council's Statement of Environmental Effects (Campbelltown Council 1999-2001);
- Fauna lists prepared for the Campbelltown Local Government Area (NPWS 1997); and
- A flora and fauna assessment for the proposed bypass of the township of Appin (LesryK Environmental Consultants 1995).

In addition to these documents, the Environment Australia Online Database (Environment Australian February 2002) and National Parks and Wildlife Service's Atlas of New South Wales Wildlife Database (NPWS February 2002) (search area 10×10 kilometres centred on study area) were also accessed.

Refer to **Appendix F** for the all database searches and the full species list.

9.2 Landforms, Geology & Soils

Existing Situation

The site is located on the Cumberland Plain, characterised by gentle slopes with incised drainage channels. Natural slopes are generally low, being typically less than 5%. The landscape consists of almost completely cleared, dry sclerophyll low open forest and low woodland. The road corridor has been planted with native trees.

The geology of the area is located within the Georges River Alluvial terraces. The soils are classified as part of the Blacktown group. These are clay soils derived from the Wianamatta Shale.

Impacts

The Proposal would alter the appearance of the landscape by the removal of a large number of trees along the length of the widening. Due to the altitude of the Proposal site it is considered unlikely to have any acid sulphate soils present. The soil is considered to have low fertility and is mainly used as forestry for the growing of timber and the grazing of cattle.

There is no evidence of major erosion problems within the area of the proposed site. To ensure erosion and sedimentation impacts are minimised, control measures (as outlined below) would be implemented. These mitigation measures would be designed to filter sediment-laden run-off water from the road drainage system before it leaves the site.

Proposed Safeguards

Erosion and Sediment Control would be managed through the implementation of safeguards detailed in Section 6.5.1 (Erosion and Sedimentation Control), 6.5.2 (Stockpile Management), 6.5.3 (Water Quality) of the RTA's QA Specification G35.

REF: Proposed Passing Lane on Appin Road Environmental Technology - RTA Operations.

9.3 Contaminated Land

Existing Situation

It is not anticipated that any contaminated lands would be located in or adjacent to the study area.

Impacts

The Proposal has the potential to expose contaminated land as earthworks are being undertaken. However, given that the area is largely undeveloped and rural, it is highly unlikely that there would be any existing contaminated land in the study area.

The Proposal also has the potential to create contaminated land through the spillage of fuels and other chemicals used during the construction of the rest area. Again, the risk is low as the amount of fuels and chemicals used for this type of works is relatively low.

Proposed Safeguards

Controls associated with Contaminated Land would be undertaken in accordance with the specifications set out in **Section 6.5** (p.14) of RTA's Environmental Protection (Management Plan) - QA Specification G35.

9.4 Climate and Air Quality

Existing Situation

The climate in the vicinity of the Study Area is generally mild with an average maximum temperature of 28.5°c and an average minimum of 8.8°c. On approximately forty-two days per year the temperature can be expected to reach 30°c and on sixty-two days it can be expected to drop below 2°c. The highest maximum temperature is in February (42.8°c) and the lowest minimum temperature is in July (-10°c). Average wind speeds range from 4.5 kilometres/hour in February, to 9.3 kilometres/hour in November. (Wollondilly SoE)

The study area is considered to be within a medium air quality environment due to a medium to high population density, combined with medium levels of industrial activity. Industry in the vicinity of the study area includes Ingham's (Chicken) Enterprises Processing Plant which would have some impact on local air quality. Air quality is not expected to alter substantially closer to the Road corridor, however traffic emissions of this relatively busy road may impact on air quality on a local scale.

Potential Impact

Rain and occasional fog would be high risk factors during construction. Heavy rain could amplify construction problems with water draining off the pavement into work areas and then transporting high sediment loads into traversing drainage lines. Additional traffic problems could occur as a result of accidents due to poor visibility, increasing the potential for material spillages and traffic delays.

During construction, temporary dust impacts could potentially affect road users and nearby residents. However, due to the minor nature of the works it is unlikely that road users and residents would experience any adverse impacts.

Post construction, it is not anticipated that there would be any worsening of air quality, as the works will not result in an increase in traffic.

Proposed Safeguards

Air quality with respect to the proposal would be managed through the implementation of safeguards detailed in Section 6.6 (Air Quality) of the RTA's QA Specification G35. Safeguards in relation to climate include all mitigative measures outlined in **Section 10.1** of this REF.

REF: Proposed Passing Lane on Appin Road Environmental Technology - RTA Operations.

9.5 Hydrology and Water Quality

Existing Situation

The site is located at an elevation of approximately 220m, the Georges River passes south to north approximately 500m east of the proposal.

Potential Impact

The Proposal has the potential to impact on the water quality of the Georges River (located 500m east of the Proposal) through the input of sediment contained in site run-off, pollutants from fuel and hydraulic fluid leaks or spills, and general litter.

Spills during the refuelling of plant and equipment have the potential to cause localised contamination of waterways. Mitigation measures outlined below would ensure this risk is kept to a minimum.

After construction the proposal has the potential to increase runoff volumes and velocity through increasing the impervious area of the road. This has the potential to exacerbate downstream flooding and erosion problems.

Proposed Safeguards

Hydrology and Water Quality would be managed through the implementation of safeguards detailed in Section 6.5.1 (Erosion and Sedimentation Control), 6.5.2 (Stockpile Management), 6.5.3 (Water Quality) of the RTA's QA Specification G35.

9.6 Flora

Landscope Environmental was commissioned by the RTA to carry out a Flora Assessment for the Proposal. The assessment involved:

- A literature review
- A field survey (February 2002)
- A report including:
 - An assessment of the type and degree of impacts of the Proposal on flora species and communities in the Study Area; and
 - Recommendations to reduce the extent of impacts of the proposal on all flora species and/or communities.
- Specific input such as:
 - An assessment in accordance with EPBC administrative guidelines; and
 - An "eight-part test" under Section 5A of the Environmental Planning and Assessment 1979.
- Preparing maps and photographs.

The Landscope Environmental report, including a list of all species occurring in the study area is given in **Appendix D**.

Existing Situation

Vegetation Communities:

Two broad vegetation communities occur within the subject site:

- 1. Grey Box Narrow-leaved Ironbark Forest Red Gum (Eucalypt) Woodland; and
- 2. Exotic Grassland.

Community I: The road reserve on the western side of Appin Road is vegetated by remnant woodland that is part of the Cumberland Plain Woodland complex. This complex is listed as an endangered ecological community on Schedule I, Part 3 of the NSW Threatened Species Conservation Act 1995 and on Schedule I of the Environment Protection and Biodiversity Conservation Act 1999. At the northern end of the alignment corridor, Grey Box and Narrow-leaved Ironbark are the most common trees, while at the southern end Narrow-leaved Ironbark is replaced by Forest Red Gum. The remnant woodland is very narrow between the edge of the road and the adjacent property boundary and is generally between about 5 metres and 8 metres wide. On private land adjacent to the road reserve, scattered trees of the same species occur but the understorey is completely cleared and agricultural grasses have been sown for livestock grazing.

The Community comprises trees to 20 metres in height with a spreading, medium density canopy. A native shrub layer to 2 metres high is present and in some areas is in good condition. The groundcover varies from completely weed dominated to native grasses, herbs and twiners with sparse weeds. Weeds are most common in the roadside drainage swale where they comprise almost the entire vegetation. Few saplings are present in the study area. This lack of seedlings is likely due to the age of the trees and the dense weed grass cover in many areas, preventing the establishment of seedlings.

Community I Common Species (*= exotic species)

Trees

The most abundant tree species are Grey Box *Eucalyptus moluccana* (which occurs throughout the Study Area), Forest Red Gum *Eucalyptus tereticornis* and Narrow-leaved Ironbark *Eucalyptus crebra*. Rough-barked Apple *Angophora floribunda* and Thin-leaved Stringybark *Eucalyptus eugenoides* also occur at the northern end of the corridor.

Shrubs

Common species of the shrub stratum, where present are Blackthorn *Bursaria spinosa*, Sickle Wattle *Acacia falcata*, Cherry Ballarat *Exocarpos cuppressiformis*, and Parramatta Green Wattle *Acacia parramattensis*.

Groundcovers

Common groundcover species are Rhodes Grass Chloris gayana*, Happy Wanderer Hardenbergia violaceae, Centella asiatica, Common Couch Cynodon dactylon, Pale Vanilla Lily Arthropodium milleflorum, Kikuyu Grass Pennisetum clandestinum*, Purple Top Verbena bonariensis*, Ribwort Plantago lanceolata*, Cobbler's Pegs Bidens pilosa* and Common Sida Sida rhombifolia*.

Community 2: All of the area to the west of the existing road reserve consists of privately owned farming properties that have been cleared and intensively grazed over many decades. While scattered native trees occur, the understorey has been substantially cleared and a grassland dominated by exotic species has resulted. Grassland dominated by Kikuyu also occurs in patches in the road reserve, where trees do not occur.

Community 2 Common Species (*= exotic species)

Entolasia stricta, Prairie Grass Bromus catharticus*, Wild Oats Avena fatua*, Italian Ryegrass Lolium multiflorum*, Kikuyu Grass Pennisetum clandetinum*, Common Couch Cynodon dactylon, Rhodes Grass Chloris gayana* and Paspalum Paspalum dilatatum *. Common herb species are predominantly weeds including Fleabeane Conyza bonariensis*, Scotch Thistle Onopordum acanthium ssp. acanthium*, Common Sowthistle Sonchus oleraceus*, White Clover Trifolium repens* and Purple Top Verbena bonariensis*.

Conservation Significance

Twenty-six (26) plant species of national conservation significance were identified as having been recorded in the Wollondilly and Campbelltown local government areas. Please Refer to Appendix 2 of the Flora and Fauna Report (**Appendix D**). However, no species of national or state conservation significance listed by Briggs and Leigh (1996) or on the Schedules to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* or the NSW *Threatened Species Conservation Act 1995* were located during the survey.

The following five (5) species have been identified within the study area and are considered to be of regional conservation significance in western Sydney. These species occur scattered through the remnant native vegetation stand within the road reserve. They are:

- · Rumex brownii, Pale Vanilla Lily;
- Arthropodium milleflorum, Saloop Bush;
- · Einadia nutans var. nutans, Love Creeper;
- Glycine microphylla; and
- Vittadinia sulcata, Fuzzweed.

Impacts

As a result of construction of the proposed overtaking lane, approximately 60 Eucalypt trees would require removal. The removal of these individuals from the Cumberland Plain Woodland complex would not result in the regional or local extinction of the species. Nor would it result in a substantial reduction in the area of the community remaining in the Sydney Basin Bioregion, with approximately 0.01% of the known extant area of the community proposed to be removed.

The stand has been, and continues to be modified and degraded by weed invasion, natural senescence, road runoff and the direct and indirect effects of agricultural and urban development. Given these factors the "eight part test" undertaken by Landscope environmental concluded that the removal of the individuals within the community as part of the Proposal does not constitute a significant impact and the preparation of a Flora Species Impact Statement would not be required.

Proposed Safeguards

Flora Controls would be undertaken in accordance with the specifications set out in **Section 6.9**, **Section 6.10** and **Section 6.18** (p.19/20/25) of RTA's Environmental Protection (Management Plan) - QA Specification G35. In addition, the following site specific mitigative measures would also be required as part of the Proposal:

 Trees would be removed and felled in such a manner that they minimise the extent of disturbance on adjacent vegetation.

9.7 Fauna

Landscope Environmental was commissioned by the RTA to carry out a Fauna Assessment for the Proposal. The assessment involved:

- A literature review
- A field survey
- A report including:
 - An assessment of the type and degree of impacts of the Proposal on flora species and communities in the Study Area; and
 - Recommendations to reduce the extent of impacts of the proposal on all fauna species and/or populations.

- Specific input such as:
 - An assessment in accordance with EPBC administrative guidelines;
 - An assessment of the impacts of the proposal in relation to SEPP 44 Koala Habitat; and
 - An "eight-part test" under Section 5A of the Environmental Planning and Assessment 1979.
- Preparing maps and photographs.

The Landscope Environmental report, including a list of all species occurring in the study area is given in **Appendix D**.

Existing Situation

Fauna Characteristics of the Site

Fauna surveys previously undertaken for the region and compilation lists previously prepared were investigated by Landscope Environmental. These lists identified forty native mammals, two hundred and twelve native birds, forty-eight reptiles, twenty frogs and one threatened invertebrate previously recorded in the area. The survey of the study area recorded one native mammal, ten native birds and one reptile in the study area. Please refer to Appendix 3 of the Flora and Fauna Report (Appendix D) for further detail.

Threatened Fauna

During the field investigation one species, the White-throated Needletail, *Hirundapus caudacutus*, listed under the Schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* was recorded. Giving consideration to the habitat requirements of these species, and the relative size of the site in comparison to other large stands of woodland in the study region, it is not considered that the White-throated Needletail would be adversely affected by the current Proposal.

No species scheduled under the NSW *Threatened Species Conservation Act* were recorded or indicated as occurring within the study area, and the habitat(s) to be removed or temporarily affected by the proposed works are not considered significant for the life cycle requirements of any of the threatened species identified as having been previously recorded in the study region. Please refer to Section 13.2 of the Flora and Fauna report (**Appendix D**).

Fauna Habitat

1. Grey Box - Narrow-leaved Ironbark - Forest Red Gum (Eucalypt) Woodland

The Eucalypt woodland occurs as a band of remnant vegetation 5 to 20 metres wide. This habitat type is restricted mainly to the road reserve of the study area. The width of the woodland band varies throughout the study area. The woodland supports large mature trees to 15 metres in height, some of which contain hollows (to 300 mm in diameter) suitable for the roosting and breeding needs of native animals.

Throughout the woodland, the tree canopy is relatively continuous. The understorey contains a sparse to medium density layer of native shrubs and saplings to 3 metres in height. The ground cover consists of a medium to high density layer of both native and exotic grasses and herbs to a height of I metre. Leaf litter, logs and ground debris, all important habitat features for reptiles, frogs and invertebrates, are also present within the woodland community. As a result of construction of the proposed overtaking lane, approximately 60 Eucalypt trees would require removal.

Given the size of the hollows present in the trees, and the context of the study site, these could potentially be used by several of the hollow dependant threatened microchiropterans (insectivorous bats) previously recorded in the region. The size of the hollows would not be suitable for any of the

threatened owls, nor, given the essentially isolated location of the site, any of the threatened arboreal mammals.

In relation to the threatened bats, even though these species could potentially occur within several of the tree hollows present, in comparison with the habitat resources provided in the nearby conservation areas, the habitats present within the study area are considered to be of limited value. The fauna assessment found, that at a regional level, the loss of several hollow bearing trees that may be utilised by hollow dependant threatened bats, is not considered to present a significant impact on these species, their populations, ecological communities or habitats.

The area is not considered Potential or Core Koala habitat. Giving consideration to the objectives of SEPP 44, it is not considered that the proposed works would require the preparation of a Plan of Management for Koalas, or the adoption of any other mitigative measures.

2. Exotic Grasslands

No native species are considered to rely on this habitat type for any of their important life cycle components. Several very common and adaptable native animals, which are regularly observed in cleared disturbed areas, were observed within the grasslands, but the habitat resources present are not considered to be integral to the presence of these animals. It is not anticipated that the removal or further modification of this habitat type would adversely affect any native Fauna species.

Impacts

The woodlands within the study area would provide resources suitable for the life cycle needs of a range of tolerant and highly adaptable native species, though it is not considered that the loss of these resources would result in either the local displacement of loss of any of those animals recorded or expected. In comparison with proximate areas of larger more intact and better conserved bushland, the woodland remnant within the study area is not considered an important habitat resource or fauna corridor.

The proposed works would not result in any threatened species, populations, ecological communities, or habitats being significantly impacted upon, such that a viable population of that species would be placed at risk of extinction. Similarly, the works would not fragment, disturb or alter any movement or dispersal corridors, or isolate any proximate areas of suitable habitat.

Given these factors the "eight part test" undertaken by Landscope environmental concluded that the removal of the woodland remnant within the road reserve does not constitute a significant impact on the fauna of the area and the preparation of a fauna Species Impact Statement is not considered necessary.

Based on the results of the flora and fauna surveys and the literature review, it is not considered that there are any ecological constraints to the proposed construction of an overtaking lane on Appin Road, Appin, proceeding as planned. The proposed works would not appreciably affect any populations of native plants or animals such that they are placed at risk of extinction. Similarly the works would not remove or affect any habitats of local, regional, state or national conservation concern.

The Proposed addition of an overtaking lane to Appin Road, north of the township of Appin, NSW, is not considered to considerably affect, threaten or have an adverse impact on any of the species listed under the Schedules to the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 or the NSW Threatened Species Conservation Act 1995.

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The proposal would not require the preparation of a fauna Species Impact Statement and it is unlikely to require referral of the matter to the Federal Minister of the Environment.

Proposed Safeguards

Fauna Controls would be undertaken in accordance with the specifications set out in **Section 6.9**, **Section 6.10** and **Section 6.18** (p.19/20/25) of RTA's Environmental Protection (Management Plan) - QA Specification G35. In addition, the following site specific mitigative measures would also be required as part of the Proposal:

- Prior to their removal, all hollow-bearing trees would first be checked for the presence of birds
 nesting and arboreal animals such as possums and bats. Animals found to be occupying trees
 would be safely removed before clearing of the trees or shrubs. Removed animals would be
 relocated to adjacent woodland habitats by a qualified ecologist; and
- Tree hollows would also be checked for animals after felling or pushing, and injured animals would be taken to a local vet, or the local wildlife rescue service would be notified.

9.8 Noise and Vibration

A noise and vibration assessment was undertaken by Environment Technology Branch. The study involved:

- An assessment of the works to determine potential impacts;
- Identification of potential impacted receiver locations;
- Determination of ambient environmental conditions:
- Identification of applicable environmental assessment criteria;
- Prediction of the impacts of the Proposal on the existing environment and against the target objectives; and
- Recommendation of mitigation measures

Field investigations were undertaken by Environment Technology Branch, Environmental Monitoring Section for a period of five days from Tuesday 26th February 2002, to Saturday 2nd March 2002, inclusive. Noise measurements were obtained by placing an Acoustic Research Laboratories Noise Logger 1.5m from the closest facade of one of the three potentially impacted receivers. A copy of the Noise and Vibration Assessment Report is provided as **Appendix E.**

Existing Situation

Residential properties are located on the eastern side of Appin Road. There are 3 isolated potentially impacted receivers in the study area with access to Appin Road. These properties are located approximately 15m from the roadway and would potentially be affected by Construction noise and vibration.

Potential Impact

Potential impacts on the three identified receivers as a result of the Proposal are:

- Construction noise;
- Construction vibration; and
- Operational noise.

Construction Noise: The NSW Environment Protection Authority (EPA) *Environmental Noise Control Manual* (ENCM), Chapter 171, sets out noise criteria applicable to construction site noise for the purpose of defining intrusive noise impacts.

The duration of the proposed works would be approximately 6 months, however due to the progressive nature of the works, construction in front of the identified receivers would be unlikely to take place for the full duration of the Proposal. Consequently, EPA's 4-26 week construction criteria have been used in this assessment (measured background noise plus 10 dB). Considering the typical sound power levels of construction plant items, **Table 9.1**, below shows predicted construction noise levels compared to the relevant EPA noise goals at the three identified receivers.

Table 9.1: Construction Noise Level Objectives and Predicted Levels at Identified Receivers.

Site	EPA Construction Noise Goal Day LA ₁₀ (0700 – 1800)	Predicted Construction Noise LA ₁₀ (0700 – 1800)	Exceedance of EPA Goal dB
Α	50	80	+30
В	50	80	+30
C	50	80	+30

While daytime construction activities are predicted to exceed the current EPA Criteria by up to 30 dB, it is not expected that these levels would cause adverse comment, however, it is recommended that best practice work methods be adopted to ensure that potential impacts would be minimised.

Construction Vibration: German Standard DIN 4150 (1986) which sets conservative vibration levels for structural damage at 5mm/second is generally recognised as setting the most appropriate criteria for architectural assessment. These levels would rarely be exceeded by roadworks, however human perception and comfort levels are usually reached at a much lower level. In this regard the British Standard BS6472 provides the most authoritative criteria for assessment of the impacts of construction vibration on the community. For details of criteria with regard to construction vibration (please refer to Section 4.2 of Appendix E).

It may be expected that the residences would experience vibration levels up to 3 mm/sec when vibratory rolling is being undertaken at the closest point to the residence. While this level of vibration is well below levels that may cause architectural damage, it would be at a level that would be likely to cause adverse comment.

Operational Noise: The NSW Government's "Environmental Criteria for Road Traffic Noise" (ECRTN) (May 1999) provides the assessment criteria for road traffic noise in NSW. According to the definitions supplied, the scope of this Proposal is such that it does not provide for substantial changes in alignment or a design increase in traffic volumes or mix, therefore the Proposal is not subject to noise level targets.

Since residences are located on the eastern side of Appin Road, the inclusion of the proposed passing lane on the southbound traffic and the relocation of the northbound traffic towards the west would imply that residences would be further away from the northbound traffic. It would be expected that the new lane configuration with the proposed passing lane would result in minor reduction in the operational road traffic noise at all identified receiver locations. The overall operational noise level would be expected to improve and decrease by approximately 2 to 4 dBA.

Proposed Safeguards

Noise and Vibration controls would be undertaken in accordance with the specifications set out in **Sections 6.7** and **6.8** (pp.17/18) of RTA's Environmental Protection (Management Plan) - QA Specification G35. In addition, the following site-specific safeguards have been recommended in the specialist Noise and Vibration Assessment.

Construction works would be restricted to the following times:

Monday to Friday:

7 am to 6pm

Saturday:

8 am to Ipm

Sundays and Public Holidays:

No Work.

- For works performed outside of the standard working hours, the procedure contained in the RTA's Noise Management Manual, 2001, "Practice Note vii Roadworks Outside of Normal Working Hours" shall be followed: and
- Mitigation strategies would be developed and best management practices would be adopted that are consistent with the RTA's Environmental Noise Management Manual, 2001.

9.9 Indigenous and Non - indigenous Heritage

Environmental Resources Management Australia (ERM) was commissioned by the RTA to carry out an Indigenous and Historic Heritage Assessment for the project. The assessment involved, but was not limited to:

- Review of relevant statutory registers and inventories of Indigenous and historic cultural heritage;
- · Review of previous Indigenous and historic cultural heritage investigations;
- Development of a predictive archaeological statement;
- Liaison with the Tharawal Local Aboriginal Land Council (TLALC);
- · Identification of remediation impacts; and
- Development of recommendations and mitigation measures.

The archaeological survey of the study area was carried out on 20/3/2002 by Andrew Sneddon of ERM, accompanied by Lance Syme of TLALC. A copy of the ERM report is presented as **Appendix C.**

Existing Situation

The background searches undertaken by ERM found that there is scholarly disagreement over whether the area now occupied by Appin was part of the Gandangara or Tharwal People. Traditional practices survived into the late eighteenth century, even though Aboriginal people became heavily involved with the European settlers. Despite destruction caused by clearing for roads and paddocks, previous archaelogical studies within a 2.5km radius have uncovered five types of site; open artefact scatters, grinding grooves, modified trees, art, and NPWS Potential Archaeological Deposits.

The field survey did not result in the recording of indigenous or historic sites within the study area. A timber stockyard of indeterminate age was noted to the north west, outside the study area, and would not be affected by the proposal. The study concluded that the avenue of trees flanking Appin Road should be considered a natural feature which has been modified by humans to form part of the wider cultural landscape and that Appin Road is a historic communication route.

Impacts

As a result of the heritage investigations, it is not anticipated that the Proposal would impact on any item of Indigenous or Non-Indigenous Heritage.

Proposed Safeguards

Indigenous Heritage Controls would be undertaken in accordance with the specifications set out in Section 6.14 (p.22) of RTA's Environmental Protection (Management Plan) - QA Specification G35. In addition, the following site-specific controls would also be undertaken:

• The number of trees removed by the Proposal would be kept to a minimum, and appropriate replanting take place upon completion of the Proposal.

9.10 Socio-economic Considerations

Existing Situation

The project lies across two council areas, Campbelltown and Wollondilly. A large number of Wollondilly residents (70% of those employed) travel outside Wollondilly LGA to employment in Campbelltown, Camden, Liverpool and other areas. Tourism is a growing industry for Wollondilly Shire. Greater awareness of the area's closeness to Sydney, together with its projected rural image, has meant an increase in tourism traffic. Accommodation in the area is award-winning and the future trend is expected to be an increase in Farmstays. The region is also eagerly awaiting the soon-to-becompleted Highlands Resort.

Impacts

The proposal has the potential to improve transport between Appin, and the wider Wollondilly LGA and Campbelltown. This will benefit road users and the economies of both areas.

The proposed works are highly unlikely to negatively alter the socio-economic circumstances of the region as the Proposal would ensure continued accessibility for transport including freight and tourist traffic. In the short term the Proposal would cause a small amount of delay for residents and businesses using the road for transport purposes.

Proposed Safeguards

Traffic would be managed during the works in accordance with **Section 6.4** (access and Traffic Management) of the RTA's QA Specification G35. In addition, the safeguards as outlined in **Section 10** of this REF would provide overall assistance in the realisation of positive social and economic values.

9.11 Visual and Landscape Assessment

Existing Situation

The site is located on the Cumberland Plain, characterised by gentle slopes with incised drainage channels. Natural slopes are generally low, being typically less than 5%. The landscape consists of almost completely cleared, dry sclerophyll low open forest and low woodland. The road corridor is lined with native trees.

Appin road is a communication line of historic importance. The trees flanking the road represent a conscious reworking of the natural environment to produce a particular landscape. As such, Appin Road's avenue of trees forms both a natural and cultural landscape.

The landscape has been considerably altered in recent decades. Long stretches of the trees flanking Appin Road have been removed, particularly around the entrance to Ingham's Enterprises.

Impacts

The proposed works would generally result in:

- Widening of the road pavement; and
- Removal of a number of large trees resulting in a break in the already fragmented avenue of trees adjacent to Appin Road.

It is not anticipated that the proposed works would introduce a substantial visual impact due to the level of current disturbance over a majority of the study area and the introduction of safeguards such as progressive rehabilitation and revegetation of the site post construction.

Proposed Safeguards

Measures recommended to minimise the potential impacts are:

- The number of trees removed would be kept to a minimum; and
- Encourage the re-establishment of shrub and ground vegetation at the edge of works.

9.12 Waste Minimisation and Management

Impacts

Wastes generated from the Proposal would include:

- Bitumen, concrete and asphalt.
- Cleared vegetation and topsoil.
- Waste oils and liquids from maintenance of construction plant and equipment.
- Garbage and sewage from site compounds.

Proposed Safeguards

The RTA adopts the Resource Management Hierarchy principles embodied in the Waste Avoidance & Resource Recovery Act 2001 (WARR Act). The Resource Management Hierarchy principles of the WARR Act are as follows:

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

Waste Management controls would be undertaken in accordance with the specifications set out in **Section 6.17** (p.24) of RTA's Environmental Protection (Management Plan) - QA Specification G35

9.13 Cumulative Environmental Effects

The anticipated cumulative environmental effects of the Proposal relate to the combined effect of individual impacts of the Proposal, as well as to the cumulative effect of this Proposal with other nearby projects or planned projects or activities in the locality.

It is not anticipated that the RTA, in the near future, would carry out any additional works in the vicinity of the study area. However, should a program of additional works be realised, the potential cumulative environmental effects of multiple upgrading Proposals would include:

- A short term decrease in water quality in the local catchments would occur as potential point sources of pollution are increased. Works would be relatively minor in nature, and a major river, the Georges River is located within 1km of Appin Rd;
- A short term decrease in air quality of the environment immediately surrounding the study area(s) would occur as the amount of heavy machinery and vehicles associated with construction would increase:
- Cumulative short term increases in travel time have the potential to occur as travel speeds are reduced in the vicinity of the proposed works; and
- A positive long term cumulative impact would be a reduction in accidents due to the provision
 of additional infrastructure to support road users travelling short and long distances.

Therefore the introduction of safeguards such as those outlined in **Section 10** of this REF would be of paramount importance in the management and reduction of potential environmental impacts associated with any future works in the area.

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9.14 Principles of Ecologically Sustainable Development

The National Strategy for Ecologically Sustainable Development (NSESD) has been formulated to ensure ESD is accounted for in 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 which are considered below in **Table 9.2** in terms of the Proposal.

Table 9.2: Principles of ESD applied to the Proposal

Principle	Consideration for Proposal
Precautionary Principle	The Proposal follows the existing road corridor, widening only marginally. Mitigation measures have been proposed which would minimise the impacts of the Proposal. None of the studies undertaken identified any serious or irreversible damage.
Intergenerational Equity	The Proposal considers future land use and would improve congestion to future motorists. At the same time, the Proposal considers and minimises impacts on the local environment to ensure that no further degradation would occur.
Conservation of Biological Diversity & Ecological Integrity	The Proposal has avoided, where possible, disturbance to the local ecology. Where this has not been possible, mitigation measures have been included in this REF (Sections 9.6 and 9.7) to ensure the Proposal would not compromise biological diversity or ecological integrity.
Improved Valuation and Pricing of Environmental Resources	The integrity of the Georges River and its catchment area, 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 Cumberland Plain Woodland is also recognised as a valuable resource in terms of its life support system for communities and its ever-dwindling nature. To ensure that these resources remain, the Proposal addresses issues relevant to water quality and ecological integrity. Mitigation measures outlined in this REF (Section 8.2) have been provided to ensure the value of these environmental resources is maintained.

9.15 Matters of National Environmental Significance and Commonwealth Land

The Commonwealth Environment Protection and Biodiversity Act 1999 (EPBC Act) requires that the following factors must be considered:

Matters of National Environmental Significance

- World Heritage Properties: None Found within 10km of the study area.
- Wetlands of International Importance: The study area is listed as being within the catchment of Towra Point Nature Reserve. Towra Point Nature Reserve is located approximately 35km north east of the study area.
- Commonwealth Listed Threatened Species and Ecological Communities: There are 2
 Threatened Ecological Communities and 28 listed Threatened Species potentially occurring in the vicinity of the proposed works.
- Commonwealth Listed Migratory Species: There are 8 migratory species potentially occurring within 10km of the study area.
- Nuclear Actions: The Proposal would not involve a nuclear action.
- Commonwealth Marine Areas: None Found within 10km of the study area.

Other Factors:

- Commonwealth Land: There are no Commonwealth reserves listed within 10km of the study area.
- **Regional Forest Agreements:** There are no Regional Forest Agreements listed within 10km of the study area.
- Conservation Reserves: There are no Conservation Reserves listed within 10km of the study area.

For clarification of NES issues with regard to Vegetation Communities, please refer to **Section 9.6** of this report and **Appendix D**. The factors which need to be taken into account when considering the environmental impact of an activity on NES Matters and Commonwealth Land are listed and considered in **Section II** of this REF. Refer to **Appendix D** for results of the EPBC Act database search.

The study area is listed as being located within the catchment area of Towra Point Nature Reserve, a RAMSAR wetland. However, the study area is approximately 35km south west of that Reserve, and provided that erosion, sedimentation and pollution control measures are implemented effectively on site, it would be highly unlikely that the localised catchment would be affected in any way by the Proposal.

10 Implementation Stage

10.1 Summary of Proposed Safeguards

A Project Environmental Management Plan (PEMP) and Contractor's Environmental Management Plan (CEMP) would be developed in accordance with the specifications set out in the RTA's *Environmental Protection (Management Plan) - QA Specification G35*. **Table 10.1**, below outlines additional site specific requirements that are not covered by G35 for inclusion in the PEMP / CEMP. The PEMP and CEMP would be reviewed and certified by the RTA Environmental Adviser, Sydney Region, prior to the commencement of any site works.

Table 10.1 - Site Specific Safeguards.

Impact	Mitigation Measure			
Flora	In addition to the controls set out in Section 6.9 of the RTA's Environmental Protection (Management Plan) - QA Specification G35, the following site specific safeguards would also be incorporated into the PEMP:			
	 Trees would be removed and felled in such a manner that they minimise the extent of disturbance on adjacent vegetation. 			
Fauna	In addition to the controls set out in Section 6.10 of the RTA's Environmental Protection (Management Plan) - QA Specification G35, the following site specific safeguards would also be incorporated into the PEMP:			
	 Prior to their removal, all hollow-bearing trees would first be checked for the presence of birds nesting and arboreal animals such as possums and bats. Animals found to be occupying trees would be safely removed before clearing of the trees or shrubs. Removed animals would be relocated to adjacent woodland habitats by a qualified ecologist; and 			
	 Tree hollows would also be checked for animals after felling or pushing, and injured animals would be taken to a local vet, or the local wildlife rescue service would be notified. 			
Visual and Landscape	 The number of trees removed would be kept to a minimum; and Encourage the re-establishment of shrub and ground vegetation at the edge of works. 			
Indigenous and Non- indigenous Heritage	 In addition to the controls set out in Section 6.14 of the RTA's Environmental Protection (Management Plan) - QA Specification G35, the following site specific safeguards would also be incorporated into the PEMP: The number of trees removed by the Proposal would be kept to a minimum, and appropriate replanting take place upon completion of the Proposal. 			

Impact	Mitigation Measure Noise and Vibration controls would be undertaken in accordance with the specifications set out in Sections 6.7 and 6.8 (pp.17/18) of RTA's Environmental Protection (Management Plan) - QA Specification G35. In addition, the following site-specific safeguards would also be incorporated into the PEMP.			
Noise and Vibration				
	Construction works would be restricted to the following times:			
		Monday to Friday:	7 am to 6pm	
		Saturday:	8 am to 1pm	
		Sundays and Public Holidays:	No Work.	
	proced "Praction	For works performed outside of the standard working hours, the procedure contained in the RTA's Noise Management Manual, 2001, "Practice Note vii - Roadworks Outside of Normal Working Hours" shall be followed; and		
		tion strategies would be develo		

Environmental Noise Management Manual, 2001.

10.2 Summary of Key Issues / Risks

- Potential presence of sites of indigenous archaeological / cultural significance;
- Presence of one (I) EPBC Act Schedule I and TSC Act Schedule I (threatened) vegetation community; and
- Noise and Vibration during construction.

10.2.1 Summary of Beneficial Effects

- Increased safety for all road users, primarily heavy vehicle drivers;
- Improved travel times for all road uses; and
- Improved travelling experience for all road uses along a tourist route.

10.2.2 Summary of Adverse Effects

- Short-term adverse Construction noise and Vibration;
- During construction, temporary dust impacts could potentially affect road users and nearby residents;
- Traffic delays during construction due to a period of partial road closure; and
- Potential for water pollution, erosion and sedimentation of the regionally significant Georges River.

11 Clause 228 and EPBC Act (1999) Checklist

11.1 Clause 228 Factors

The fifteen factors listed in Clause 228(2) of the State EP&A Regulation 2000 have been addressed in **Table II.I** below to ensure that the likely impacts of the proposed activities on the natural and built environment are fully considered.

Table 11.1: Clause 228 Factors (NSW Legislation)

` ' '	
Clause 228 Factors	Impact
a. Any environmental impact on a community? The Proposal would not have any adverse impacts on the community in the long-term. There may be some traffic delays in the short term during the works, however these would be mitigated with the introduction of safeguards as proposed in Section 10 of this REF.a management plan. The Proposal would have positive impacts on the community in the long term due to the improvements to traffic flow along Appin Road.	Short term negative, Long term positive.
b. Any transformation of a locality? The Proposal would generally transform the locality in a positive manner. Appin Road would be widened to ensure better traffic flows and therefore some roadside vegetation would be cleared, however this would be mitigated by landscaping and replacement planting.	Short term negative, Long term positive
c. Any environmental impact on the ecosystems of the locality? The Proposal would have a potential impact the ecosystems of the area and some potential habitat would be removed as a result of the removal of vegetation adjacent to the road. However, these impacts would be minimised through the introduction of mitigation measures as outlined in Section 10 of this REF.	Short term negative, Long term positive.
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality? The Proposal would result in short term noise and vibration impacts as a result of construction and a short-term reduction in aesthetic and scientific values through the removal of vegetation associated with the endangered Cumberland Plain Woodland. However, revegetation works proposed post construction (see Section 10 of this REF) would assist in the amelioration of these impacts in the long term.	Short term negative, 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? No localities, places or buildings having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations would be impacted as a result of the proposed works.	Nil
	\$

of the national parks and wildlife act 1974)?

The Flora and Fauna study undertaken for the Proposal found that no protected fauna or their habitats exist within the study area, therefore there would be no impact on their habitat as a result of the proposed works.

Nil.

g. Any endangering of any species of animal, plant or other form of life whether living on land, in water or in the air?

The Flora and Fauna study undertaken for the Proposal found that no protected flora, fauna or fauna habitat exists within the study area, therefore no species of animal, plant or any other form of life would be endangered as a result of the Proposal.

Nil.

h. Any long term effects on the environment?

The Proposal would have a positive impact on the safety of the environment with the introduction of improved traffic flow. The extent of the endangered Cumberland Plain Woodland would be reduced, however mitigative measures proposed in Section 10 of this REF and rehabilitation of the site post construction would substantially reduce the environmental impact(s) of the Proposal. Therefore there would be no long term negative effects on the environment.

Nil

i. Any degradation of the quality of the environment?

There would be a short term negative impact on the local environment as vegetation would be removed and negative noise impacts for sensitive noise receptors would be reduced through the introduction of mitigative measures as outlined in Section 10 of this REF. However, the local environment would be improved in the long term through the use of native plants for regeneration, thereby having a long term positive impact.

Short term Negative, Long term positive.

j. Any risk to the safety of the environment?

In the short term, environmental risk during construction would include chemical spills and general risk associated with working under trafficked conditions. These risks would be minimised with the introduction of mitigative measures as outlined in Section 10 of this REF. There would be no additional risk to the safety of the environment as a result of the Proposal in the long term.

Short term negative, Long term nil.

k. Any reduction in the range of beneficial uses of the environment?

There would be no reduction in the beneficial uses of the area as works would generally be located in areas of prior disturbance within the existing road corridor.

Nil

I. Any pollution of the environment?

The Proposal has the potential to pollute waterways, the soil, the air and areas immediately surrounding the study area. The mitigation measures outlined in this REF would reduce or prevent those impacts.

Short term negative.

m. Any environmental problems associated with the disposal of waste?

The Proposal is not expected to have any environmental problems associated with the disposal of waste.

Nil.

n. Any increased demands on resources (natural or otherwise) that are or are likely to become in short supply?

The Proposal would not increase demands on resources, natural or otherwise, that are or are likely to become in short supply.

Nil.

o. Any cumulative environmental effect with other existing or likely	
future activities?	Short
Other upgrade projects in the area also have the potential to be polluting, causing an overall increase in the pollution load in the short term.	term negativ
A positive long-term cumulative effect would be a reduction in accidents due to improved traffic flow as a result of the introduction of an overtaking lane.	e,
	Long
	term
	Positive

11.2 EPBC Act (1999) Checklist

An additional seven factors must be considered as a requirement of the Commonwealth EPBC Act. Those seven factors are addressed in **Table 11.2** below to ensure that the likely impacts of the proposed activities on matters of national environmental significance are fully considered.

Commonwealth Environment Protection and Biodiversity Conservation Act (1999) Factors	Impact
Any environmental impact on a world heritage property? There are no world heritage properties within the vicinity of the Proposal.	Nil.
. Any environmental impact on wetlands of international mportance?	
The closest wetland of international importance is Towra Point Nature Reserve, located approximately 35km north east of the study area. Provided hat erosion, sedimentation and pollution control measures are implemented effectively on site, the Proposal is at a sufficient distance to not impact upon hat wetland.	Nil.
. Any environmental impact on Commonwealth listed threatened pecies and ecological communities?	
There are 2 Threatened Ecological Communities and 28 listed Threatened species potentially occurring in the vicinity of the proposed works. The emoval of 60 trees assessed as being part of the Cumberland Plains Woodland would have a short-term negative impact. However, the introduction of afeguards as outlined in Section 9.6 (such as revegetation of the site post construction), it is not anticipated that there would be any long term negative mpact to this Woodland.	Short term negative Long term nil
I. Any environmental impact on Commonwealth listed migratory pecies?	
ight migratory species have been recorded within 10km of the study area, nowever due to the relatively minor nature of the proposed works and the presence of substantial areas of habitat in close proximity to the site, it is not inticipated that migratory species would be affected by the proposed works	Nil
e. Does any part of the Proposal involve a nuclear action? The Proposal does not involve a nuclear action.	Nil.
	r

f. Any environmental impact on a Commonwealth marine area?

Nil.

The study area is located approximately 30km from the coast, therefore there would be no environmental impact on any Commonwealth Marine area.

g. Any impact on Commonwealth land?

Nil.

The works would be undertaken entirely within the road reserve and a portion of private land purchased by the RTA that would be designated as part of the road reserve. Therefore, there would be no impact on Commonwealth Land.

î

12 References

ANZECC 1992 National Water Quality Management Strategy: Australian water quality guidelines for fresh and marine waters. Australian and New Zealand Environment and Conservation Council, Canberra.

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

Benson D and Howell J 1990 Taken for granted: the bushland of Sydney and its suburbs. Kangaroo Press, Sydney.

DoH 1998 Managing Urban Stormwater: Soils and construction. NSW Department of Housing, Sydney.

DoT 1998 Action for Transport 2010: an integrated transport plan for Sydney. Department of Transport, Sydney.

DUAP Shaping the Georges River Catchment: Regional planning strategy and Regional Environmental Plan for the Georges River catchment. NSW Department of Urban Affairs and Planning, Sydney.

EPA 1997 State of the Environment Report 1997. NSW Environment Protection Authority, Sydney. http://www.epa.nsw.gov.au/soe/97/ch1/6_1.htm.

RTA 1999 Code of practice for water management: Road development and management. NSW Roads and Traffic Authority, Sydney.

RTA 2001 State Road 177 – Appin Road. Proposed Passing Lane North of the Entrance to Ingham's Enterprises, Appin. Strategic Concept Design Report (0177.076.SD.000)

UBD 2001 Sydney Street Directory. Universal Press Pty Ltd, Sydney.

Wollondilly Shire Council 2000, Wollondilly Shire 2000 State of the Environment Report

13 Declaration

This Review of Environmental Factors provides a true and fair review of the activity in relation to its likely 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 proposed activity.

NBOS O

Nigel Bosworth

Environmental Officer, Environmental Technology

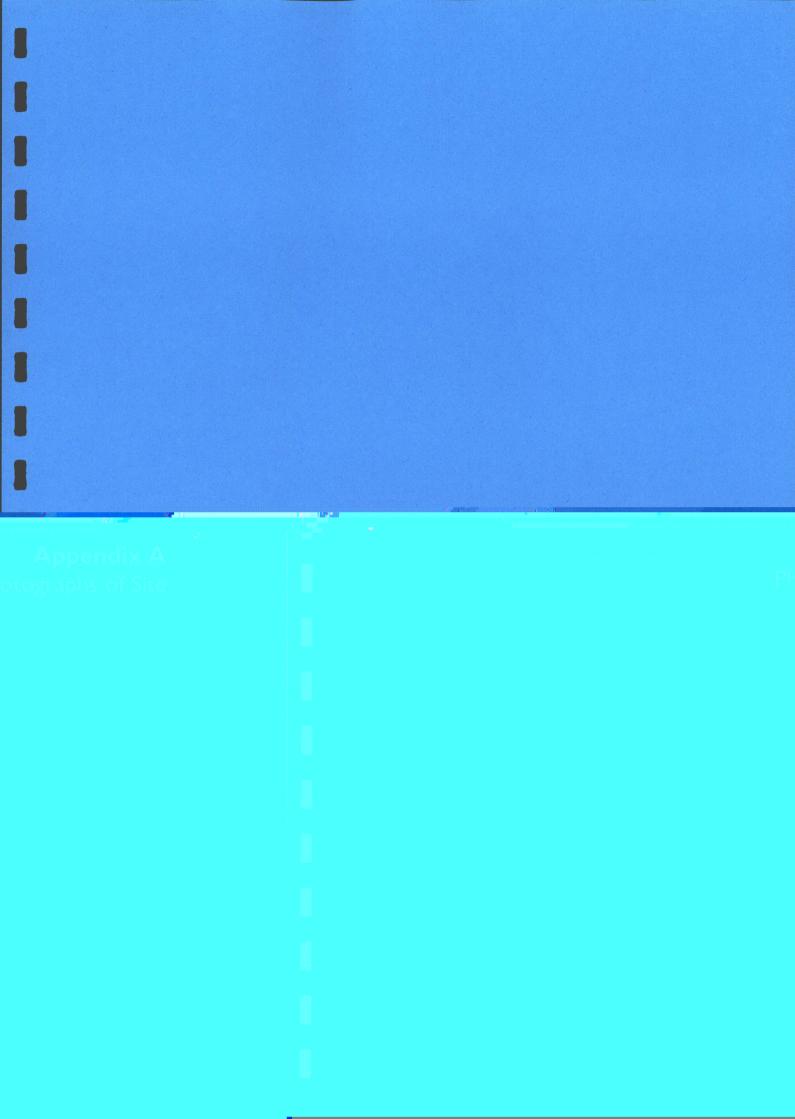
Date: 18 June 2002

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

Len Hvass

Project Manager, Traffic Project Secion

Date:





Photograph I - Proximity of trees to road



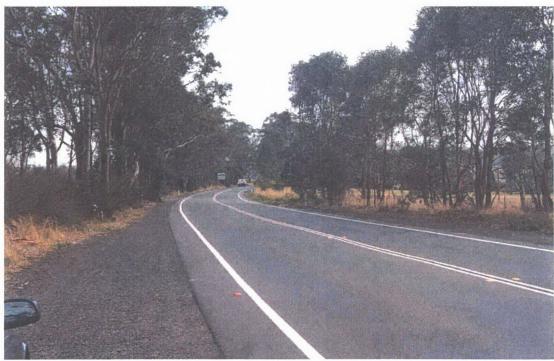
Photograph 2 - General roadscape



Photograph 3 - Proximity of residence



Photograph 4 - General roadscape



Photograph 5 - General roadscape showing accident sign

Appendix B

Concept Design Drawings

ROADS AND TRAFFIC AUTHORITY OF NSW

CITY OF CAMPBELLTOWN / SHIRE OF WOLLONDILLY

S.R. 177 APPIN ROAD

SOUTHBOUND OVERTAKING LANE 3.2km To 4.1km NORTH OF APPIN



PREPARED BY
PROJECT DESIGN SERVICES
TECHNICAL SERVICES BRANCH
OPERATIONS DIRECTORATE

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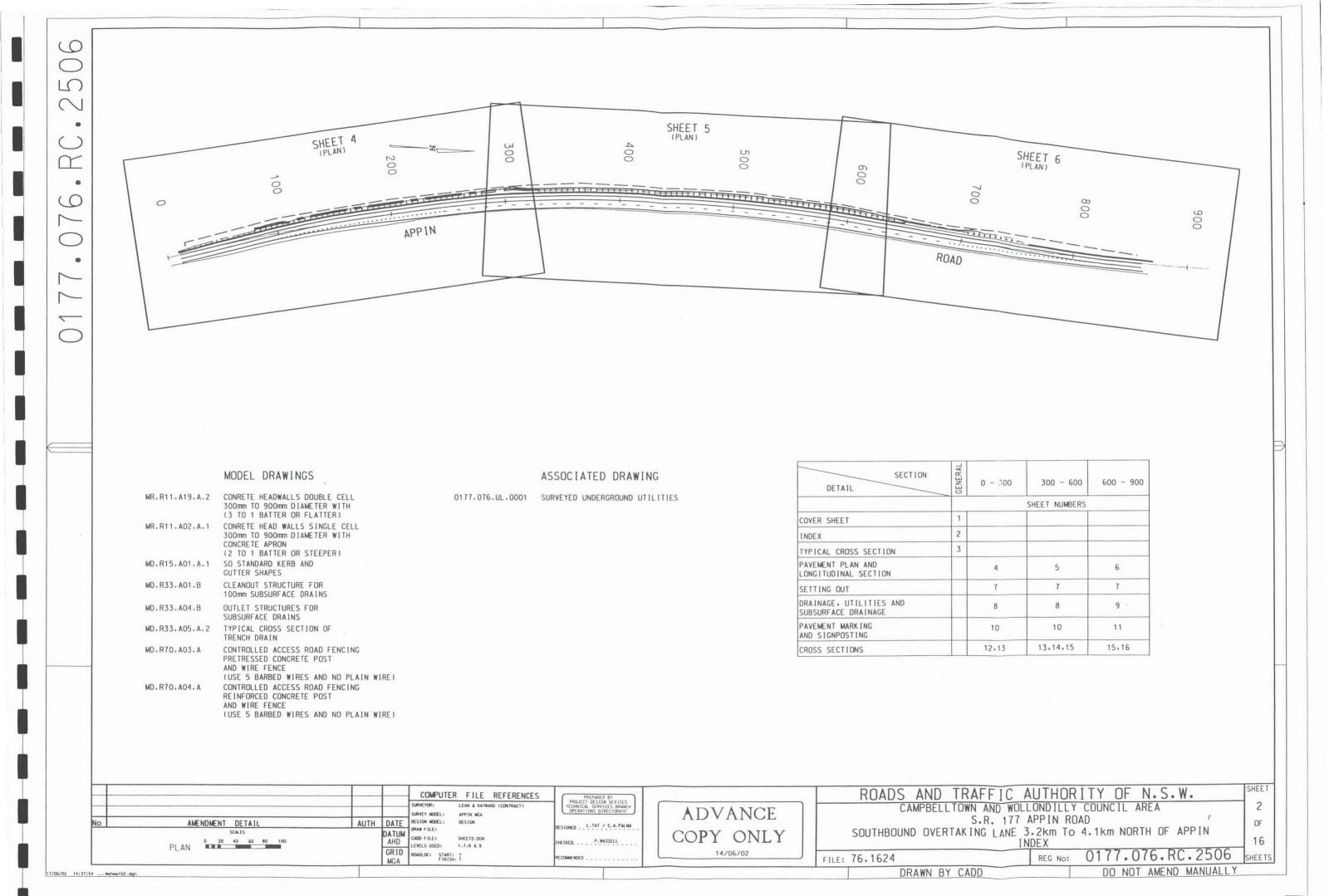
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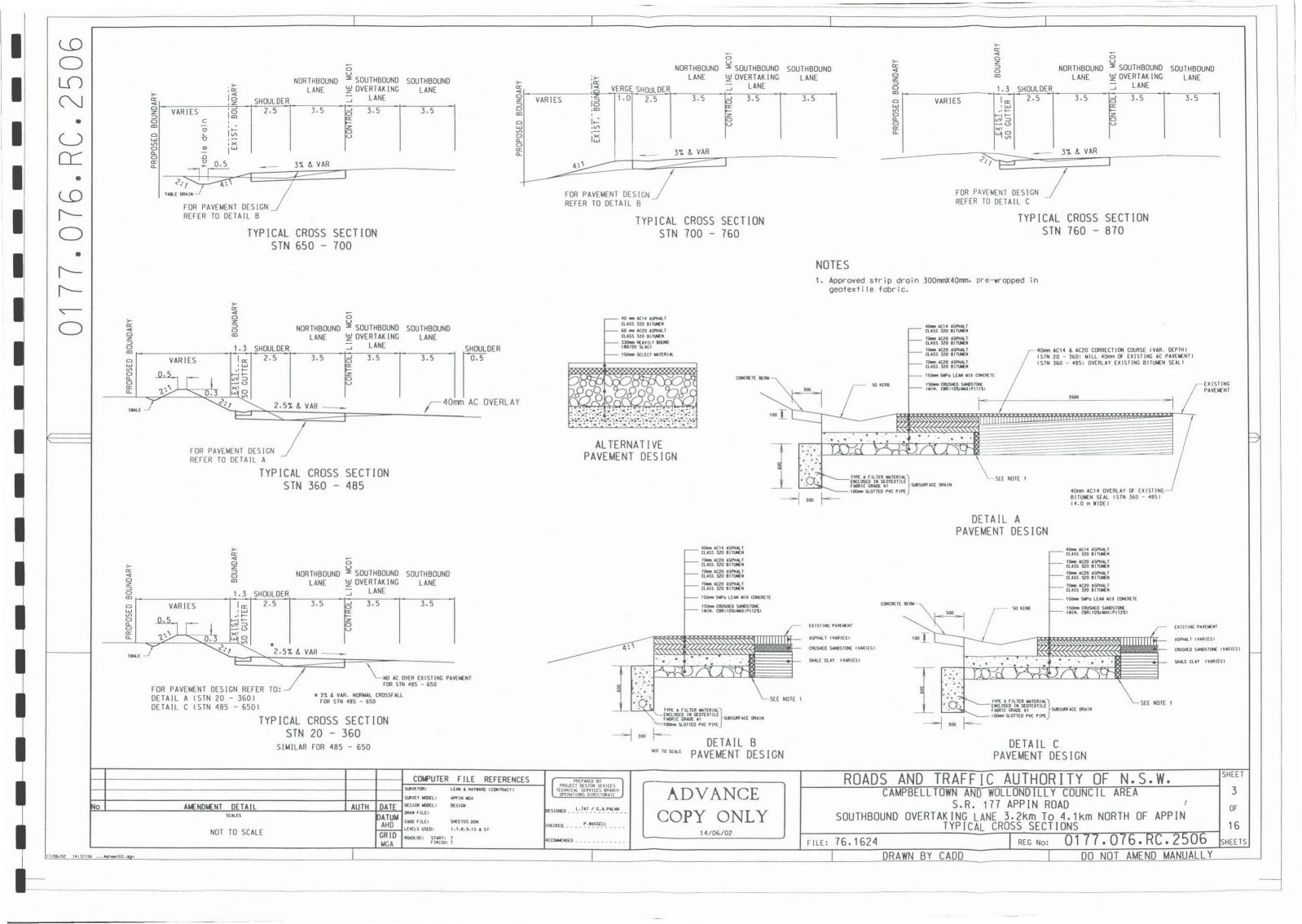
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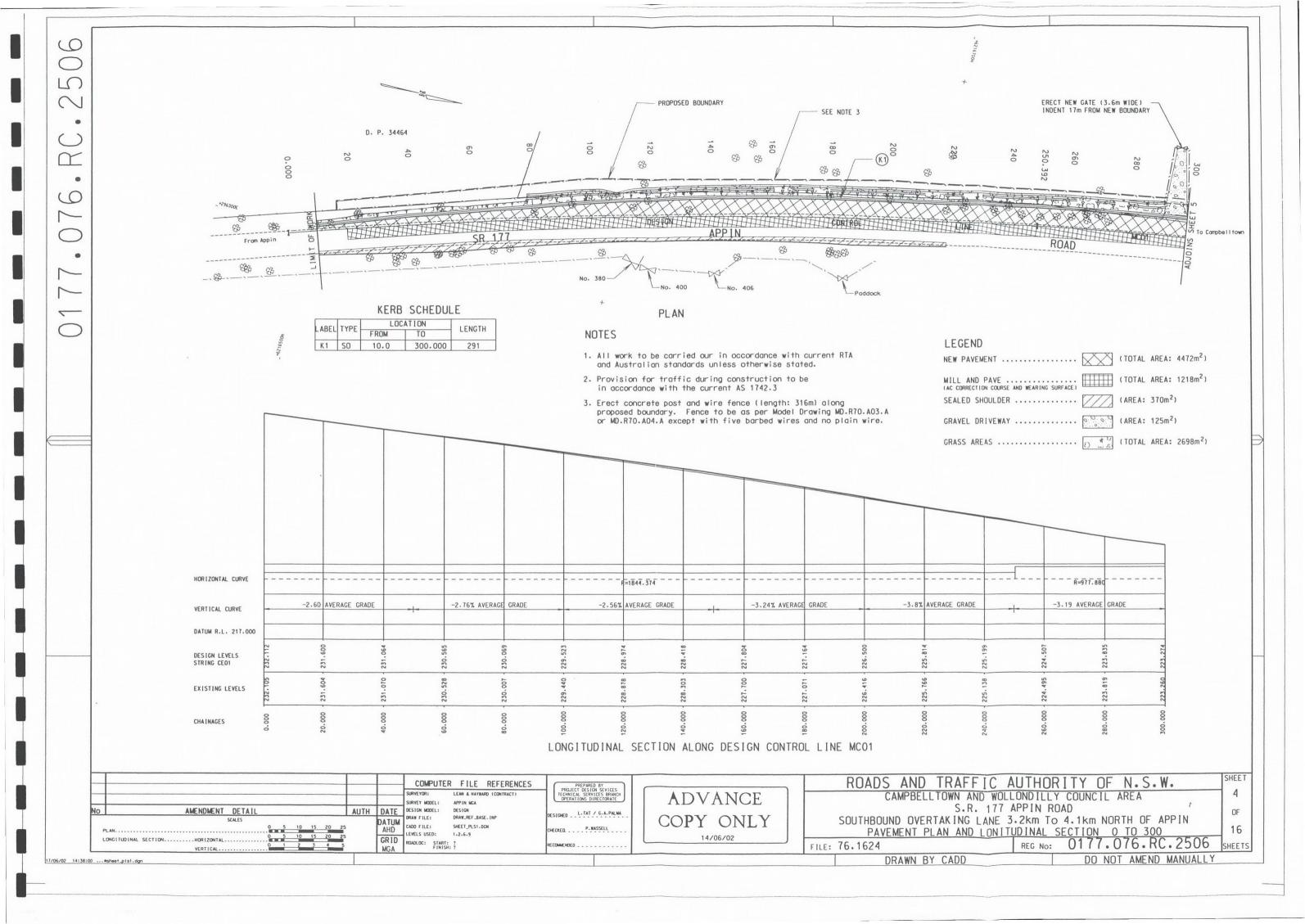
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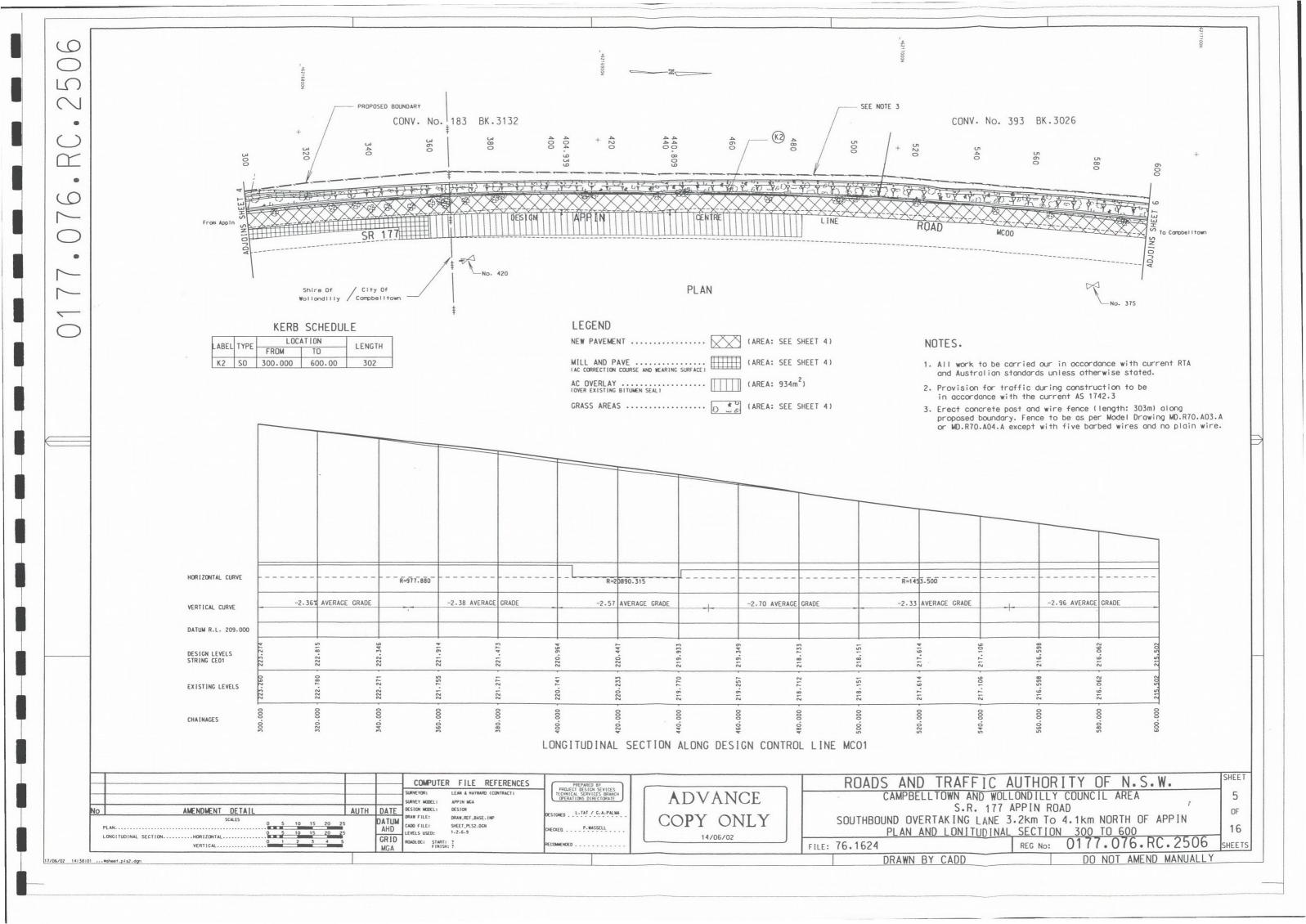
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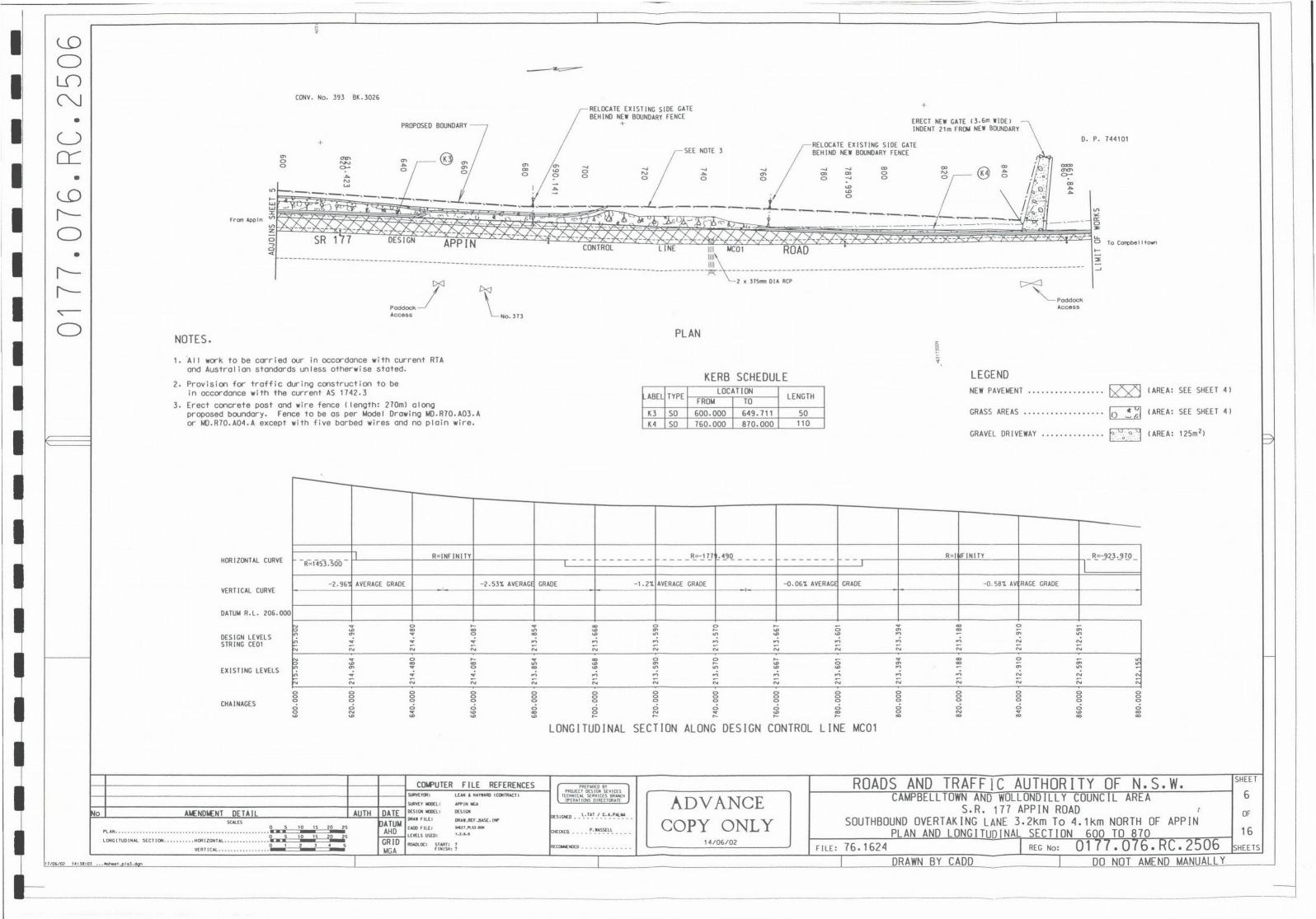
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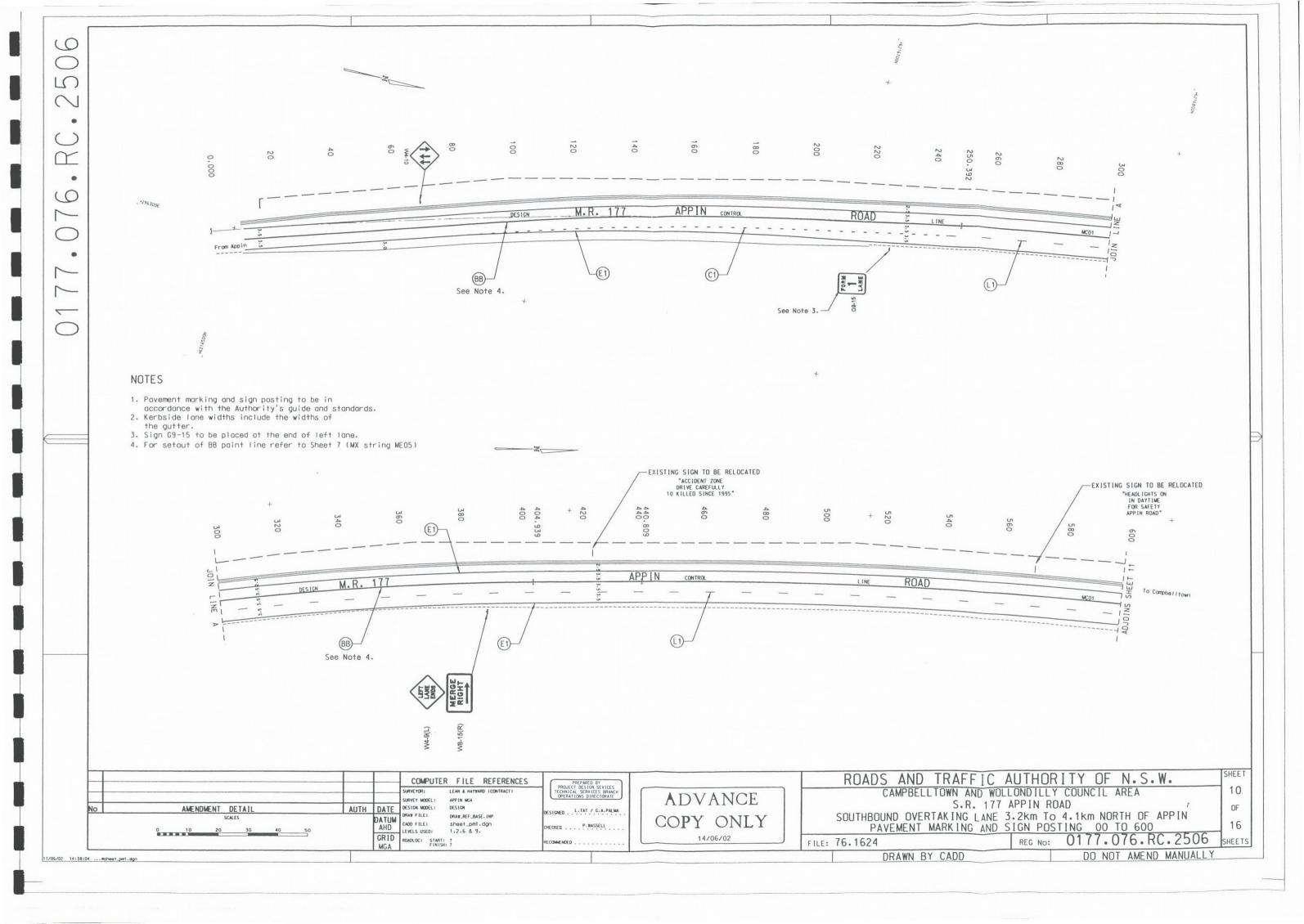












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ROADS AND TRAFFIC AUTHORITY OF N.S.W.

CAMPBELLTOWN AND WOLLONDILLY COUNCIL AREA

S.R. 177 APPIN ROAD

SOUTHBOUND OVERTAKING LANE 3.2km To 4.1km NORTH OF APPIN

SETTING OUT DETAIL

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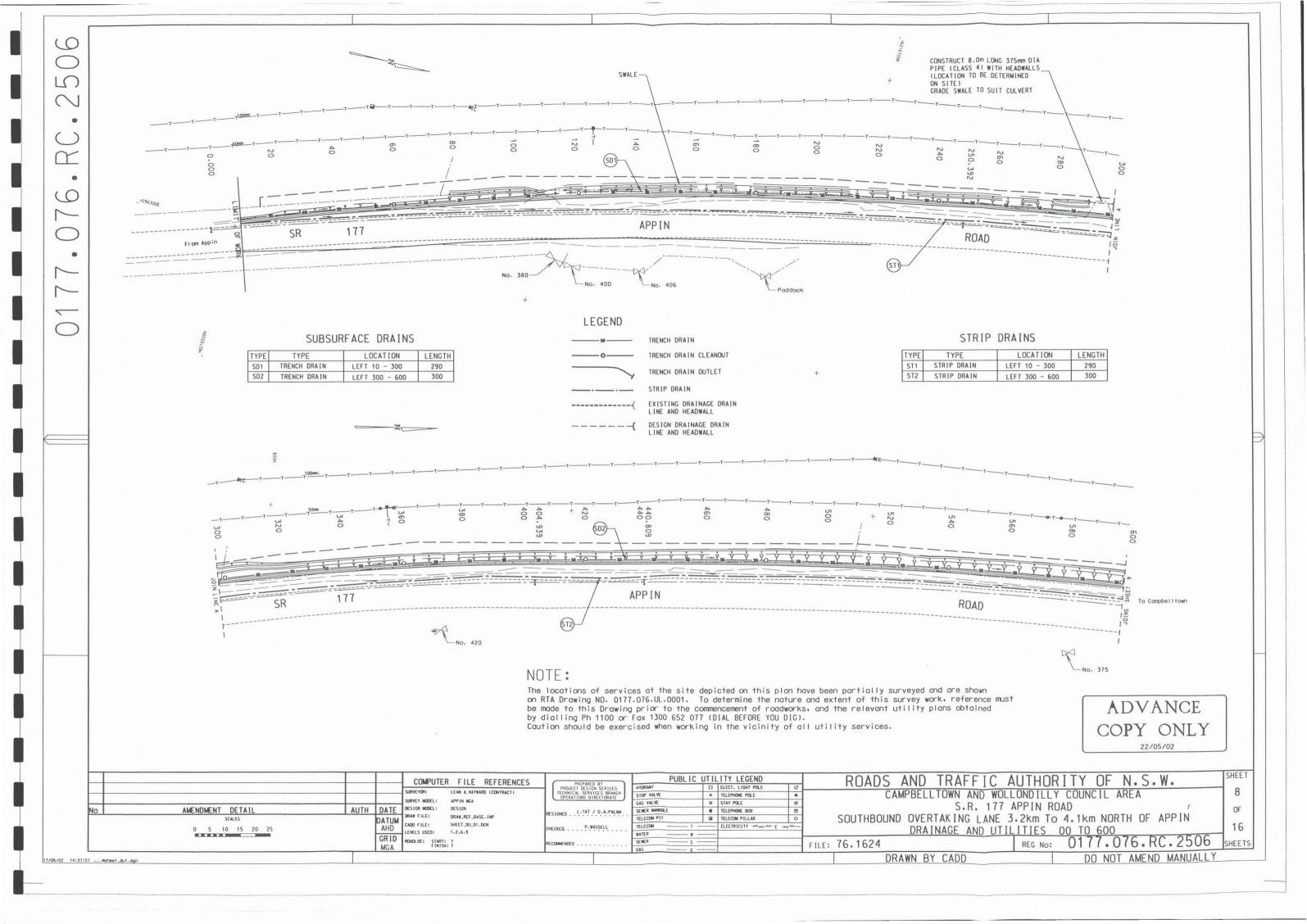
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SUBSURFACE DRAINS

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SD4	TRENCH DRAIN	LEFT 740 - 775	35

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The locations of services at the site depicted on this plan have been partially surveyed and are shown on RTA Drawing No. 0177.076.UL.0001. To determine the nature and extent of this survey work, reference must be made to this Drawing prior to the commencement of roadworks, and the relevant utility plans obtained by dialling Ph 1100 or Fax 1300 652 077 (DIAL BEFORE YOU DIG). Caution should be exercised when working in the vicinity of all utility services.

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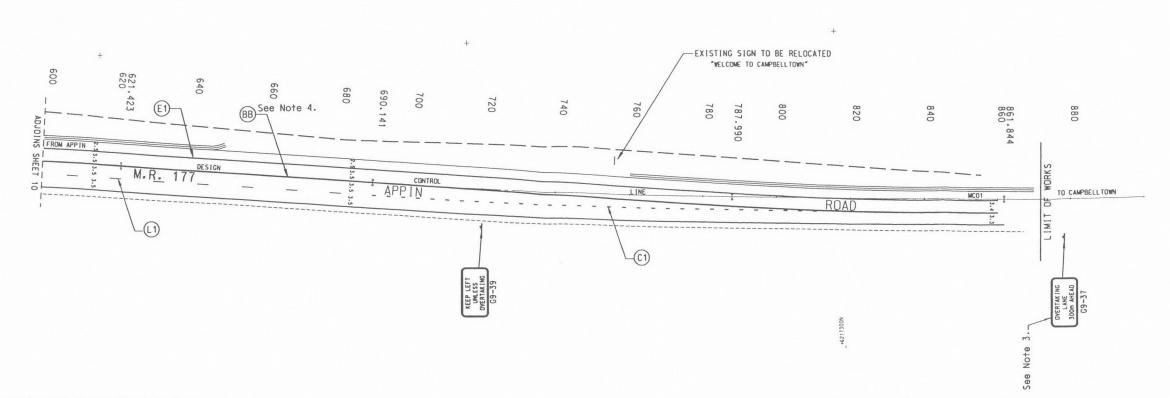
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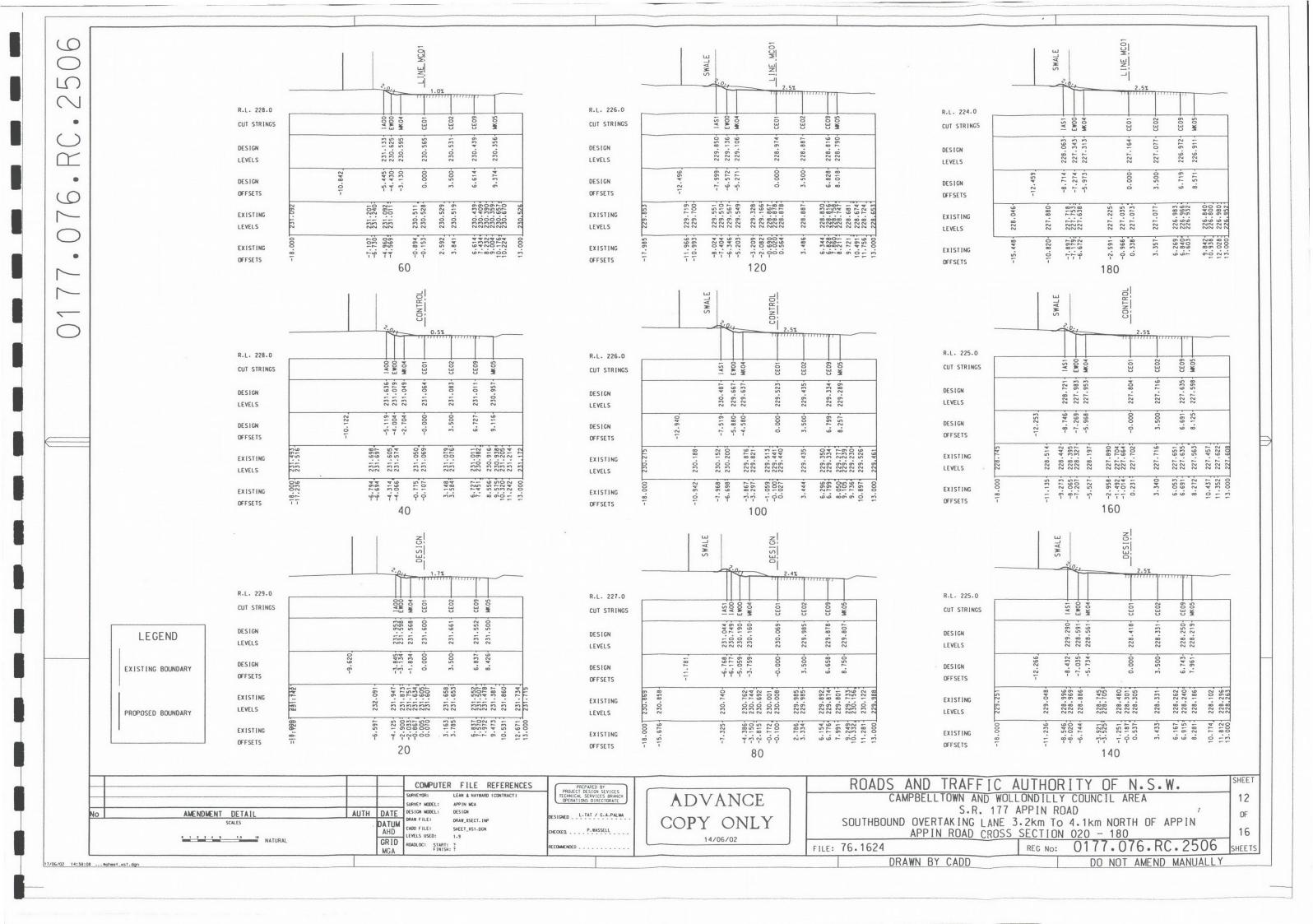
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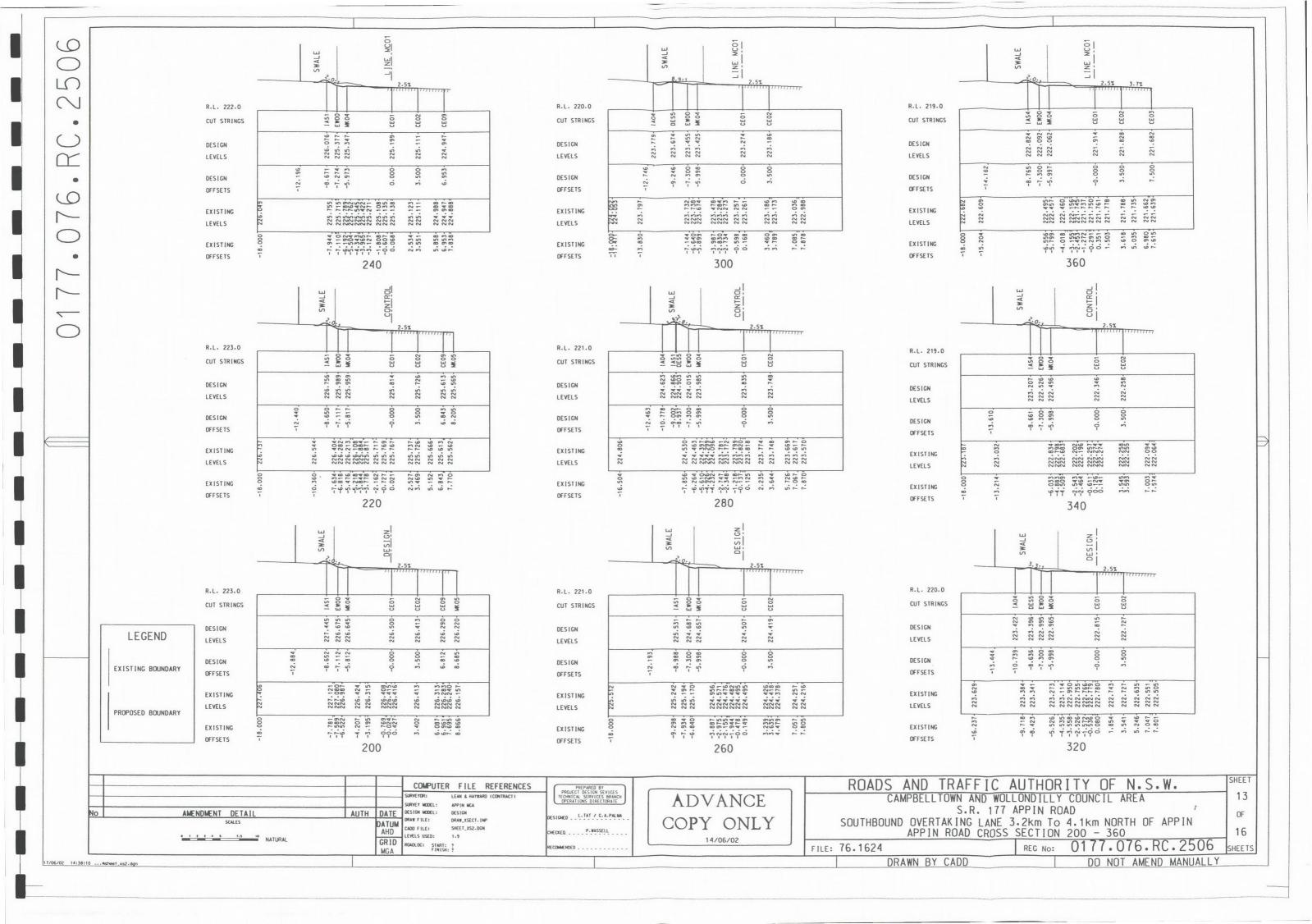


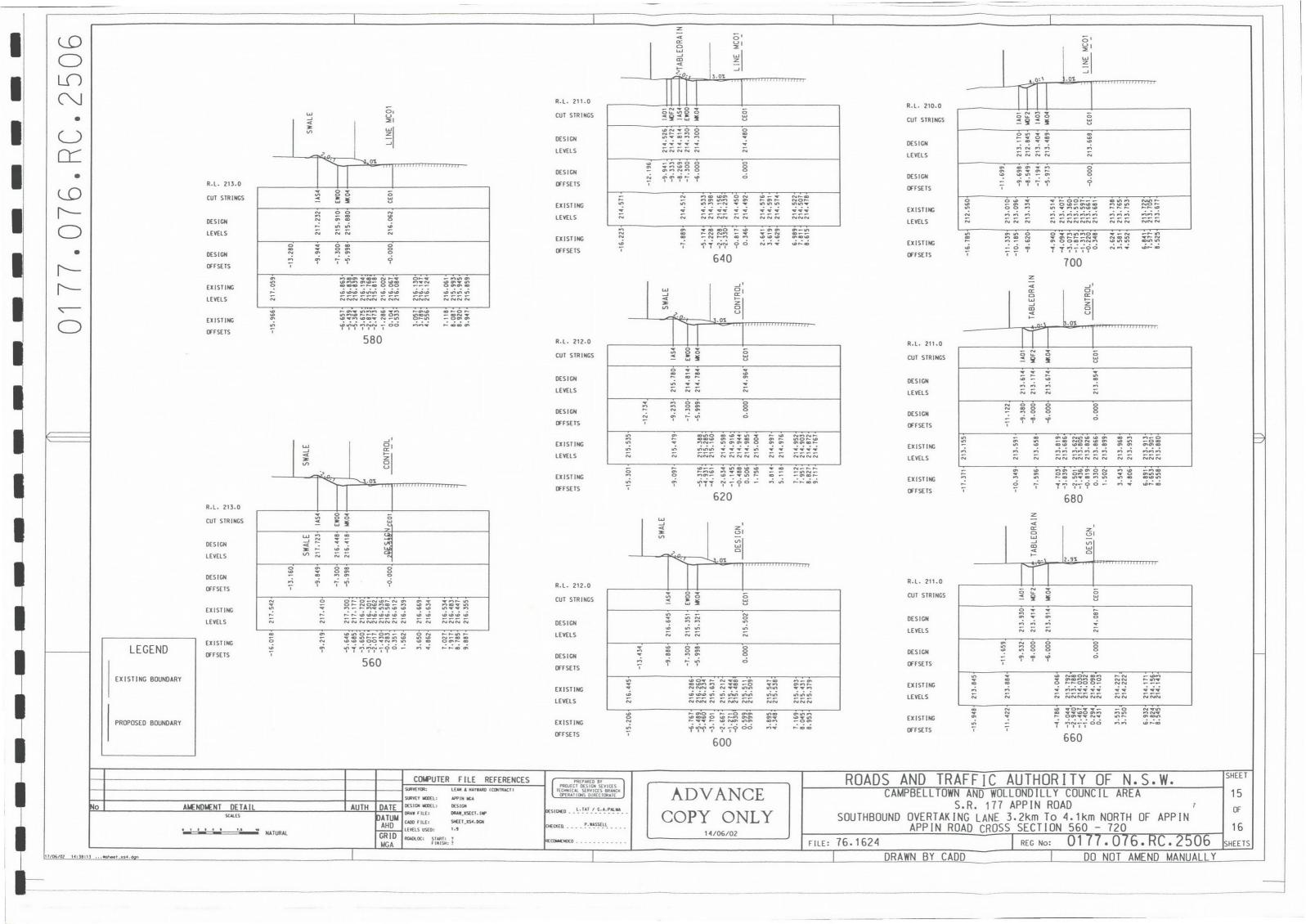
NOTES

- Pavement marking and sign posting to be in accordance with the Authority's guide and standards.
 Kerbside lane widths include the widths of the gutter.
 Sign 69-37 to be placed 270m north of station 720
- 4. For setout of BB paint line refer to Sheet 7 (MX string ME05)

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Appendix C

Indigenous and Non-Indigenous Archaeological & Cultural Heritage Assessment

Indigenous and Historic Heritage Assessment of the Appin Road Site, Appin, NSW

NSW Roads and Traffic Authority

Approved by: Hugh Swinbourne
Position: Project Director
Signed:

Date: 6 June, 2002
Environmental Resources Management Australia Pty Ltd Quality System

June 2002

8020129RP1

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This report has been prepared in accordance with the scope of services described in the contract or agreement between Environmental Resources Management Australia Pty Ltd ABN 12 002 773 248 (ERM) and the Client. The report relies upon data, surveys, measurements and results taken at or under the particular times and conditions specified herein. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client. Furthermore, the report has been prepared solely for use by the Client and ERM accepts no responsibility for its use by other parties.

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INTRODUCTION

1.1 OVERVIEW

1

The Cultural Heritage Unit of Environmental Resources Management Australia (ERM) has been commissioned by NSW RTA Environmental Technology to carry out an Indigenous and historic heritage assessment of a section of Appin Road, 3.2km – 4.1km north of Appin. The site will be the subject of a road widening project coordinated by the NSW Road and Traffic Authority (RTA) (refer to Annex A for the concept plan). The objective of the assessment is to identify areas of archaeological and cultural heritage value and to develop management policies that will conserve the cultural heritage value of the study area in light of the proposed development.

1.2 Scope Of Works

The completion of the following tasks were identified as essential to the success of the project:

- review of relevant statutory registers and inventories for Indigenous and historic cultural heritage such as the NSW NPWS Aboriginal Sites Register, the State Heritage Register (NSW Heritage Office), the Register of the National Estate (AHC), the Campbelltown and Wollondilly Council Local Environmental Plan (LEP), the National Native Title Tribunal and the Register of the National Trust;
- review of local environmental information (topographic, geological and soil descriptions) to determine the likelihood of archaeological sites and specific site types, prior land uses and existing site disturbance;
- a review of historic and parish maps for the area, local histories, and heritage studies;
- review of previous Indigenous and historic cultural heritage investigations in and around the subject site to provide specific information regarding the extent of archaeological investigation in the wider area and archaeological patterns observed;
- development of a predictive archaeological statement based on data searches and literature review in order to allow the identification of areas of archaeological potential as well as the identification of any known sites;
- liaison with the Tharawal Local Aboriginal Land Council (TLALC) to identify any archaeological sites and appraise the potential for further sites or features of archaeological sensitivity on the site;

- identification of remediation impacts in relation to predicted archaeological potential of the study area; and
- development of management recommendations and mitigation policies.

1.3 STUDY AREA

The study area is a narrow strip of land (c.900m x 20m) on the west side of Appin Road, north of the township of Appin. The strip's southern end is 3.2km north of Appin. Its northern end is 4.1km north of the town. Appin is situated 15km south of Campbelltown, in the Wollondilly Shire. However, the study area straddles the Wollondilly and Campbelltown Local Government Areas (see *Figure 1.1* for the location of the study area). The study area forms the shoulder of Appin Road, together with the adjacent land. It is level ground, lined with a narrow band of mature eucalyptus trees (principally *eucalyptus maculata*).

1.4 CONSULTATION

Prior to the commencement of the field survey, the Tharawal Local Aboriginal Land Council (TLALC), which formally represents the local Indigenous community in the Appin area, was approached. The TLALC was contacted with regards to the proposed development and was invited to participate in fieldwork associated with the Appin Road archaeological and cultural heritage study. Consequently, TLALC Site Officer Lance Syme participated in fieldwork on Wednesday, 20th March 2002. The TLALC agreed to assess the Indigenous cultural heritage value of the study area. A copy of this report was been forwarded to the TLALC on 28th March 2002 and 20th May 2002, for their input and review. A phone discussion was held with Lance Syme (TLALC), regarding the report and its recommendations on the 20th May 2002. Mr. Syme indicated that the TLALC were satisfied with the recommendations and they did not have any further comments to add to the report. A fax to confirm this was received 4th June 2002, refer to Annex B.

The National Trust (NSW) was contacted on the 18th March 2002 to determine whether any sites were registered or listed. Ms Marlene Strecker provided information regarding the classification of a number of sites in and around Appin. None were identified in the study area. Refer to Annex C for a copy of the search results.

1.5 REPORT STRUCTURE

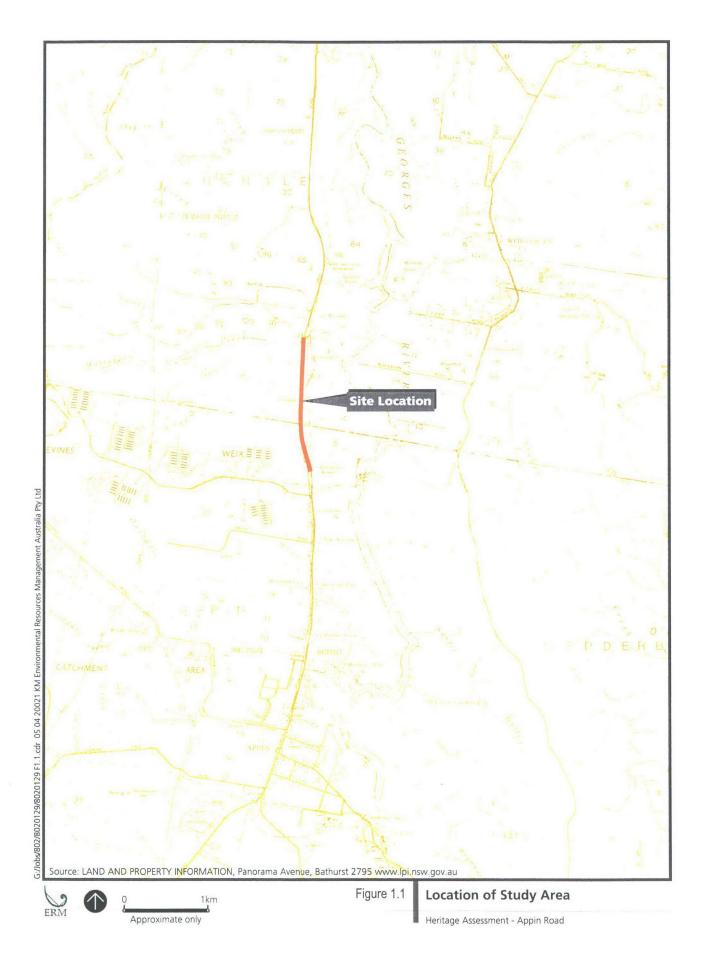
This report will deal with the requirements of the brief in the following structure:

- Chapter 2 deals with the Indigenous archaeological and cultural heritage values of the broader region and provides the context for the study area.
- Chapter 3 deals with the historic heritage values of the region and the study area.
- Chapter 4 provides the result of the archaeological fieldwork and consultation.
- Chapter 5 provides the management recommendations and mitigation policies based on the statutory requirements.

1.6 ACKNOWLEDGMENTS

The support and input of the following people contributed to the success of the project and are acknowledged:

- Lance Syme (Tharawal Local Aboriginal Land Council)
- Marlene Strecker (Classifications Officer, National Trust NSW)
- Staff at the Picton Library.



2.1 INTRODUCTION

This section provides a brief overview of the natural environment and cultural landscape of the study area and surrounding region, including topography, soil characteristics, past land use history and previous archaeological studies. The information provided focuses on factors of the natural environment and cultural landscape that are relevant to past human behaviour and archaeological site formation processes.

2.2 TOPOGRAPHY AND SOILS

Geology and soil information provides an insight into the depositional history of a study area. For instance, an erosional landscape may have a higher likelihood of artefact disturbance, whilst highly acidic soils may influence the preservation rate of artefacts.

The Appin Road site lies within the Macarthur Region, which is composed principally of Sydney Basin sedimentary sequences. More specifically, the study area is located on the Georges River Alluvial Terraces, and is therefore characterised by alluvial deposits typical of flood plain regimes.

The view from Appin Road is of the rolling topography typical of the immediate area.

2.3 Previous Archaeological Studies

A review of the archaeological context of the Appin area was undertaken to establish a basis on which a predictive model for the Appin Road study area could be formulated.

A number of archaeological/cultural heritage investigations have been conducted in the Wollondilly Shire and Macarthur Region in recent decades. The available studies give a broad picture of the wider cultural landscape and the site types, frequencies and distribution patterns that have formed the current understanding of the archaeological record in the region. Several investigations have been undertaken in the vicinity of the Appin Road study area. The findings from these investigations overall echo those of the regional studies and define the archaeological context of the study area. Studies relevant to the proposed development area include:

• JRC Planning Services. 1986, Environmental Heritage – Macarthur Regional Environmental Study (Working Paper 3).

A report prepared for the Department of Environment and Planning, dealing with both Indigenous and historic sites, and incorporating recommendations for conservation and management of significant sites.

• JRC Planning Services. 1993, Wollondilly Heritage Study, Volume 1: Final Report.

A report commissioned by the Heritage Council of NSW, the Department of Planning and Wollondilly Council, dealing with both Indigenous and historic sites, and incorporating recommendations for conservation and management of significant sites.

2.3.1 NSW NPWS Aboriginal Sites Register

There are no identified archaeological sites recorded within the study area, but a great many are recorded in the wider area (Refer Annex *D*). There are 29 Indigenous sites recorded in the NPWS Aboriginal Sites Register within a 2.5 km radius of the subject site (refer to *Table 2.1* below and *Figure 2.1*). These are a combination of surface scatters, grinding grooves, art and Potential Archaeological Deposits (PAD).

Table 2.1 Registered Indigenous Sites

ERM	NPWS Site	e Site Name Site Type			
Site ID	ID				
1	52-2-0021	Douglas Park, Managle Creek	Artefact		
2	52-2-1681	Ousedale Creek 2	Artefact		
3	52-2-1682	Ousedale Creek 3	Artefact		
4	52-2-1680	Ousedale Creek 4	Modified tree		
5	52-2-2101	Site Card unavailable	Grinding groove, Art and Artefact		
6	52-2-2059	Ousedale Creek 1	Art and Potential Archaeological		
			Deposit (PAD)		
7	52-2-2113	Site Card unavailable	Artefact		
8	52-2-2066	Sawpit Gully 14	Potential Archaeological Deposit		
			(PAD)		
9	52-2-2104	Site Card unavailable	Art and Grinding groove		
10	52-2-2062	Sawpit Gully 11	Potential Archaeological Deposit		
			(PAD)		
11	52-2-2034	Sawpit Gully 4	Grinding groove		
12	52-2-2105	Site Card unavailable	Art and grinding groove		
13	52-2-2063	Sawpit Gully 10	Potential Archaeological Deposit		
			(PAD)		
14	52-2-2103	Site Card unavailable	Art and Grinding groove		
15	52-2-2060	Sawpit Gully 12	Art		
16	52-2-2106	Site Card unavailable	Art and Grinding groove		
17	52-2-2065	Sawpit Gully 8	Grinding groove		
18	52-2-2064	Sawpit Gully 9	Grinding groove		
19	52-2-2036	Sawpit Gully 3	Grinding groove, Art, Artefact		
20	52-2-2041	Sawpit Gully 3	Artefact, Grinding groove, Art		
21	52-2-2102	Site Card unavailable	Art and Grinding groove		
22	52-2-2061	Sawpit Gully 13	Potential Archaeological Deposit		
			(PAD)		
23	52-2-1374	Sawpit Gully 1	Art		

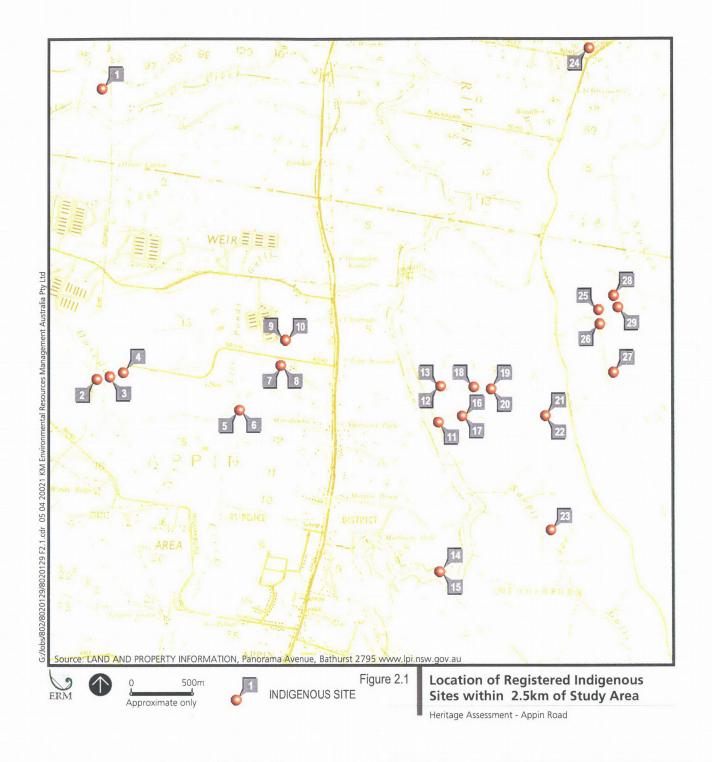
ERM	NPWS Site	Site Name	Site Type
Site ID	ID		
24	52-2-0270	Stokes Creek	Art
25	52-2-0989	Wedderburn Site 1	Art
65	52-2-0417	Appin	Art
27	52-2-0994	Wedderburn Site 3	Artefact and Art
28	52-2-0990	Wedderburn Road 2	Artefact and Art
29	52-2-0993	Wedderburn Site 4	Art

^{1.} Precise locations of Aboriginal Sites are held by the NSW NPWS for protection of the artefacts.

2.3.2 Native Title Claims

A native title search request was lodged with the National Native Title Tribunal (18/3/2002). The results of the search are provided in Annex E.

As of 20th March 2002 there were no Native Title applications registered or in the process of registration which affect the study area.



2.4 STATUTORY CONTROLS

Indigenous cultural heritage in Australia is protected and managed under the following Commonwealth and State legislation.

• Australian Heritage Commission Act 1975 (Commonwealth)

The Australian Heritage Commission Act (1975) established the Australian Heritage Commission which identifies places in the National Estate and maintains a register of places which are significant in terms of their association with particular community or social groups for social, cultural or spiritual reasons.

 Aboriginal and Torres Strait Islander Heritage Protection Amendment 1987 (Commonwealth)

The ATSIHP Act 1984 (Amended 1987) is a Commonwealth act that protects areas and/or objects which are of significance to Aboriginal people and which are under threat of destruction. A significant area or object is defined as one that is of particular importance to Aboriginal people according to Aboriginal tradition.

• New South Wales National Parks And Wildlife Act 1974 (State)

All Indigenous relics are protected under Section 90 of the *National Parks and Wildlife Act* 1974. Sites of traditional significance that do not necessarily contain archaeological materials may be gazetted as Aboriginal places and are protected under Section 84 of the Act. This protection applies to all sites, regardless of their significance or land tenure. Under Section 90, it is an offence to knowingly disturb, damage or destroy relics or Aboriginal Places without the prior written consent of the Director-General of the National Parks and Wildlife Service (NPWS).

• Environmental Planning And Assessment Act 1979 (State)

The Environmental Planning And Assessment Act 1979 (EP&A Act) requires that environmental impacts are considered prior to land development. This includes impacts on indigenous and non-indigenous heritage. Local Environmental Plans prepared in accordance with EP&A Act provide guidance on the level of environmental assessment required.

2.4.1 Heritage Register Listings

The AHC Register of the National Estate Database (RNE) and the NSW Heritage Office State Heritage Register (SHR) were also searched for Indigenous cultural heritage sites. No sites were listed in the vicinity of the study site.

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There are also no Indigenous heritage items listed on the Campbelltown and Wollondilly Council LEP's within the study area. Refer to Annex *F*.

2.5 LAND USE AND IMPACT ON ARCHAEOLOGICAL SITES

Information concerning past land use practices has been based on a visual inspection of the study area. The long strip comprising the study area is divided lengthways into two by barbed wire fences which separate farm paddocks (on the western side of the study area) from the shoulder of Appin Road (the eastern side of the study area). All native vegetation has been cleared from the farm paddocks, which now play host to grazing sheep and cattle. However, a variety of mature eucalyptus trees (principally *eucalyptus maculata*) stand adjacent to the shoulder of Appin Road on the eastern edge of the study area. These trees form a very narrow band along the edge of the road, usually being a single line of trees, and rarely more than a band three deep. They are mixed with thin scrub and the occasional stunted prickly pear. Another such band lines the east side of Appin Road and together they form an established avenue of trees.

Ploughing and vegetation clearance in the paddocks will have resulted in considerable subsurface disturbance. The construction of the road, including at least one culvert in the study area, will also have caused extensive subsurface disturbance.

2.6 PREDICTIVE STATEMENT

There is scholarly disagreement over which tribal/language group occupied the Appin area. The Wollondilly region, probably including Appin, was inhabited predominantly by the Gandangara People in the eighteenth century, and into the nineteenth century, when their numbers had been greatly reduced by European disease and dispossession. However, Appin lies on the interface between tribal/language groups and there is some possibility that it fell within the Tharawal area. The Gandangara and Tharawal shared relatively close ties. Both groups suffered equally at the hands of white settlers.

Aboriginal people became heavily involved in the European settlements of the area from an early date, being farmhands, stockmen and domestic workers. Traditional practices survived into the late eighteenth century. They are evidenced by the site types noted below, as well as by corroboree sites. Therefore, it is possible that artefact scatters once existed in the study area. The presence of contact sites between Indigenous and European cultures should also be considered. However, the clearing for the roads and paddocks in the study area would have almost certainly obliterated such sites.

Given the proximity of the study area to Appin Road it was always unlikely that sites of Indigenous significance would be identified. However, on the basis of archaeological sites registered in the region and the results of past archaeological studies, a number of site types may occur in the study area.

Five site types are apparent within a 2.5km radius of the study area. These are:

- open artefact scatters;
- grinding Grooves;
- modified trees;
- art (pigment); and
- NPWS Potential Archaeological Deposits (PAD).

Grinding grooves occur on flat sandstone outcrops. No such sandstone outcrops exist in the study area and no grooves were therefore anticipated.

The Macarthur region generally is notable for its large quantity of scarred and carved trees. Historically, extensive timber felling and ground clearance to create farming and grazing land occurred in the Appin area. This has contributed to the general absence of mature trees that would have once been suitable for Aboriginal utilisation as a timber resource. Scarred trees are less likely to exist in areas where timber getting was one of the earliest primary industries. However, the Wedderburn State Forest (half a kilometre from the study site) contains some examples.

Scarred trees are the result of the removal of a section of bark for the production of shields, water containers, canoes or shelter roofing. Scars may also be in the form of toeholds, which were used by Aboriginals foraging for native honey and possums. Trees could also be elaborately carved with human and animal figures, and geometric designs. These site types are the most relevant for the purposes of this project given the earmarked destruction of up to sixty mature eucalyptus trees. Furthermore, the Gandangara people of the Macarthur Region were possibly unique in the area east of the Dividing Range for this tree-carving practice (JRC Planning Services 1986:39).

Wollondilly Shire Council could not provide information regarding the age of the trees flanking Appin Road beyond the last 35 years. People from the local History Society say they are old growth trees, remnants of the original stands of eucalypts in the area. If so, they may display scarification or modification. However, they are predominantly *eucalyptus maculata*, a type not ordinarily used for modification. Thus, scarred trees are unlikely in the study area. However, the presence of the occasional Greybox, a type more commonly modified, makes the presence of scarred trees a small possibility.

Art (both engraved and pigmented) is typically found in rock overhangs, caverns and caves, and on flat areas of sandstone. No such geomorphology was present in the study area.

Given the extensive subsurface damage caused by tree clearing and road construction in the study area, the likelihood of finding a Potential Archaeological Deposit (PAD) was very low.

Other site types exist in the wider region including:

Middens

Middens are the result of seasonal camping and exploitation of food resources such as oysters and fresh water mussels. Extended deposition of shell and other food remains results in the deposition of a feature distinguishable from a natural shell layer through the inclusion of burnt or blackened shell, non-molluscan fauna, non-articulated bivalves, charcoal, burnt wood, hearth stones, stone artefacts and stratification. Middens are usually found on the coast and on the shorelines of estuaries, lakes and inland rivers. Although sometimes identified on ridges, these middens tend to be less extensive than those located close to the resource base.

· Ceremonial Grounds

These usually take the form of a raised earth-mound circle, or two circles (one larger, one smaller) linked by a path. These were used for tribal meetings and ceremonies. Given their fragile nature and the history of European land use practices they are identified very rarely.

Burials

Burials can occur anywhere but tend to be located in soft sandy soils. Generally they are only identified through accidental exposure. The Gandangara people of the Macarthur Region adopted an unusual burial practice in which people of importance were placed in mounded graves, beside elaborately carved trees (JRC Planning Services 1986:39).

Given the disturbance to the study area caused by the construction of Appin Road and tree clearing the likelihood of finding middens, ceremonial grounds and burials in the study area was extremely small.

3.1 HISTORICAL DEVELOPMENT OF THE APPIN AREA

Appin was settled in 1811 when Governor Macquarie made the first land grant of 1000 acres to Deputy Commissary General William Broughton. Broughton had the distinction of being a 'First Fleeter', and was a leading identity in the Colony and the Appin area throughout his lifetime.

Appin had a population of 562 in 1825. The township was planned for settlers in 1834 (to the 1829 regulations) and soon became a wealthy hamlet on the route between Campbelltown and the Illawarra. By 1836 one visitor described the land along Appin Road to Campbelltown as some of the most extensively cleared and worked in the Colony (see JRC Planning Services 1986:94 on the comments of Quaker James Backhouse).

Unfortunately Appin's early history was characterised by conflict between the Indigenous people and the settlers. This animosity resulted in a punitive military expedition in 1816, initiated by Macquarie, which culminated in the 'Appin Massacre', in which 14 Aboriginal people were shot. Many more are said to have been driven off the cliffs of a gorge behind Broughton's farm. Indigenous numbers around Appin were reduced dramatically after this event. Many of those who remained found employment with the local farmers.

Two churches (the Catholic St. Bede's and the Anglican St. Mark the Evangelist's) were built by 1841 in the town. They both still stand in Appin, and are Heritage Listed. The town plays host to a number of culturally significant buildings that have been the subject of a number of heritage surveys and discussions (see for example JRC Planning Services 1986 and 1993; Proudfoot 1977).

Appin is also significant for its association with the explorer Hamilton Hume who grew up on a farm off Appin Road. A monument to him now stands on Appin Road at the place where he set off (in 1824) with Captain Hovell on their inland journey of discovery to Port Phillip Bay. The monument is situated just over a kilometre from the northern end of the study area.

Through the nineteenth and early twentieth centuries Appin remained a small but thriving rural community, producing wheat, barley, corn, vegetables and (later) oats for the Sydney and Wollongong markets. Dairy farms were established in the later nineteenth century. For much of its early history the timber resources of the Appin area were exploited. The building of the Cataract Dam late in the nineteenth century saw an influx of workers into Appin. However, the township's fortunes declined in the early nineteenth century, receiving a small boost in the 1960s with the opening of a nearby colliery. Today, Appin is a dormitory suburb of Campbelltown with a small

shopping complex and some residential development. It is still largely rural-agricultural, one large concern being Inghams Enterprises which has established a poultry farm approximately 450m south of the study area.

Appin Road was the primary northward route available to settlers in Appin from its earliest days. It appears on a map by T.L. Mitchell (AO Map No. 5067) dating to c. 1830, together with the line of a proposed railway (the railway line to Campbelltown was completed in 1858). For much of its history Appin Road was part of the important north-south Liverpool to Illawarra movement corridor. However, it has declined greatly in importance since the Hume and Princes Highways were constructed. In the nineteenth century teamsters with bullock and horse drawn drays used Appin Road to transport Appin's agricultural produce to Sydney. In the first half of that century Appin Road was the site of numerous hold-ups by bushrangers. Appin Road today still follows its original alignment and is a significant historic communication route.

4.1 INTRODUCTION

4

The archaeological survey of the study area was carried out on Wednesday, 20th March 2002. The Indigenous and historic heritage survey was undertaken by Andrew Sneddon (Cultural Heritage Unit, ERM) and Lance Syme (Tharawal Local Aboriginal Land Council).

4.2 METHODOLOGY

The study area was divided into narrow transects (c. 3m in width). Dr Sneddon and Mr Syme walked these transects along the length of the study area surveying the ground for artefacts and the trees for evidence of modification. The survey achieved 100% walkover coverage.

4.2.1 Ground Surface Visibility

Ground surface visibility is a term used to refer to the degree to which the surface of the ground can be observed. This may be influenced by natural processes such as wind erosion or the character of the natural vegetation, and land use practices such as ploughing or grading. It is expressed in terms of the percentage of ground surface visible per square metre for an observer on foot (Bird 1992).

Table 4.1 has been devised to indicate the level of ground surface visibility. It is a subjective method of assessment, but provides a useful tool when attempting to describe the level of ground surface visible during field surveys or inspection.

Table 4.1 Ground Surface Visibility Rating

Description	GSV Rating %
Very Poor – heavy vegetation, scrub foliage or debris cover, dense tree	0-9%
of scrub cover. Soil surface of the ground very difficult to see. Poor – moderate level of vegetation, scrub, and / or tree cover. Some	10-29%
small patches of soil surface visible in the form of animal tracks,	
erosion, scalds, blow outs etc, in isolated patches. Soil surface visible in random patches.	
Fair - moderate levels of vegetation, scrub and / or tree cover. Moderate sized patches of soil surface visible, possibly associated with	30-49%
animal, stock tracks, unsealed walking tracks, erosion, blow outs etc, soil surface visible as moderate to small patches, across a larger section	
of the study area.	
Good - moderate to low level of vegetation, tree or scrub cover.	50-59%
Greater amount of areas of soil surface visible in the form of erosion, scalds, blow outs, recent ploughing, grading or clearing.	,

60-79%
80-100%

The ground surface visibility in the study area can on the most part be described as fair to good. Those parts of the study area that are now paddocks were covered in grass. Those parts on the shoulder of Appin Road, under the trees displayed a mix of scrub and light vegetation (refer to *Photograph 4.1, Photograph 4.2* and *Photograph 4.3*). Little if any artefactual material is likely to have been obscured.

The shoulder of Appin Road contained a large amount of modern debris such as beer tops, remnant plastic pens, modern glass and generic plastic rubbish.

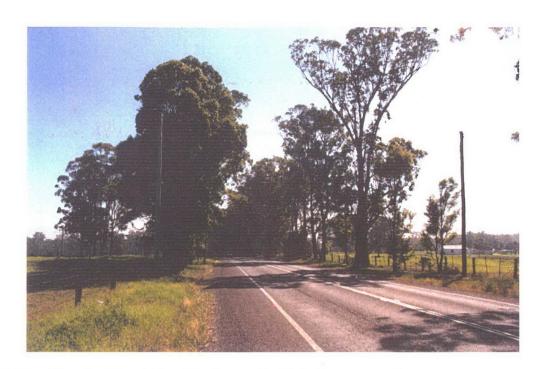
4.3 AREAS OF ARCHAEOLOGICAL SENSITIVITY

The term 'area(s) of archaeological sensitivity' is used to describe areas that are likely to contain subsurface cultural resources. These areas are identified as sensitive landforms or areas due to the results of the field work, sites previously recorded within or around the subject area, and archaeological predictive models for the likely occurrence of sites. These areas can be defined based on all or some of the factors mentioned above.

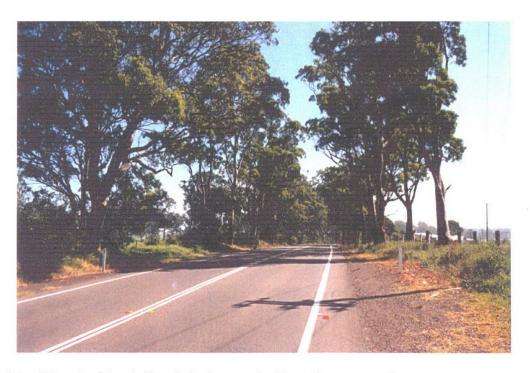
Based on the regional archaeological record for the current study area, there remains the potential for Indigenous archaeological sites to be present throughout the Appin area. However, given the heavy disturbance resulting from the construction of Appin Road and tree clearing and ploughing to its west, the study area is considered to have a very low level of archaeological sensitivity for intact archaeological / cultural deposits.

4.4 RESULTS AND CONCLUSION

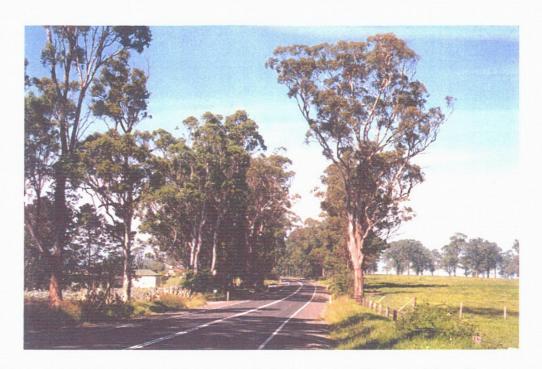
The survey did not result in the recording of Indigenous or historic sites. However, the avenue of trees flanking Appin Road should be considered a natural feature that has been modified by humans to form part of the wider cultural landscape (discussed further below). Additionally, Appin Road itself is a significant historic communication route.



Photograph 4.1 View 1 of Appin Road facing north. Note the avenue of trees.



Photograph 4.2 View 2 of Appin Road, facing north. Note the avenue of trees.



Photograph 4.3 View of Appin Road, facing south. Note avenue of trees and fenceline.

5.1 INTRODUCTION TO THE SIGNIFICANCE ASSESSMENT PROCESS

An assessment of significance seeks to determine the value or importance that a place, item or site may have to the community at large. The concept of cultural significance is intrinsically connected to the physical fabric of an item or place, its location, setting and its relationship to other items in the cultural landscape. The assessment of significance aims to identify the response that these factors evoke from the community. The standardised character of significance assessments are commonly applied to sites, places or items that have tangible historic structures, or visible physical relics, and where there is an understanding and appreciation of the extent of the historic resources.

Archaeological sites however, require quite a different approach to significance assessment due to the nature of the archaeological resource. The assessment of significance of archaeological sites and resources are defined in most cases by what it can contribute to our understanding or knowledge of a place or site. In most cases, it is not possible to fully articulate or comprehend the value or importance let alone the extent of the archaeological resource at the outset. Therefore, the evaluation of the cultural significance of archaeological material is based on the potential that this resource has to contribute to our understanding of the past. Of importance in the assessment of archaeological resources is the type of information that can be revealed by the archaeological deposit. In particular, significance can be derived from the fact that knowledge can be gained from the archaeological resource that is not available through other sources, and the contribution that it can make to our understanding of a place or a cultural landscape.

Despite the difference the same set of criteria can be used to assess the cultural significance of different types of heritage resources.

5.2 Basis For Evaluation

The Australia ICOMOS Charter for the conservation of places of cultural significance (the Burra Charter) was formulated in 1979 and most recently revised in 1999, is the standard adopted by most heritage practitioners in Australia. The Charter divides significance into various groups or categories for the purpose of assessment. They are Social, Aesthetic, Scientific/Technical, Historical and Other. Refer to Annex G.

In addition, the NSW State Heritage Register, which was established by the amendments to the NSW Heritage Act in 1998, has a separate set of assessment criteria and relates to both historic items or places, as well as Aboriginal and European sites of contact. To be considered for listing on the

State Heritage Register an item will need to meet one or more of the following criteria:

- (a) an item is of importance in the course, or pattern, of NSW's cultural or natural history;
- (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW cultural or natural history;
- (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;
- (d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;
- (e) an item has the potential to yield information that will contribute to an understanding of NSW's cultural and natural history;
- (f) an item possess uncommon, rare or endangered aspects of NSW's cultural or natural history; and
- (g) an item is important in demonstrating the principle characteristics of a class of NSW's cultural or natural places; or cultural or natural environment.

A central feature of the amendments to the Act, is the clarification and strengthening of responsibility for the management of heritage items at the Local and State level. Subsequently, items can be assessed as having Local or State significance. An item cannot be excluded from the Register on the grounds that items with similar characteristics have been listed. These criteria can also be applied to items that do not qualify for a state level significance ranking.

These criteria are also useful in assessing a range of heritage items, and can be applied to places and sites with standing or built heritage and archaeological sites.

The assessment of significance of Indigenous archaeological sites or cultural places can be assessed on the criteria of the Burra Charter, the Australian Heritage Commission Criteria of the National Estate, as well as the NSW National Parks and Wildlife Service guidelines. The criteria of the NPWS are inherently derived from both the Burra Charter and the National Estate Criteria, while the NSW Heritage Office criteria can also be used to gain a better understanding of the regional or State based themes for evaluation. Archaeological significance can also be assessed based on the abovementioned criteria, but in particular assessments have tended to occur under the heading of archaeological research potential. That is, the potential of a site or set of cultural resources to contribute to our current understanding or knowledge regarding the past. Also of importance in the evaluation process is the assessment of Rarity and Representativeness.

5.3 ADDITIONAL CONSIDERATIONS

In addition to the above considerations, and of particular significance to the avenue of trees flanking Appin Road (part of which forms the study area), are a number of recommendations and aims incorporated in various heritage studies and the *Wollondilly Local Environmental Plan*.

For example, the *Macarthur Regional Environmental Study* (JRC Planning Services 1986) (a Working Paper prepared for the Department of Environment and Planning) placed great emphasis on the need to conserve and manage notable cultural landscapes. It notes (page 120) that the region's landscape character is distinctive due to (among other things):

- planting around properties;
- remnant indigenous vegetation patterns;
- historic communication/transport network; and
- harmony between cultural landscape patterns and the natural base.

More specifically, it states that "the character of Appin and vegetation patterns are particularly notable" while "Appin Road is a significant historic communication line" (JRC Planning Services 1986:127). It recommends "[r]etention of indigenous tree character in this landscape unit" and that towns like Appin "should be separated by extensive tracts of woodland/forest" (JRC Planning Services 1986:127). Further, the study notes that "[i]n the region where trees make a distinctive contribution to the regional character, tree preservation orders could be more effectively employed" (JRC Planning Services 1986:156).

These observations and recommendations are echoed in the later *Wollondilly Heritage Study* (JRC Planning Services 1993). In its discussion of Cultural Landscapes in the Wollondilly area, the study notes that "natural features are present but will have been modified by human actions so that the ensuing landscape reflects a complex interrelationship between cultural and natural forces" (page 43). These cultural characteristics include vegetation groups. Cultural Landscapes "embody the existence of interrelationship of events, places and people through time to give a composite image and continuity, a sense of history, and meaning" (page 44). The avenue of trees along Appin Road (illustrated in *Photograph 4.1, Photograph 4.2* and *Photograph 4.3*) might fall within these principles. This Study also notes the historic significance of Appin Road, marked by the flanking trees, and observes that the road "affords significant views over the region" (page 59).

These recommendations find legislative form in the *Wollondilly Local Environmental Plan* (s.2), which stresses the Council's aim of conserving the Shire's environmental heritage, while ensuring development does not detract from the significance of heritage items *and their settings* (my italics).

5.4 EVALUATION AND STATEMENT OF CULTURAL SIGNIFICANCE

The following is an evaluation (in light of the above considerations) of the significance of that portion of the avenue of trees flanking Appin Road which forms the study area.

The provisions of the Burra Charter of most relevance to the following discussion are:

Article 3.1. (Conservation) requires a cautious approach of changing as much as necessary but as little as possible.

Article 8. Conservation requires the retention of appropriate visual setting...

The criteria for listing on the State Heritage Register most relevant to the following discussion are:

Criterion (a). An item is of importance in the course, or pattern, of NSW's cultural or natural history.

Criterion (c). An item is important in demonstrating aesthetic characteristics.

As already noted, Appin Road is a communication line of historic significance. The trees flanking the road represent a local cultural and aesthetic ideal, and a conscious reworking of the natural environment to produce a particular environmental landscape. As such, Appin Road's avenue of trees (including that part forming the study area) forms a both a natural and cultural landscape. Further, the trees enhance the heritage items in the township of Appin, as well as the nearby Monument to Hume and Hovell (a little over a kilometre away). They form an integral part of the setting of those heritage items.

However, that landscape has been considerably altered in recent decades. Long stretches of the trees have already been removed (eg. around the entry to the Inghams poultry farm), and the removal of those trees in the study area would still leave a considerable stretch of trees further south, leading into the township of Appin.

Rating: Moderate Local Significance.

5.5 MANAGEMENT RECOMMENDATIONS

The following recommendations are provided based on the results of the background research, archaeological predictive models, field survey, consultation and assessment of cultural significance.

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5.5.1 Recommendations

- 1) It is recommended that the number of trees destroyed in the process of development in the study area should be kept to a minimum, and appropriate replanting take place upon completion of the project.
- 2) It is recommended that all works associated with the proposed development cease if Indigenous and/or Historic artefacts or relics are uncovered, and the relevant statutory authority contacted. The Indigenous Heritage Division of the NSW National Parks and Wildlife Service must be contacted if Indigenous cultural material is uncovered, while the NSW Heritage Office must be contacted if historic relics or artefacts are uncovered.
- 3) A timber stockyard of indeterminate age, associated with the sheep paddocks west of the study area, was noted during survey (refer to *Photograph 5.1*). The stockyard is outside the study area and will not be disturbed during construction. Construction should proceed along the proposed impact areas as planned to avoid the timber stockyard.



Photograph 5.1 View of stockyard in paddocks north-west of study area

REFERENCES

Bird, C F M (1992) Archaeology of the Goulburn River Basin. A Background Study Unpublished Report.

Fowler, L R, F B Knox and S den Hertog (eds.) (1988) A History of the Forbidden Land, Wollondilly Shire Wollondilly Shire Council.

JRC Planning Services (1986) Environmental Heritage - Macarthur Regional Environmental Study (Working Paper 3)

JRC Planning Services (1993) Wollondilly Heritage Study (Vol. 1) - Final Report.

Percival, S (1992) Chronicles of Appin, NSW Campbelltown and Airds Historical Society Inc. Campbelltown.

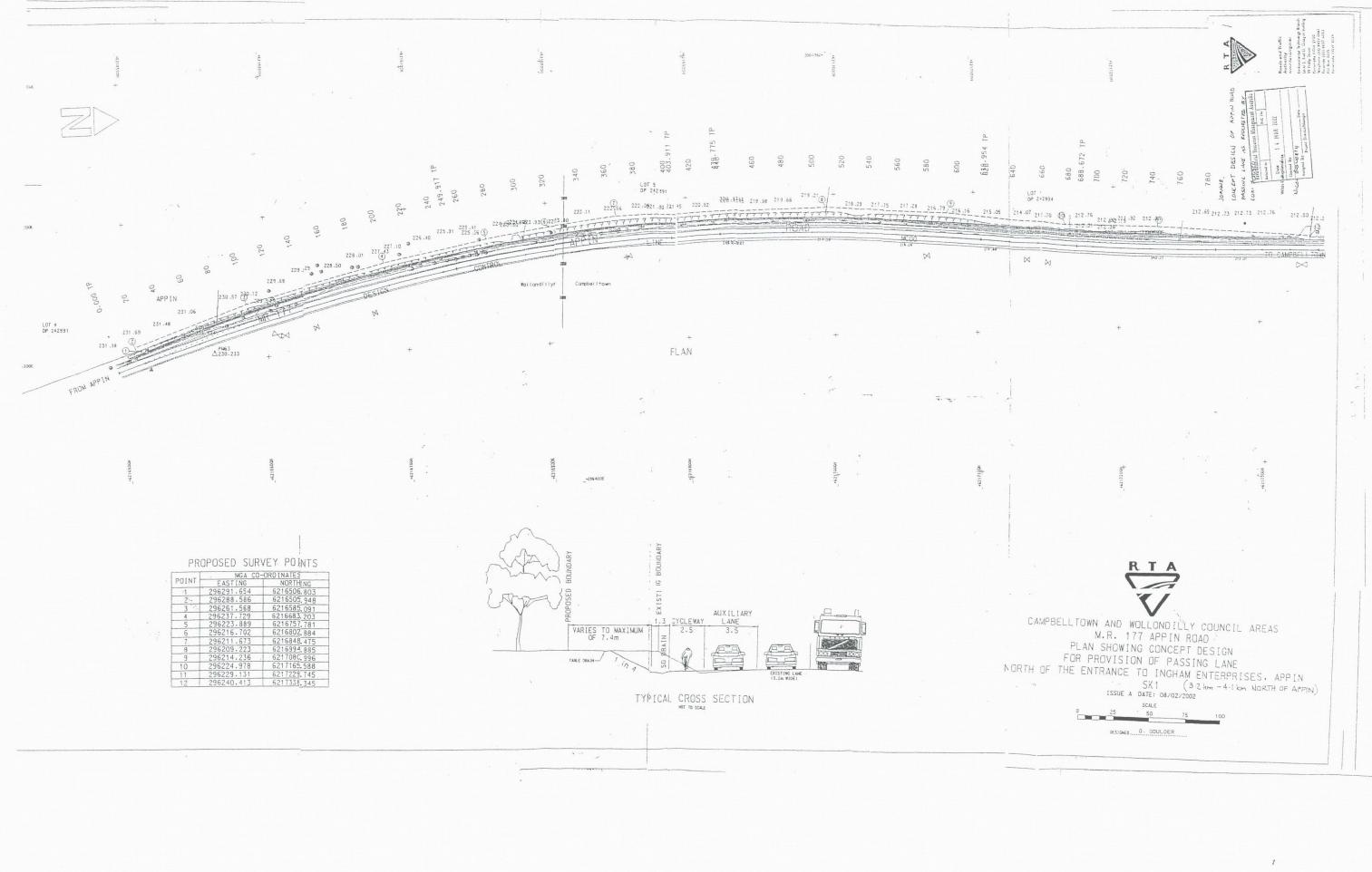
Proudfoot, H (1977) Colonial Buildings - Macarthur Growth Centre (Campbelltown, Camden, Appin) Macarthur Development Board.

Wollondilly Local Environmental Plan (1991)

http://www.stonequarry.com.au/towns/appin.html

Annex A

RTA Concept Plan



Annex B

Tharawal LALC Correspondence

ERM 2002. Indigenous and Historic Heritage Assessment of the Appin Rd site, Appin, NSW. Report to NSW Road Traffic Authority

Consultation with Tharawal LALC

A copy of the draft report was forwarded to the Tharawal LALC on the 28th March 2002 and the 20th May 2002, for their input and review. A phone discussion was held with Lance Symes (Tharawal LALC) on May 20th 2002, regarding the Appin Rd report and its recommendations. Mr. Symes indicated that the Tharawal LALC were satisfied with the recommendations and they did not have any further comments to add to the report.

Signed

Joanne Jordan

Project Archaeologist ERM

Lance Symes

Tharawal LALC

Annex C

National Trust Classifications

NATIONAL TRUST OF AUSTRALIA (NSW) CLASSIFICATIONS – APPIN ROAD & AREA

7312 CAMPBELLTOWN	CAMPBELLTOWN	APPIN ROAD	DENFIELD & CURTILAGE
7755 CAMPBELLTOWN	CAMPBELLTOWN	APPIN ROAD	GLEN LORNE
8922 CAMPBELLTOWN	CAMPBELLTOWN	APPIN ROAD	MEADOWVALE FORMERLY HUMEWOOD/ROOKWOOD
9835 CAMPBELLTOWN	CAMPBELLTOWN	APPIN ROAD	ST HELEN'S PARK ETC*
B123 CAMPBELLTOWN	CAMPBELLTOWN	APPIN ROAD 302	HOUSE
7753 CAMPBELLTOWN	CAMPBELLTOWN	MENANGLE ROAD 3KM FROM APPIN ROAD JUNCTION	GLEN ALPINE

733 WOLLONDILLY	APPIN	APPIN ROAD	WINDMILL HILL FORMERLY UPCHURCH FARM
616 CAMPBELLTOWN	APPIN	APPIN ROAD	MT GILEAD INCLUDING WINDMILL, STORE AND STABLE
515 CAMPBELLTOWN	APPIN	APPIN ROAD	BEULAH FORMER SUMMER HILL
714 CAMPBELLTOWN	APPIN	APPIN ROAD OFF OVER WOODHOUSE CREEK ON "BEULAH"	TIMBER BEAM BRIDGE ON 'BEULAH'
621 WOLLONDILLY	APPIN	BROOKS POINT ROAD	NORTHAMPTONDALE
550 WOLLONDILLY	APPIN	BROOKS POINT ROAD	ELLADALE FORMERLY RECTORY
679 WOLLONDILLY	APPIN	CHURCH STREET	ST MARK THE EVANGELIST ANGLICAN CHURCH
678 WOLLONDILLY	APPIN	CHURCH STREET	ST MARK THE EVANGELIST ANGLICAN CEMETERY+
672 WOLLONDILLY	APPIN	KING STREET	ST BEDE'S ROMAN CATHOLIC CHURCH AND GROUNDS
671 WOLLONDILLY	APPIN	KING STREET AT REAR OF CHURCH	ST BEDE'S ROMAN CATHOLIC CEMETERY +
579 WOLLONDILLY	APPIN	MAIN STREET 20	HOUSE
543 WOLLONDILLY	APPIN	MAIN STREET CORNER TOGGERAL STREET	COURTHOUSE FORMER
595 WOLLONDILLY	APPIN	MAIN STREET, NEXT TO HOTEL	HOUSE ADJOINING HOTEL
643 WOLLONDILLY	APPIN	TOGGERAI STREET	RECTORY FORMER

Annex D

NSW National Parks And Wildlife Service - Aboriginal Sites Register 8 February 2002

ERM Locked Bag 24 Broadway NSW 2007

Attention: Joanne Jordan

Our Ref: AHIMS#5412 Your Ref: 8020129

Dear Sir/Madam,



NSW NATIONAL PARKS AND WILDLIFE SERVICE

ABN 30 841 387 271

RE: Aboriginal sites search, Appin Rd, Proposed Development for the Following Area Zone 56 Eastings: 289000-303000, Northings: 6211000-6224000

Reference is made to your recent enquiry in respect to whether any Aboriginal sites are registered at the above location.

A search of the National Parks and Wildlife Service's (NPWS) Aboriginal Sites Register database has shown that 168 known Aboriginal sites are currently recorded in or near the proposed development area (refer attached report for any site details & the area that was searched).

The following qualifications apply to the Aboriginal Sites Register database;

- The database only includes recorded sites.
- Large areas of New South Wales have not been the subject of systematic survey or the recording of Aboriginal history. These areas may contain sites which are not currently listed on the Aboriginal Sites Register.
- Site records come from a variety of sources and are variable in their accuracy. When a database search identifies sites in or near the area it is recommended that the exact location of the sites be determined by relocation on the ground.
- The criteria used to search the database are derived from information provided by the client and assume that this information is correct.
- This information can only be used for the purpose it was requested for not to made available to public.

You should be aware that all Aboriginal sites are protected under the *National Parks and Wildlife Act 1974*, regardless of their inclusion on the Sites Register, and it is an offence to damage or destroy them without the prior permission of the Director-General of the NPWS.

In determining development applications under the *Environmental Planning and Assessment Act 1979*, local councils must include matters relating to Aboriginal heritage in the decision making process. As part of this process, the NPWS may be asked for advice on whether an area proposed for development should be subject to Aboriginal heritage assessment. NPWS advice is broadly based on the following criteria;

1) The NPWS would normally recommend an Aboriginal heritage assessment under the following circumstances:

PO Box 1967 Hurstville NSW 2220 Australia Tel: (02) 9585 6444 Fax: (02) 9585 6555 www.npws.nsw.gov.au

- the Sites Register identifies sites in or near the development area, and these could be impacted during or after the development (this includes indirect impacts, such as increased run-off or sedimentation, changes in visitation, etc).
- the proposed development is likely to impact areas of bushland or undisturbed ground.
- the proposed development is likely to impact areas containing sandstone outcrops (greater than 1m²), rock shelters and overhangs, old growth trees, sand bodies, and ground adjacent to creeks, rivers, lakes and swamps.
- the proposed development is likely to impact an area of importance to the Aboriginal community not included in the above (eg. story places, buildings, missions, etc)
- 2) The NPWS would <u>not</u> normally recommend an Aboriginal heritage assessment under the following circumstances:
- the proposed development is within land previously subject to intensive ground disturbance, such as quarrying, repeated market gardening, earthworks for pipelines, roads, sports fields etc. However it should be noted that sites could still occur in these context for example, ploughing generally impacts the top 20cm of ground and there is potential that undisturbed archaeological deposit may occur in areas where soil depth exceeds 20cm. Scarred trees may be located within road reserves and adjacent sport fields, etc.
- the development is within an existing residential or industrial area, or the redevelopment of an existing building is proposed, and the above criteria (listed in section 1) do not apply.

An Aboriginal heritage assessment would provide you with information about the location and significance of sites or sensitive areas, as well as advice on appropriate management options for these areas. It is recommended that an Aboriginal heritage assessment be carried out by a person qualified in undertaking Aboriginal heritage assessments. It is also recommended that the Aboriginal community (Local Aboriginal Land Council, Tribal Council etc) is contacted and its views sought on possible impacts to Aboriginal heritage.

If the proposed development area is found to contain an Aboriginal site, reference should be made to the NPWS requirements for Aboriginal heritage under the Integrated Development Approval Process (*Environmental Planning & Assessment Amendment Act 1997*).

If you wish to discuss this further, please contact Archaeologist, Kathryn Przwyolnik (02) 9585 6677

Yours faithfully

Rebecca Simon

Aboriginal Sites Registrar

Cultural Heritage Service Division

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		Information Contact	
52-2-0014	AMG	56		1	None			Art (Pigment or Engraved)		
52-2-1796	AMG	56		1	None			Modified Tree (Carved or Scarred)		3500
52-2-1879	AMG	56		ī	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		3655
52-2-1921	AMG	56		j	None			Art (Pigment or Engraved)		4213
52-2-1794	AMG	56		1	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		3579
52-2-1795	AMG	56		1	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		3579
52-2-1213	AMG	56		,	None			Grinding Groove		
52-2-2052	AMG	56		.1	None			Art (Pigment or Engraved)		
52-2-1922	AMG	56		1	None			Art (Pigment or Engraved)		4213
52-2-1214	AMG ~	56		j	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-2096	AMG	56)	None			Modified Tree (Carved or Scarred)		



Aboriginal Heritage Information Management System National Park and Wildlife Services, NSW

List of Sites (Partial)
AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ad	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information contact	
52-2-1933	AMG	56	7.		None			Burial		
52-2-2095	AMG	56		:	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-2098	AMG	56		i	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
2-2-2094	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-2097	AMG	56		1	None			Earth Mound Shell		
								Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-2099	AMG	56		1	None			Art (Pigment or Engraved) Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
2-2-1607	AMG	56		1	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		2149
2-2-1881	AMG	56)	None			Art (Pigment or Engraved)		3655
52-2-1880	AMG	56			None			Art (Pigment or Engraved)		3655
52-2-1878	AMG	56	:		None			Art (Pigment or Engraved)		3655

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Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		mormation contact	
52-2-1597	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		2038
52-2-1877	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Grinding Groove		3655
52-2-1924	AMG	56	;		None			Art (Pigment or Engraved)		4213
52-2-0021	AMG	56	¥		None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-1681	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		2451
52-2-1682	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		2415
52-2-1680	AMG	56			None			Modified Tree (Carved or Scarred)		2451
52-2-0020	AMG	56			None			Art (Pigment or Engraved)		
52-2-1610	AMG	56			None			Earth Mound Shell Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		2148
52-2-0022	AMG	56	i		None			Art (Pigment or Engraved)		



Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	eld AMG/GDA Zone	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		miormation contact	
2-2-0023	AMG	56)	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
								Art (Pigment or Engraved)		
2-2-0024	AMG	56		ı	None			Art (Pigment or Engraved)		
2-2-2101	AMG	56			None			Grinding Groove		
								Art (Pigment or Engraved)		
								Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
-2-2059	AMG	56			None			Art (Pigment or Engraved)		
								Potential Archaeological Deposit (PAD)		
2-2-2113	AMG	56		1	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
2-2-2066	AMG	56		ı	None			Potential Archaeological Deposit (PAD)		
2-2-2104	AMG	56			None			At (Diament or Engraved)		
-2-2104	AWO	30			None			Art (Pigment or Engraved) Grinding Groove		
2-2-2062	AMG	56		1	None			Potential Archaeological Deposit (PAD)		
2-2-2107	AMG	56			None			Art (Pigment or Engraved)		
	***							Grinding Groove		
-2-2057	AMG	56			None			Art (Pigment or Engraved)		

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Number of Sites: 168

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location	×	mormation contact	
52-2-2108	AMG	56	-9	,	None			Art (Pigment or Engraved)		
52-2-2056	AMG	56		i	None			Art (Pigment or Engraved)		
52-2-0501	AMG	56			None			Art (Pigment or Engraved)		
52-2-2034	AMG	56)	None			Grinding Groove		4168
52-2-2105	AMG	56		,	None			Art (Pigment or Engraved) Grinding Groove		
52-2-2063	AMG	56		;	None			Potential Archaeological Deposit (PAD) Art (Pigment or Engraved)		
52-2-2103	AMG	56		ŝ	None			Art (Pigment or Engraved) Grinding Groove		
52-2-2060	AMG	56		,	None			Art (Pigment or Engraved)		
52-2-2109	AMG	56			None			Art (Pigment or Engraved)		
52-2-2058	AMG →	56	;		None			Art (Pigment or Engraved) Potential Archaeological Deposit (PAD)		



Number of Sites: 168

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information contact	
2-2-2106	AMG	56			None			Art (Pigment or Engraved)		
								Grinding Groove		
52-2-2065	AMG	56	÷		None			Grinding Groove		
52-2-2064	AMG	56	÷	,	None			Grinding Groove		
52-2-2036	AMG	56	:		None			Grinding Groove		
								Art (Pigment or Engraved)		
								Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-2041	AMG	56	:		None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
								Grinding Groove		
								Art (Pigment or Engraved)		
52-2-2112	AMG	56	;		None			Art (Pigment or Engraved)		
52-2-2055	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-1121	AMG	56	1		None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-2102		56	;		None			Art (Pigment or Engraved)		
	*							Grinding Groove		
52-2-2061	AMG	56			None			Potential Archaeological Deposit (PAD)		

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial) AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Acc	cess Restrict	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information Contact	*
52-2-1373	AMG	56	i		None			Art (Pigment or Engraved)		
52-2-1374	AMG	56	*		None			Art (Pigment or Engraved)		1807
52-2-1371	AMG	56	;		None			Grinding Groove		
52-2-1372	AMG	56	÷	ï	None			Art (Pigment or Engraved)		
52-2-0270	AMG	56		.1	None			Art (Pigment or Engraved)		1807
52-2-0989	AMG	56		Ī	None			Art (Pigment or Engraved)		1807
52-2-0417	AMG	56		i	None			Art (Pigment or Engraved)		
52-2-0994	AMG	56		j	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Art (Pigment or Engraved)		1807
52-2-0990	AMG	56		I	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Art (Pigment or Engraved)		3099
52-2-0993	AMG _	56		1	None			Art (Pigment or Engraved)		1807
52-2-0027	AMG	56		,	None			Art (Pigment or Engraved)		



Aboriginal Heritage Information Management System

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List of Sites (Partial) AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		mormation contact	
52-2-1368	AMG	56	i	1	None			Art (Pigment or Engraved)		
52-2-1202	AMG	56	:	1	None			Grinding Groove		1807
52-2-0278	AMG	56			None			Art (Pigment or Engraved) Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		1819
52-2-0419	AMG	56)	None			Art (Pigment or Engraved)		1819
52-2-1127	AMG	56			None			Art (Pigment or Engraved)		1807
52-2-0283	AMG	56			None			Art (Pigment or Engraved)		
52-2-0421	AMG	56			None			Art (Pigment or Engraved)		
52-2-1163	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		1807
52-2-1160	AMG	56			None			Art (Pigment or Engraved)		1807
52-2-1161	AMG _	56			None			Art (Pigment or Engraved)		1807
52-2-1107	AMG	56			None			Art (Pigment or Engraved)		1807

Aboriginal Heritage Information Management System National Park and Wildlife Services, NSW

List of Sites (Partial)
AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Access Restrictions		tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information contact	
52-2-1164	AMG	56)	None			Art (Pigment or Engraved)		1807
52-2-1162	AMG	56		1	None			Art (Pigment or Engraved)		1807
52-2-1166	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
52-2-1120	AMG	56	ï	1	None			Art (Pigment or Engraved)		1807
52-2-1168	AMG	56	ž.	1	None			Grinding Groove		
52-2-0273	AMG	56	1	1	None			Art (Pigment or Engraved)		
52-2-0840	AMG	56	;	1	None			Art (Pigment or Engraved)		1807
52-2-0422	AMG	56	į		None			Art (Pigment or Engraved)		
52-2-1169	AMG	56	1		None			Grinding Groove		
52-2-0928	AMG ~	56	;		None			Art (Pigment or Engraved)		
52-2-0919	AMG	56	ž		None			Grinding Groove Water Hole		1193



Aboriginal Heritage Information Management System National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Access Restrictions			Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information Contact	
45-2-0382	AMG	56		1	None			Art (Pigment or Engraved)		1333
52-2-1328	AMG	56		1	None			Modified Tree (Carved or Scarred)		
52-2-0274	AMG	56			None			Grinding Groove		
52-2-1170	AMG	56		1	None			Grinding Groove		
52-2-1603	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		1819
52-2-0984	AMG	56			None			Art (Pigment or Engraved)		
52-2-0855	AMG	56			None			Art (Pigment or Engraved)		
52-2-1167	AMG	56			None			Art (Pigment or Engraved)		
52-2-1331	AMG	56			None			Art (Pigment or Engraved)		1562
52-2-0839	AMG ~	56			None			Art (Pigment or Engraved)		1819
52-2-1330	AMG	56			None			Grinding Groove		

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		Information Contact	
52-2-1329	AMG	56	,	,	None			Grinding Groove		1562
52-2-1334	AMG	56	:		None			Art (Pigment or Engraved)		1562
52-2-0272	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-1171	AMG	56	;		None			Art (Pigment or Engraved)		
52-2-0425	AMG	56	, , , , , , , , , , , , , , , , , , ,		None			Art (Pigment or Engraved)		
52-2-0277	AMG	56	ř.		None			Art (Pigment or Engraved)		
52-2-1237	AMG	56	1		None			Art (Pigment or Engraved)	¥	1807
52-2-1333	AMG	56			None			Art (Pigment or Engraved)		1562
52-2-1172	AMG	56	1		None			Grinding Groove		
52-2-1220	AMG ~	56	1		None			Art (Pigment or Engraved)		1229
52-2-0279	AMG	56	1		None			Art (Pigment or Engraved)		



Aboriginal Heritage Information Management System National Park and Wildlife Services, NSW

List of Sites (Partial) AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information Contact	
52-2-1156	AMG	56	:	,	None			Water Hole		
52-2-0844	AMG	56	:		None			Grinding Groove		
52-2-0280	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-0842	AMG	56	:		None			Grinding Groove		
52-2-0843	AMG	56			None			Art (Pigment or Engraved)		
52-2-0426	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-0841	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Art (Pigment or Engraved)		
52-2-1111	AMG	56			None			Grinding Groove		
52-2-1112	AMG	56			None			Grinding Groove		
52-2-1332	AMG	56			None			Art (Pigment or Engraved)		1562
52-2-1204	AMG	56			None			Grinding Groove		

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		information contact	
52-2-1115	AMG	56	1		None			Grinding Groove		
52-2-1006	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-0717	AMG	56	:		None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Art (Pigment or Engraved)		
52-3-0524	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-1203	AMG	56	1		None			Art (Pigment or Engraved)		
52-2-0720	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-0718	AMG	56			None			Art (Pigment or Engraved)		
52-2-0719	AMG	56			None			Grinding Groove		
52-2-0922	AMG	56			None			Art (Pigment or Engraved)		
52-2-1683	AMG ~	56			None			Grinding Groove		2461
52-2-1205	AMG	56	:		None			Art (Pigment or Engraved)		



Aboriginal Heritage Information Management System National Park and Wildlife Services, NSW

List of Sites (Partial) AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location		mormation contact	
52-2-1201	AMG	56	00.22	1	None			Grinding Groove		
52-2-1656	AMG	56		1	None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		2248
52-2-1206	AMG	56		1	None			Art (Pigment or Engraved)		
52-2-0716	AMG	56		1	None			Art (Pigment or Engraved)		
52-2-0713	AMG	56		1	None			Art (Pigment or Engraved)		
52-2-0429	AMG	56		1	None			Art (Pigment or Engraved)		
52-2-1207	AMG	56			None			Art (Pigment or Engraved)		
52-2-0807	AMG	56)	None			Art (Pigment or Engraved)		
52-2-0712	AMG	56			None			Art (Pigment or Engraved)		
52-2-0714	AMG	56			None			Art (Pigment or Engraved)		
52-2-0715	AMG	56			None			Art (Pigment or Engraved)		

Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Sender Gender General Location	Site Id	AMG / GDA	Zone	Easting	Northing	Ad	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
52-2-0765 AMG 56 None Grinding Groove 52-2-0711 AMG 56 None Grinding Groove 52-2-0921 AMG 56 None Art (Pigment or Engraved) 52-2-1386 AMG 56 None Grinding Groove 52-2-0707 AMG 56 None Grinding Groove 52-2-1122 AMG 56 None Grinding Groove 52-2-1129 AMG 56 None Grinding Groove 52-2-1129 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0923 AMG 56 None Art (Pigment or Engraved)						Gender	General	Location		miormation contact	
52-2-0711 AMG 56 None Grinding Groove 52-2-0921 AMG 56 None Art (Pigment or Engraved) 52-2-1386 AMG 56 None Grinding Groove 52-2-0707 AMG 56 None Grinding Groove 52-2-1122 AMG 56 None Grinding Groove 52-2-1122 AMG 56 None Grinding Groove 52-2-1124 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0411 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)	52-2-0281	AMG	56		7.1	None			Art (Pigment or Engraved)		
52-2-0921 AMG	52-2-0765	AMG	56		1	None			Grinding Groove		
52-2-1386 AMG 56 None Grinding Groove 52-2-0707 AMG 56 None Grinding Groove 52-2-1122 AMG 56 None Grinding Groove 52-2-1129 AMG 56 None Grinding Groove 52-2-1129 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0923 AMG 56 None Art (Pigment or Engraved)	52-2-0711	AMG	56		1	None			Grinding Groove		
52-2-0707 AMG 56 None Grinding Groove 52-2-1122 AMG 56 None Grinding Groove 52-2-1129 AMG 56 None Grinding Groove 52-2-0411 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0923 AMG 56 None Art (Pigment or Engraved)	52-2-0921	AMG	56		1	None			Art (Pigment or Engraved)		
52-2-1122 AMG 56 None Grinding Groove 52-2-1129 AMG 56 None Grinding Groove 52-2-0411 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0923 AMG 56 None Art (Pigment or Engraved)	52-2-1386	AMG	56		1	None			Grinding Groove		
AMG 56 None Grinding Groove 52-2-0411 AMG 56 None Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0923 AMG 56 None Art (Pigment or Engraved)	52-2-0707	AMG	56		1	None			Grinding Groove		
Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) 52-2-0923 AMG 56 None Art (Pigment or Engraved)	52-2-1122	AMG	56		1	None			Grinding Groove		
52-2-0923 AMG 56 None Art (Pigment or Engraved)	52-2-1129	AMG	56		1	None			Grinding Groove		
	52-2-0411	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal)		
	52-2-0923		56			None			Art (Pigment or Engraved)		
711 (Figinotical Englaves)	52-2-0708		56			None			Art (Pigment or Engraved)		3570



Aboriginal Heritage Information Management System National Park and Wildlife Services, NSW

List of Sites (Partial)

AHIMS # 5412 - Appin Rd

Site Id	AMG / GDA	Zone	Easting	Northing	Ac	cess Restric	tions	Site Features	Further Site Information Contact	Report ID
					Gender	General	Location			
52-2-0709	AMG	56			None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Art (Pigment or Engraved)		3570
52-2-0591	AMG	56	;		None			Artefact (Stone, Bone, Shell, Glass, Ceramic and Metal) Art (Pigment or Engraved)		
52-2-0446	AMG	56			None			Grinding Groove		
52-2-1124	AMG	56	:		None			Art (Pigment or Engraved)		
52-2-0710	AMG	56			None			Grinding Groove Water Hole		
52-2-0444	AMG	56			None			Art (Pigment or Engraved)		
52-2-0920	AMG	56			None			Grinding Groove Water Hole		
52-2-0819	AMG	56			None			Grinding Groove		

Annex E

National Native Title Tribunal Search Results



NATIONAL NATIVE TITLE TRIBUNAL

Level 25

GPO Box 9973, SYDNEY NSW 2001

25 Bligh Street

Telephone: (02) 9235 6300

SYDNEY NSW 2000 Facsimile: (02) 9233 5613

AUSTRALIA

Website: www.nntt.gov.au

Your Ref: 8020129 Our Ref: 616/02JR

20 March 2002

Mr Andrew Sneddon **ERM** Locked Bag 24, **BROADWAY NSW 2007**

Environmental	Resou	rces Ma	nagement	Australia
Referred to:			Ref. No.	
Date Received	2.1	MAN	2002	
Checked By:				
Accepted By:	roject I	Director/	Date: Ivianager	

Dear Mr Sneddon,

Re: Your search request in relation to Wollondilly Shire Council Local Government Area

Thank you for your letter of 18 March 2002 regarding the above search request.

A search on 20 March 2002 at 10.49am of the Local Government Area nominated in your request indicates that the nearest active claimant native title determination application, determination of native title or Registered Indigenous Land Use Agreement to the specific area you have nominated is;

Register Type	NNTT Reference Numbers	
National Native Title Register	Nil.	
Register of Native Title Claims	NC97/7, NC97/8.	
Unregistered Claimant applications	NC96/30.	
Register of Indigenous Land Use	Nil.	
Agreements		

Please note that there may be a delay of up to 48 hours between a claimant native title application being lodged in the Federal Court and its transferral to the Tribunal. As such the information contained in this search, in relation to unregistered claimant applications, may not show claimant applications recently lodged or amended in the Federal Court.

I have enclosed for your reference the relevant register extracts and/or summary of the application and attachments that should assist you in determining if your interests are affected. I have also included an information sheet detailing the differences between the Register of Native Title Claims extract and the application summary together with an information sheet on the Tribunals search service.

Search and/or geospatial analysis charges

The charge for a search of the registers/applications summary is \$21.45 per 15 minutes and \$7.15 per 5 minutes thereafter and a photocopying charge of \$0.50 per A4 page and \$1.00 per A3 page. For this search this amount is \$37.45. A debit advice notice will be forwarded to you.

Tribunal accepts no liability for reliance on enclosed information

The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

Should you require any further information, please do not hesitate to contact me on (02) 9235 6300.

Yours sincerely

Jason Roberts

Case Management Unit

Rdents

Annex F

Campbelltown And Wollondilly Council Local Environmental Plan- Heritage Listings



New South Wales Consolidated Regulations

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CAMPBELLTOWN (URBAN AREA) LOCAL ENVIRONMENTAL PLAN 2002 - SCHEDULE 1

SCHEDULE 1 Heritage items and heritage conservation areas

(Schedule 3)

Part 1 Heritage items

Abington Crescent

Glen Alpine Site of original house

Lot 756 DP 787316, Heritage Park, Glen Alpine

Significance: Local

Allman Street

Water Supply Reservoir, Cattle Tank and Silt Traps

R28561 and R28562, Hurley Park, Campbelltown

Significance: State

Appin Road

Denfield

Lot 11 DP 812910 and Lot 122 DP 813654, St Helens Park

Permanent Conservation Order No 540

Significance: State

Silos

Public road

Appin Road reservation

Bradbury

Significance: Regional

Badgally Road

Blairmount

Lot 102 DP 708401, Blairmount

Significance: Local

Glenroy

Lot 2 DP 703539, Claymore

Significance: Local

Hillcrest

Lot 2 DP 1017017, Claymore

Significance: Local

Belltrees Close

Glen Alpine second house of that name

```
12 Belltrees Close, Lot 443 DP 746821, Glen Alpine
Significance: Local
Blaxland Road
Blair Athol group comprising:
Blair Athol
23 Blair Athol Drive, Lot 359 DP 870579, Blair Athol
The Kia
21 Blair Athol Drive, Lot 357 DP 870579, Blair Athol
29 Blair Athol Drive, Lot 401 DP 870579, Blair Athol
Significance: Local
Broughton Street
Presbyterian Cemetery
Part Lot 1 DP 596379, Campbelltown
Significance: Local
St Elmo
94 Broughton Street, Lot 3 DP 221454, Campbelltown
Significance: Local
Campbelltown Road
Denham Court group
Lot 392 DP 564854, Denham Court
Permanent Conservation Order No 212
Significance: State
Milestones
Various locations along Campbelltown Road, on road reserve
Significance: State
Robin Hood Farm
Lot 201 DP 255306, Campbelltown Road, Ingleburn
Significance: State
Condamine Street
House
2 Condamine Street, Lot 1 DP 917059, Campbelltown
Significance: Local
Cordeaux Street
St John the Evangelist Church (new)
Lot 1 DP 227905, Campbelltown
```

Significance: Local

St Peters Anglican Church group

Lots 50 and 52 DP 811930, Campbelltown

Significance: State

Dove Place Boronia 6 Dove Place, Lot 18 DP 247802, Ingleburn Significance: Local Eagleview Road Eagleview House 107 Eagleview Road, Lot 105 DP 260047, Minto Significance: Local Eschol Park Drive Eschol Park 14 Eschol Park Drive, Lot 22 DP 545718, Eschol Park Significance: Local Fern Avenue Raith Lot 2 DP 871149, Bradbury Significance: Local Fitzroy Crescent Warby's Dams 1 and 2 on Leumeah Creek Lot 35 DP 31214 and Lot 7 DP 232798, Leumeah Significance: Regional George Street St Johns Church group Lots 1 and 2 DP 246268, Campbelltown Permanent Conservation Order No 193 Significance: State Guernsey Avenue Campbellfield or Redfern's Cottage Part of Lot 2 DP 1025136 Significance: Local Hansens Road Kiera-villa 20 Hansens Road, Lot E DP 162716, Minto Heights Significance: Local Hollylea Road Hollylea and former Plough Inn 185 Airds Road, Lot 232 DP 713035, Leumeah Permanent Conservation Order No 343 Significance: State

SRA Land, Campbelltown

Significance: Local

Lindesay Street

Warby's Dams 3 and 4 on Leumeah Creek

Lot 48 DP 213178, Leumeah

Significance: Regional

Lithgow Street

Glenalvon and Water Trough

4 Lithgow Street, Lot 1 DP 34658, Campbelltown

Permanent Conservation Order No 4

Significance: State

House

64 Lithgow Street, Lot B DP 415425, Campbelltown

Significance: Local

Richmond Villa

12 Lithgow Street, Lot 3 DP 827691, Campbelltown

Significance: Local

St Davids Presbyterian Church and former Manse

32 and 40 Lithgow Street, Lots 11 and 12 DP 806710, Campbelltown

Significance: Local

Macquarie Road

The Pines

13 Macquarie Road, Lot 1 DP 449394, Ingleburn

Significance: Local

Mercedes Road

Stone Cottage

26 Mercedes Road, Lots 55 68 Section 2 DP 2189, Ingleburn

Significance: Local

Mississippi Crescent

Epping Forest

Lot 34 DP 262269, Kearns

State Heritage Order No 1298

Significance: State

Moonstone Place

Mount St Joseph

13A Moonstone Place, Lot 4372 DP 261630, Eagle Vale

Significance: Local

Narellan Road

Stations of the Cross

Lot 1 DP 247902, Campbelltown

Significance: Regional Old Menangle Road Emily Cottage Lot 61 DP 997095, Campbelltown Significance: Local Ouondong Lots A and B DP 156043, Campbelltown Significance: State Oxford Road Ingleburn Community Hall Lot 8 Section 8 DP 2913, Ingleburn Significance: Local Ingleburn Horse Trough situated in Oxford Road, Ingleburn, adjacent to Lot 4 DP 10494 14 Oxford Road, Ingleburn Significance: Local Ingleburn Primary School Lot 1 DP 122332, Ingleburn Significance: Local Woodcrest 111 Oxford Road, Lot 426 DP 259167, Ingleburn Significance: Local Oxley Street Caversham 26 Oxley Street, Lot 1 DP 743185, Campbelltown Significance: Local House MYOB 24 Oxley Street, Lot 1 DP 555265 and Lot 26 DP 220014, Campbelltown Significance: Local Wesleyan Chapel (now part of Uniting Church), Lot 1 DP 770123, Campbelltown Significance: Local Parkholme Circuit Englorie Park House 2 Parkholme Circuit, Lot 48 and Part Lot 50 DP 845826, Englorie Park Significance: Local Queen Street Airds Cottage (formerly Farrier's Arms) and Water Trough 318 Queen Street, Part Portion 67 and Part Portion 74 Parish of St Peter, Campbelltown Significance: Local Campbelltown Community Centre (formerly Fieldhouse's Produce Store and

Campbelltown News Building)

317 Queen Street, Part Portion 74 Parish of St Peter, DP 77929, Campbelltown

Significance: Local

Campbelltown Court House

95 Queen Street, Part of Lot 1 DP 772068, Campbelltown

Significance: State

Commercial Bank of Sydney (former)

263 Queen Street, Lot 1 DP 123556, Campbelltown

Permanent Conservation Order No 499

Significance: State

Dredges Cottage

303 Queen Street, Lot 111 DP 705804, Campbelltown

Permanent Conservation Order No 640

Significance: State

Fisher's Ghost Restaurant

316 Queen Street, Lot 33 DP 131201, Campbelltown

Significance: Local

Gold Wheel Restaurant

38 Queen Street, Lot 1 DP 742064, Campbelltown

Significance: Local

Post Office Campbelltown (former)

261 Queen Street, Lot 2 DP 628679, Campbelltown

Permanent Conservation Order No 265

Significance: State

Queen Street Group comprising:

McGuanne House, 286 Queen Street, Campbelltown, Lot 4 DP 827641

Old Railway Hotel, 288 Queen Street, Campbelltown, Lot 3 DP 827641

William Bursill's Shop, 292 294 Queen Street, Campbelltown, Lot 2 DP 827641

The Coaching House, 298 Queen Street, Campbelltown, Lot 1 DP 827641

Permanent Conservation Order No 7

Significance: State

Town Hall and former Fire Station

297 Queen Street, Lot 103 DP 621563, Campbelltown

Significance: Local

Warby's Stables and Barn

 $12\ 14\ \mathrm{Queen}$ Street, Part Lot 1 DP 216516 and Part Lot B DP 449236, Campbelltown

Campbellcown

Permanent Conservation Order No 497

Significance: State

Water Trough

Within Civic Centre, corner Broughton Street, Lot 301 DP 715353, Campbelltown

```
Significance: Local
Roy Watts Road
Hurlstone Agricultural High School Original School Building, 1926
Lot 1 DP 175962, Glenfield
Significance: Local
St Helens Park Drive
St Helens Park House and Dam
Lot 60 DP 739072, Part of Lot 2 DP 791082 and Part of Lot 4 DP 865319, St
Permanent Conservation Order No 406
Significance: State
St Johns Road
Methodist/Congregational Cemetery
Lot 13 DP 631041, Pioneer Park, Campbelltown
Significance: Local
Shiel Place
St Andrews
11 Shiel Place, Lot 1200 DP 749489, St Andrews
Significance: Local
Sturt Street
8 Sturt Street, Lot 3 DP 218620, Campbelltown
Significance: Local
House
10 Sturt Street, Lot 1 DP 743626, Campbelltown
Significance: Local
House
14 Sturt Street, Lot 3 DP 103059, Campbelltown
Significance: Local
Waminda Avenue
104 Waminda Avenue, Lot 21 DP 573760, Campbelltown
Significance: Local
Warby Street
House
60 Warby Street, Lot 32 DP 7496, Campbelltown
Significance: Local
Waterhouse Place
Briar Cottage
Lot 43 DP 261258, Airds
```

Significance: Local

Part 2 Heritage conservation areas

Queen Street Heritage Conservation Area, including:

McGuanne House, 286 Queen Street, Campbelltown, Lot 4 DP 827641

Old Railway Hotel, 288 Queen Street, Campbelltown, Lot 3 DP 827641

William Bursill's Shop, 292 294 Queen Street, Campbelltown, Lot 2 DP 827641

The Coaching House, 298 Queen Street, Campbelltown, Lot 1 DP 827641

296 Queen Street, Campbelltown, Lot 5 DP 827641

300 Queen Street, Campbelltown, Lot 2 DP 270118

3 Allman Street, Campbelltown, Lot 1 DP 51446

5 Allman Street, Campbelltown, Lot 1 DP 727966

Bradbury Avenue, Campbelltown, Lot 1 DP 270118

2 Bradbury Avenue, Campbelltown, Lot 3 DP 270118

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WOLLONDILLY LOCAL ENVIRONMENTAL PLAN 1991 - SCHEDULE 1

SCHEDULE 1 Items of the environmental heritage

(Clause 6)

APPIN

- 1 Former Weatherboard Shop (now house); lot 8 Section 1 No 20 Appin Road.
- 2 Schoolmasters Residence; Appin Public School, Appin Road.
- 3 Stone Cottage; lot 4 DP 235986 Appin Road.
- 4 St Bedes Roman Catholic Church and Graveyard; lot 1 DP 227868 King Street.
- 5 Former Courthouse; lot 9 <u>Section 3</u> Corner Appin Road and Toggerai Streets.
- 6 Northamptondale Group House, Trees, Slab, Farm Outbuildings; lot 2 DP 594207 Brookes Point Road.
- 7 Windmill Hill House Ruin; part lot 2 DP 510762 Wilton Road.
- 8 Elladale; lot 101 DP 790844 Brookes Point Road.
- 9 Appin Inn Site; lot 2 DP 529457 Appin Road.
- 10 Site of Darcy's House; lots 1 and 2 DP 594426 Appin Road.
- 11 Broughtons Pass Weir.
- 12 Cataract Dam.
- 13 Former St Marks Rectory; lot 27 DP 747041 Toggerai Street.
- 14 St Marks Anglican Church and Graveyard; lots 19 and 20 $\underline{\text{Section}}$ 3 Church Street.
- 15 "Upper Canal" Water Supply System.

BARGO

- 1 Wirrimbirra Sanctuary; lot 1 DP 789005, lots 18, 19, part lot 32, lots 33 and 203 DP 751250 Remembrance Driveway.
- 2 Bargo Railway Bridge south of Railway Station; Tylers Road.
- 3 Bargo Railway Bridge north of Railway Station; Wellers Road.
- 4 Hotel Bargo; lots 7 and 8 DP 9024 Southern Road.
- 5 Bargo Railway Station.
- 6 Bargo Railway Viaduct.
- 7 Old Coomeroo Homestead and Silo; lot 46 DP 751250 Southern Road.
- 8 Hawthorne; lot 232 DP 613595 Hawthorne Road.
- 9 Bargo Cemetery; Southern Road.

BUXTON

- 1 Buxton Primary School; lots 18 to 31 and 48 to 57 $\,\underline{\text{section}}\,\, \underline{6}\,\, \, \text{DP}\,\, 2444\,\, \text{Wallaroo}$ Road and Norwood Road.
- 2 Buxton House; lot 50 to 54 $\underline{\text{section 4}}$ DP 2444 Corner East Parade and Matcham Road.

CAMDEN

- 1 Camden Valley Inn; lot Y DP 408826 Remembrance Driveway.
- 2 Brownlow Hill Group: Houses, Avairy, Garden, Roundhouse, Stables and Trees; lot 2 DP 569408 and lot 1 DP 614348 Brownlow Hill Loop Road.
- 3 Camden Park Estate Group:

Lots 1 and , DP 213696, the land included in Permanent Conservation Order No 341, being the curtilage of the building known as "Camden Park", Menangle;

Former Camden Park Gatelodge, Lot 1, DP 168893;

Macquarie Monument near Barragal Lagoon, Lot 1, DP 168893;

- 3 Cottages on ridge above the orchard, Lot 11, DP 531897;
- 3 Cottages on slope above the orchard, Lot 11, DP 531897;

Orchard site including Camellia Garden, trees, piggery and storage shed, Lot 11, DP 531897;

Cottage, Dairy and Hayshed at Dairy No 8 on western boundary adjacent to Remembrance Driveway, Lot $11,\ \text{DP}\ 531897;$

Cottage, Dairy and Feed Stalls at Dairy No 9, on western boundary adjacent to Remembrance Driveway, Lot 11, DP 580654; and

Cottage, Dairy, Feed Sheds and Silos at Dairy No 4, on southern boundary adjacent to Woodbridge Road, Lot 1, DP 168893.

4 Aboriginal scarred trees on Lots 2, 3 and 5, DP 233005 and Lot 1, DP 551376 (Camden Park).

CAWDOR

- 1 Methodist Church Group: Church, Cemetery, Parsonage; part lot 12 DP 531898 Cawdor Road undescribed lot, Cawdor Road and Parsonage Pt lot 12 DP 531898 Cawdor Road.
- 2 Cawdor Village Group: church, house and slab shed, trees, school and school residence; part lot 10 DP 751265 Cawdor Road.
- 3 Cawdor Creamery Site; part lot 12 DP 531898, Cawdor Road.
- 4 Slab Hut and trees; lot 1 DP 180644 No 470 Cawdor Road.
- 5 House, Slab House and Hayshed; part lot 1 DP 5995 Cawdor Road.

COURIDJAH

- 1 Thirlmere Pumping Station; Thirlmere Lakes National Park.
- 2 Couridjah Railway Station.
- 3 Stone culvert under Former Loop Line 750m north of Couridjah Station.

DOUGLAS PARK

- 1 Mountbatten Group: house, chapel, and garden building; lot 2 DP 576136 and lot A DP 421246 Duggan Street.
- 2 St Mary's Towers; lot 1 DP 250359 Mt Keira Road.

GLENMORE

- 1 Uniting Church Group: church, cemetery, and trees; lot 3 DP 778482 Moores Way.
- 2 Robert Moore's house; lot 1 DP 584283 Moores Way.
- 3 Glenmore House; lot 1 DP 778482 Moores Way.
- 4 Former Schoolhouse; lot 21 DP 263003 Moores Way.

MALDON

1 Suspension Bridge (Nepean River).

MENANGLE

- 1 Menangle Railway Viaduct.
- 2 Menangle Railway Station.
- 3 Camden Park Estate Central Creamery; lot 2 DP 581462 Station Street.
- 4 Camden Park Rotolactor; lot 201 DP 590247 Station Street.
- 5 St Patrick's Roman Catholic Church; lot 100 DP 790213 Menangle Road.
- 6 Menangle Store; lot 8 DP 531899 Menangle Road.
- 7 Gilbulla (Anglican Conference Centre); lot A DP 407248 and DP 370921 Moreton Park Road.
- $8\ \mathrm{St}$ James Anglican Church; DP 306367 and R.O.W. T and G A936648 of lot 17 DP 251588 Menangle Road.

MOUNT HUNTER

1 Mount Hunter Creamery; lot 15 DP 935994 Burragorang Road.

MOWBRAY PARK

- 1 Mowbray Park Group: gatehouse, group of buildings; part lot 1 DP 772643 Barkers Lodge Road.
- 2 Wellington Park Iceworks site; part lot 133 DP 751287 and part DP 64676 Rays Lane.

OAKDALE

- 1 Oakdale Timber Mill; lot 2 DP 598732 Mill Road.
- 2 Oakdale Winery Cottage; lot 10 DP 264139 Burragorang Road.

PICTON

- 1 Rogers Stone Cottage; lots 9 and 10 $\underline{\text{Section 7}}$ Argyle Street.
- 2 James Cottage; lot DP 58853 Argyle Street.
- 3 Former Fairley Residence; lot 9 DP 58853 Argyle Street.
- 4 Redbank Uniting Church; part lot 9 and lot 10 $\underline{\text{Section 2}}$ Corner Thirlmere Way and Argyle Street.
- 5 Abbotsford Group: house, cottage and brick outhouse, underground water storage tank, trees and garden; part lot 1 DP 207960 Oaks Road.
- 6 St Marks Anglican Church, Cemetery and Gardens; lots 7 and 8 Section 1, DP 939379 Menangle Street west.
- 7 Victorian House; lot 18 <u>Section 2</u> DP 939379 Menangle Street west.
- 8 Larkin Cottage; lot 1 DP 742569 No 1 Elizabeth Street.
- 9 Larkin Cottage; lots 2 and 3 Section 13 DP 939379 No 5 Elizabeth Street.
- 10 Koorana Group: house and trees; lot 2 DP 207443 Remembrance Driveway.
- 11 Old Shire Hall; lot 2 DP 580175 Menangle Street.
- 12 Stonequarry Creek Bridge Piers; Argyle Street.
- 13 Wendover House; lot B DP154331 No 83 Menangle Street.
- 14 Courthouse; lot 5 DP 151904 Argyle Street.
- 15 Jarvisfield Group: house and barn; lot 2 DP 789555 Remembrance Driveway.
- 16 Vault Hill Cemetery; undescribed lot Remembrance Driveway.
- 17 Razorback Inn; part lot 146 DP 751287 Remembrance Driveway.
- 18 George IV Inn; lot A DP 366865 Argyle Street.

- 19 Railway Bridge (hole in the wall); Argyle Street.
- 20 Former Gatehouse; lot 1 DP 85000 Argyle Street.
- 21 Picton Loopline Level Crossing Site; Railway lands adjacent to former Gatehouse, Argyle Street.
- 22 Picton Mainline Railway Loop and Tunnel.
- 23 Former Mainline Railway Tunnel (Mushroom Tunnel).
- 24 Redbank Range Railway Tunnel.
- 25 Former Hotel Picton (now Pheasants Kitchen Restaurant); lot 1 DP 155642 corner Argyle Street and The Oaks Road.
- 26 Furniture Store; lot 1 and 2 DP 563577 Menangle Street.
- 27 Stonequarry Creek Quarry Site.
- 28 House; lot 15 Section 4 DP 192895 No 87 Menangle Street.
- 29 Former CBC Bank; part lot 2 Section 4 DP 192895 Argyle Street.
- 30 Former Coachhouse; part lot 2 Section 4 DP 192895 Argyle Street.
- 31 Post Office; part lot 1 corner Argyle and Menangle Streets.
- 32 Anglican Rectory; undescribed lot No 99 103 Argyle Street.
- 33 House; part lot 1 $\underline{\text{Section 11}}$ DP 939379 No 49 Argyle Street.
- 34 House; lot 1 DP 742840 No 51 Argyle Street.
- 35 House; lot 9 DP 111356 No 53 Argyle Street.
- 36 Macquarie House; lot 8 Section 9 DP 939379 No 55 Argyle Street.
- 37 House; lot 6 Section 10 DP 939379 No 42 Argyle Street.
- 38 Picton Urban Conservation Area.

RAZORBACK

- 1 Wooden Mile Post; lot 101 DP 773131 Razorback Road.
- $2\ \text{Mt}$ Hercules Group: house, slab barns, trees; lot $12\ \text{DP}\ 112301\ \text{Mt}$ Hercules Road.

TAHMOOR

- 1 Denfield Villa; lot 6 DP 597171 Remembrance Driveway.
- 2 Myrtle Creek bridge adjoining Remembrance Driveway.
- 3 Bellefield; lots 137 and 138 DP 8982 Pitt Street.
- 4 Stratford House; lot 2 DP 236262 Rockford Road.
- 5 Tahmoor House; lot 12 DP 10669 Remembrance Driveway.
- 6 Rockford Crossing; Remembrance Driveway at Bargo River.
- 7 Bunya Pine; Tahmoor Village Shopping Centre lot 100 DP 791277 Remembrance Driveway.

THE OAKS

- 1 Noakes Store; lot 20 DP 939905 Corner Macintosh and John Streets.
- 2 Glendiver; lot 1 DP 714831 Glendiver Road.
- 3 St Matthews Anglican Church and Cemetery; lot 51 DP 751287 Old Oaks Road.
- 4 The Hermitage group: house, trees and garden, stone terracing and convict graves site; lot 1 DP 215211 Hermitage Road.
- 5 St Lukes Anglican Church and trees; part lot 3 $\underline{\text{Section 9}}$ DP 975241 Merlin Street.

- 6 St Aloysius group: Church, Presbytery, Convent and small schoolhouse; lots 2 7 Section 1 DP 975241 Merlin Street.
- 7 The Oaks Schoolhouse; lots 9, 14 and part 15 Section 5 DP 975241 and undescribed lots John Street.

THERESA PARK

1 Theresa Park Church group: church, schoolmaster's residence and school; lot 1 DP 626656 Werombi Road.

THIRLMERE

- 1 Thirlmere Public School and school residence; lot 1 DP 598357 Oaks Street.
- 2 Thirlmere House; lot 2 DP 773135 Burns Road.
- 3 Queen Victoria Hospital; lot 3 DP 264150 Thirlmere Way.
- 4 Thirlmere Cemetery; Station Street.
- 5 Thirlmere Urban Conservation Area.

WALLACTA

- 1 Ravenwood; lot 14 DP 569961 Bents Basin Road.
- 2 Sarahville; lot 21 DP 567670 Bents Basin Road.
- 3 Charleville; lot 16 and 17 DP 546709 Bents Basin Road.
- 4 Blaxlands Farm; part lot D DP 339526 Silverdale Road.
- 5 Blaxlands Crossing; Nepean River.

WARRAGAMBA

1 Warragamba Dam Group; Ropeway Dam, Cableway, Suspension Bridge, Light Railways.

WILTON

- 1 Wilton Park Group: Stables, coachhouse, water tanks, stallion boxes, covered yards; lot 8 DP 243079 Wilton Park Road.
- 2 St Lukes Anglican Church; lots 4 6 Section 1 DP 751297 Argyle Street.
- 3 Pheasants Nest Weir (Nepean River).
- 4 Cordeaux Dam and Pumping Station.

YERRANDERIE

- 1 Former Police Station.
- 2 Former Courthouse.
- 3 Roman Catholic Church.
- 4 Yerranderie Silver Mining Field.

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Annex G

ICOMOS Burra Charter

The Burra Charter

(The Australia ICOMOS Charter for Places of Cultural Significance)

Preamble

Considering the International Charter for the Conservation and Restoration of Monuments and Sites (Venice 1964), and the Resolutions of the 5th General Assembly of the International Council on Monuments and Sites (ICOMOS) (Moscow 1978), the Burra Charter was adopted by Australia ICOMOS (the Australian National Committee of ICOMOS) on 19 August 1979 at Burra, South Australia. Revisions were adopted on 23 February 1981, 23 April 1988 and 26 November 1999.

The Burra Charter provides guidance for the conservation and management of places of cultural significance (cultural heritage places), and is based on the knowledge and experience of Australia ICOMOS members.

Conservation is an integral part of the management of places of cultural significance and is an ongoing responsibility.

Who is the Charter for?

The Charter sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians.

Using the Charter

The Charter should be read as a whole. Many articles are interdependent. Articles in the Conservation Principles section are often further developed in the Conservation Processes and Conservation Practice sections. Headings have been included for ease of reading but do not form part of the Charter.

The Charter is self-contained, but aspects of its use and application are further explained in the following Australia ICOMOS documents:

• Guidelines to the Burra Charter: Cultural Significance;

- Guidelines to the Burra Charter: Conservation Policy;
- Guidelines to the Burra Charter: Procedures for Undertaking Studies and Reports;
- Code on the Ethics of Coexistence in Conserving Significant Places.

What places does the Charter apply to?

The Charter can be applied to all types of places of cultural significance including natural, indigenous and historic places with cultural values.

The standards of other organisations may also be relevant. These include the Australian Natural Heritage Charter and the Draft Guidelines for the Protection, Management and Use of Aboriginal and Torres Strait Islander Cultural Heritage Places.

Why conserve?

Places of cultural significance enrich people's lives, often providing a deep and inspirational sense of connection to community and landscape, to the past and to lived experiences. They are historical records, that are important as tangible expressions of Australian identity and experience. Places of cultural significance reflect the diversity of our communities, telling us about who we are and the past that has formed us and the Australian landscape. They are irreplaceable and precious.

These places of cultural significance must be conserved for present and future generations.

The Burra Charter advocates a cautious approach to change: do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained.

Australia ICOMOS Inc

Article 1. Definitions

For the purposes of this Charter:

- 1.1 Place means site, area, land, landscape, building or other work, group of buildings or other works, and may include components, contents, spaces and views.
- 1.2 *Cultural significance* means aesthetic, historic, scientific, social or spiritual value for past, present or future generations.

Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.

Places may have a range of values for different individuals or groups.

- 1.3 Fabric means all the physical material of the place including components, fixtures, contents, and objects.
- 1.4 Conservation means all the processes of looking after a place so as to retain its cultural significance.
- 1.5 *Maintenance* means the continuous protective care of the *fabric* and *setting* of a *place*, and is to be distinguished from repair. Repair involves restoration or reconstruction.
- 1.6 Preservation means maintaining the fabric of a place in its existing state and retarding deterioration.
- 1.7 Restoration means returning the existing fabric of a place to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.
- 1.8 Reconstruction means returning a place to a known earlier state and is distinguished from restoration by the introduction of new material into the fabric.
- 1.9 Adaptation means modifying a place to suit the existing use or a proposed use.
- 1.10 *Use* means the functions of a place, as well as the activities and practices that may occur at the place.
- 1.11 Compatible use means a use which respects the cultural significance of a place. Such a use involves no, or minimal, impact on cultural significance.
- 1.12 Setting means the area around a place, which may include the visual catchment.
- 1.13 Related place means a place that contributes to the cultural significance of another place.

Explanatory Notes

The concept of place should be broadly interpreted. The elements described in Article 1.1 may include memorials, trees, gardens, parks, places of historical events, urban areas, towns, industrial places, archaeological sites and spiritual and religious places.

The term cultural significance is synonymous with heritage significance and cultural heritage value.

Cultural significance may change as a result of the continuing history of the place.

Understanding of cultural significance may change as a result of new information.

Fabric includes building interiors and subsurface remains, as well as excavated material.

Fabric may define spaces and these may be important elements of the significance of the place.

The distinctions referred to, for example in relation to roof gutters, are:

- maintenance regular inspection and cleaning of gutters;
- repair involving restoration returning of dislodged gutters;
- repair involving reconstruction replacing decayed gutters.

It is recognised that all places and their components change over time at varying

New material may include recycled material salvaged from other places. This should not be to the detriment of any place of cultural significance.

- 1.14 Related object means an object that contributes to the cultural significance of a place but is not at the place.
- 1.15 Associations mean the special connections that exist between people and a place.
- 1.16 Meanings denote what a place signifies, indicates, evokes or expresses.
- 1.17 Interpretation means all the ways of presenting the cultural significance of a place.

Conservation Principles

Article 2. Conservation and management

- 2.1 Places of cultural significance should be conserved.
- 2.2 The aim of conservation is to retain the cultural significance of a place.
- 2.3 Conservation is an integral part of good management of places of cultural significance.
- 2.4 Places of cultural significance should be safeguarded and not put at risk or left in a vulnerable state.

Article 3. Cautious approach

- 3.1 Conservation is based on a respect for the existing fabric, use, associations and meanings. It requires a cautious approach of changing as much as necessary but as little as possible.
- 3.2 Changes to a *place* should not distort the physical or other evidence it provides, nor be based on conjecture.

Article 4. Knowledge, skills and techniques

- 4.1 *Conservation* should make use of all the knowledge, skills and disciplines which can contribute to the study and care of the *place*.
- 4.2 Traditional techniques and materials are preferred for the *conservation* of significant *fabric*. In some circumstances modern techniques and materials which offer substantial conservation benefits may be appropriate.

Explanatory Notes

Associations may include social or spiritual values and cultural responsibilities for a place.

Meanings generally relate to intangible aspects such as symbolic qualities and memories.

Interpretation may be a combination of the treatment of the fabric (e.g. maintenance, restoration, reconstruction); the use of and activities at the place; and the use of introduced explanatory material.

The traces of additions, alterations and earlier treatments to the fabric of a place are evidence of its history and uses which may be part of its significance. Conservation action should assist and not impede their understanding.

The use of modern materials and techniques must be supported by firm scientific evidence or by a body of experience.

Article 5. Values

- 5.1 *Conservation* of a *place* should identify and take into consideration all aspects of cultural and natural significance without unwarranted emphasis on any one value at the expense of others.
- 5.2 Relative degrees of *cultural significance* may lead to different *conservation* actions at a place.

Article 6. Burra Charter process

- 6.1 The *cultural significance* of a *place* and other issues affecting its future are best understood by a sequence of collecting and analysing information before making decisions. Understanding cultural significance comes first, then development of policy and finally management of the place in accordance with the policy.
- 6.2 The policy for managing a place must be *based* on an understanding of its *cultural significance*.
- 6.3 Policy development should also include consideration of other factors affecting the future of a *place* such as the owner's needs, resources, external constraints and its physical condition.

Article 7. Use

- 7.1 Where the use of a place is of cultural significance it should be retained.
- 7.2 A place should have a compatible use.

Article 8. Setting

Conservation requires the retention of an appropriate visual setting and other relationships that contribute to the cultural significance of the place.

New construction, demolition, intrusions or other changes which would adversely affect the setting or relationships are not appropriate.

Explanatory Notes

Conservation of places with natural significance is explained in the Australian Natural Heritage Charter. This Charter defines natural significance to mean the importance of ecosystems, biological diversity and geodiversity for their existence value, or for present or future generations in terms of their scientific, social, aesthetic and lifesupport value.

A cautious approach is needed, as understanding of cultural significance may change. This article should not be used to justify actions which do not retain cultural significance.

The Burra Charter process, or sequence of investigations, decisions and actions, is illustrated in the accompanying flowchart.

The policy should identify a use or combination of uses or constraints on uses that retain the cultural significance of the place. New use of a place should involve minimal change, to significant fabric and use; should respect associations and meanings; and where appropriate should provide for continuation of practices which contribute to the cultural significance of the place.

Aspects of the visual setting may include use, siting, bulk, form, scale, character, colour, texture and materials.

Other relationships, such as historical connections, may contribute to interpretation, appreciation, enjoyment or experience of the place.

Explanatory Notes

Article 9. Location

- 9.1 The physical location of a place is part of its cultural significance. A building, work or other component of a place should remain in its historical location. Relocation is generally unacceptable unless this is the sole practical means of ensuring its survival.
- 9.2 Some buildings, works or other components of *places* were designed to be readily removable or already have a history of relocation. Provided such buildings, works or other components do not have significant links with their present location, removal may be appropriate.
- 9.3 If any building, work or other component is moved, it should be moved to an appropriate location and given an appropriate use. Such action should not be to the detriment of any place of cultural significance.

Article 10. Contents

Contents, fixtures and objects which contribute to the *cultural significance* of a *place* should be retained at that place. Their removal is unacceptable unless it is: the sole means of ensuring their security and *preservation*; on a temporary basis for treatment or exhibition; for cultural reasons; for health and safety; or to protect the place. Such contents, fixtures and objects should be returned where circumstances permit and it is culturally appropriate.

Article 11. Related places and objects

The contribution which *related places* and *related objects* make to the *cultural significance* of the *place* should be retained.

Article 12. Participation

Conservation, interpretation and management of a place should provide for the participation of people for whom the place has special associations and meanings, or who have social, spiritual or other cultural responsibilities for the place.

Article 13. Co-existence of cultural values

Co-existence of cultural values should be recognised, respected and encouraged, especially in cases where they conflict.

For some places, conflicting cultural values may affect policy development and management decisions. In this article, the term cultural values refers to those beliefs which are important to a cultural group, including but not limited to political, religious, spiritual and moral beliefs. This is broader than values associated with cultural significance.

Conservation Processes

Article 14. Conservation processes

Conservation may, according to circumstance, include the processes of: retention or reintroduction of a use; retention of associations and meanings; maintenance, preservation, restoration, reconstruction, adaptation and interpretation; and will commonly include a combination of more than one of these.

Article 15. Change

- 15.1 Change may be necessary to retain *cultural significance*, but is undesirable where it reduces cultural significance. The amount of change to a *place* should be guided by the *cultural significance* of the place and its appropriate *interpretation*.
- 15.2 Changes which reduce *cultural significance* should be reversible, and be reversed when circumstances permit.
- 15.3 Demolition of significant *fabric* of a *place* is generally not acceptable. However, in some cases minor demolition may be appropriate as part of *conservation*. Removed significant fabric should be reinstated when circumstances permit.
- 15.4 The contributions of all aspects of *cultural significance* of a *place* should be respected. If a place includes *fabric, uses, associations* or *meanings* of different periods, or different aspects of cultural significance, emphasising or interpreting one period or aspect at the expense of another can only be justified when what is left out, removed or diminished is of slight cultural significance and that which is emphasised or interpreted is of much greater cultural significance.

Article 16. Maintenance

Maintenance is fundamental to conservation and should be undertaken where fabric is of cultural significance and its maintenance is necessary to retain that cultural significance.

Explanatory Notes

There may be circumstances where no action is required to achieve conservation.

When change is being considered, a range of options should be explored to seek the option which minimises the reduction of cultural significance.

Reversible changes should be considered temporary. Non-reversible change should only be used as a last resort and should not prevent future conservation action.

Article 17. Preservation

Preservation is appropriate where the existing *fabric* or its condition constitutes evidence of *cultural significance*, or where insufficient evidence is available to allow other *conservation* processes to be carried out.

Article 18. Restoration and reconstruction

Restoration and reconstruction should reveal culturally significant aspects of the place.

Article 19. Restoration

Restoration is appropriate only if there is sufficient evidence of an earlier state of the fabric.

Article 20. Reconstruction

- 20.1 Reconstruction is appropriate only where a place is incomplete through damage or alteration, and only where there is sufficient evidence to reproduce an earlier state of the fabric. In rare cases, reconstruction may also be appropriate as part of a use or practice that retains the cultural significance of the place.
- 20.2 *Reconstruction* should be identifiable on close inspection or through additional *interpretation*.

Article 21. Adaptation

- 21.1 Adaptation is acceptable only where the adaptation has minimal impact on the *cultural significance* of the place.
- 21.2 Adaptation should involve minimal change to significant fabric, achieved only after considering alternatives.

Article 22. New work

- 22.1 New work such as additions to the *place* may be acceptable where it does not distort or obscure the *cultural significance* of the place, or detract from its *interpretation* and appreciation.
- 22.2 New work should be readily identifiable as such.

Explanatory Notes

Preservation protects fabric without obscuring the evidence of its construction and use. The process should always be applied:

- where the evidence of the fabric is of such significance that it should not be altered;
- where insufficient investigation has been carried out to permit policy decisions to be taken in accord with Articles 26 to 28.

New work (e.g. stabilisation) may be carried out in association with preservation when its purpose is the physical protection of the fabric and when it is consistent with Article 22.

Adaptation may involve the introduction of new services, or a new use, or changes to safeguard the place.

New work may be sympathetic if its siting, bulk, form, scale, character, colour, texture and material are similar to the exitting fabric, but imitation should be avoided.

Article 23. Conserving use

Continuing, modifying or reinstating a significant *use* may be appropriate and preferred forms of *conservation*.

Article 24. Retaining associations and meanings

- 24.1 Significant associations between people and a place should be respected, retained and not obscured. Opportunities for the interpretation, commemoration and celebration of these associations should be investigated and implemented.
- 24.2 Significant *meanings*, including spiritual values, of a *place* should be respected. Opportunities for the continuation or revival of these meanings should be investigated and implemented.

Article 25. Interpretation

The *cultural significance* of many places is not readily apparent, and should be explained by *interpretation*. Interpretation should enhance understanding and enjoyment, and be culturally appropriate.

Conservation Practice

Article 26. Applying the Burra Charter process

- 26.1 Work on a *place* should be preceded by studies to understand the place which should include analysis of physical, documentary, oral and other evidence, drawing on appropriate knowledge, skills and disciplines.
- 26.2 Written statements of *cultural significance* and policy for the *place* should be prepared, justified and accompanied by supporting evidence. The statements of significance and policy should be incorporated into a management plan for the place.
- 26.3 Groups and individuals with associations with a place as well as those involved in its management should be provided with opportunities to contribute to and participate in understanding the cultural significance of the place. Where appropriate they should also have opportunities to participate in its conservation and management.

Article 27. Managing change

- 27.1 The impact of proposed changes on the *cultural significance* of a *place* should be analysed with reference to the statement of significance and the policy for managing the place. It may be necessary to modify proposed changes following analysis to better retain cultural significance.
- 27.2 Existing *fabric*, use, associations and meanings should be adequately recorded before any changes are made to the *place*.

Explanatory Notes

These may require changes to significant fabric but they should be minimised. In some cases, continuing a significant use or practice may involve substantial new work.

For many places associations will be linked to use.

The results of studies should be up to date, regularly reviewed and revised as necessary.

Statements of significance and policy should be kept up to date by regular review and revision as necessary. The management plan may deal with other matters related to the management of the place.

Explanatory Notes

Article 28. Disturbance of fabric

- 28.1 Disturbance of significant *fabric* for study, or to obtain evidence, should be minimised. Study of a *place* by any disturbance of the fabric, including archaeological excavation, should only be undertaken to provide data essential for decisions on the *conservation* of the place, or to obtain important evidence about to be lost or made inaccessible.
- 28.2 Investigation of a *place* which requires disturbance of the *fabric*, apart from that necessary to make decisions, may be appropriate provided that it is consistent with the policy for the place. Such investigation should be based on important research questions which have potential to substantially add to knowledge, which cannot be answered in other ways and which minimises disturbance of significant fabric.

Article 29. Responsibility for decisions

The organisations and individuals responsible for management decisions should be named and specific responsibility taken for each such decision.

Article 30. Direction, supervision and implementation

Competent direction and supervision should be maintained at all stages, and any changes should be implemented by people with appropriate knowledge and skills.

Article 31. Documenting evidence and decisions

A log of new evidence and additional decisions should be kept.

Article 32. Records

- 32.1 The records associated with the *conservation* of a *place* should be placed in a permanent archive and made publicly available, subject to requirements of security and privacy, and where this is culturally appropriate.
- 32.2 Records about the history of a *place* should be protected and made publicly available, subject to requirements of security and privacy, and where this is culturally appropriate.

Article 33. Removed fabric

Significant *fabric* which has been removed from a *place* including contents, fixtures and objects, should be catalogued, and protected in accordance with its *cultural significance*.

Where possible and culturally appropriate, removed significant fabric including contents, fixtures and objects, should be kept at the place.

Article 34. Resources

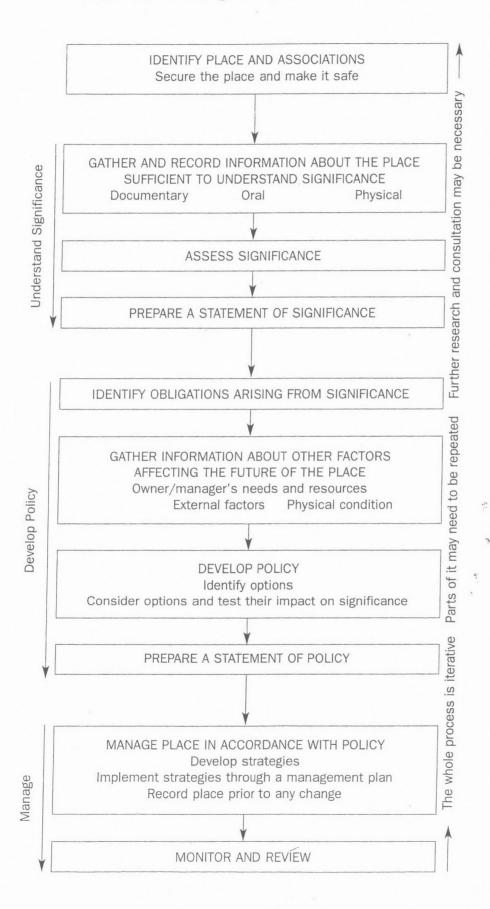
Adequate resources should be provided for conservation.

Words in italics are defined in Article 1.

The best conservation often involves the least work and can be inexpensive.

The Burra Charter Process

Sequence of investigations, decisions and actions



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Appendix D

Ecological Assessment

Main Road 177 Appin Road, Appin

Provision of Northbound Passing Lane

Flora and Fauna Survey Report

Prepared for: Environmental Technology Branch Roads and Traffic Authority by

Landscope Environmental Consultants PO Box 23 Bundeena NSW 2230

Tel: (02) 9523 9459 Fax: (02) 9527 4760

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May 2002

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INTRODUCTION

1. BACKGROUND TO THE PROPOSAL

The NSW Roads and Traffic Authority proposes to construct a northbound overtaking lane on the western side of Appin Road from 450 metres north of the entrance to Ingham's Enterprises (Figure 1). The road is currently only single lane in each direction.

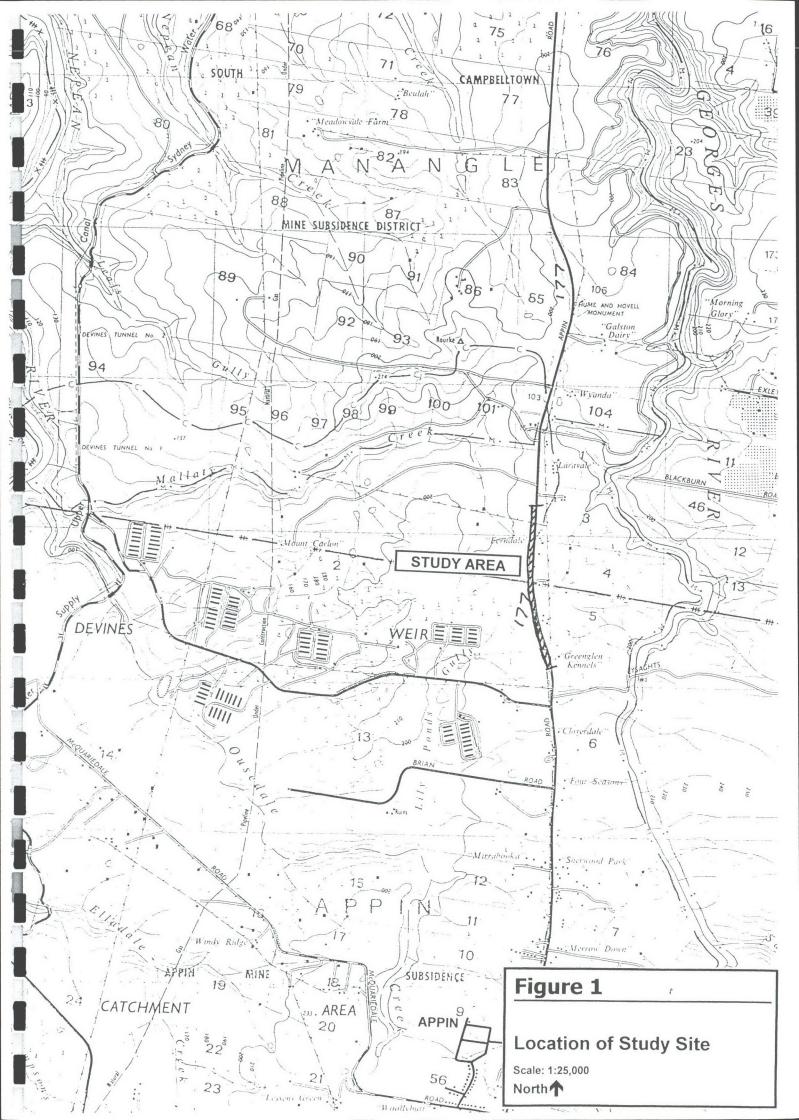
The purpose of this flora and fauna survey was to assess the impacts of the proposal on the native flora and fauna of the study area in terms of the NSW *Threatened Species Conservation Act 1995*, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the NSW *Fisheries Management Amendment Act 1997*. The term "region" as used in this report refers to the Sydney Basin Bioregion unless otherwise specified.

2. TOPOGRAPHY AND SOILS

The study area is comprised of a linear band of remnant native vegetation between the road and the property fenceline and a linear section of adjacent cleared farm pastures with scattered native trees.

The study area is located on the Cumberland Plain of the Sydney Basin Bioregion. The relief of the area is a gently undulating, with incised drainage channels. Natural slopes are generally low, being typically less than 5%.

The soils within the study area are part of the Blacktown group (Hazelton and Tille 1990). These are clay soils derived from Wianamatta Shale.



PART A: FLORA ASSESSMENT

3. METHODS

3.1 Identification And Naming Of Species And Families

Plant identifications were made according to nomenclature in Harden (1990, 1991, 1992 and 1993).

3.2 Classification Of Communities

Stands of vegetation are described according to mapping and descriptions by Benson and Howell (1990) and updated by NPWS (1997, 2000).

3.3 Conservation Significance Of Vegetation

The conservation significance of individual species, populations and ecological communities was established in the state and national context with reference to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the NSW *Threatened Species Conservation Act 1995* and Briggs and Leigh (1996). In the regional context conservation significance was established with reference to the Western Sydney Urban Bushland Biodiversity Survey (NPWS 1997), and Benson and McDougall (1991).

3.4 Literature Review

Previous botanical studies conducted in the locality and general references for the region were searched for descriptions of similar vegetation types, and for recordings of plant species and communities of national or regional conservation significance known from the area. The studies referenced were:

- Flora and Fauna Assessment of Proposed Bypass, Appin Road, Appin (Lesryk Environmental Consultants (1995).
- Rare Bushland Plants of Western Sydney (Benson and McDougall, 1991);
- Urban Bushland Biodiversity Survey: Western Sydney (NPWS 1997); and
- Native Vegetation Maps of the Cumberland Plain, Western Sydney (NPWS 2000).

In addition, the Environment Australia Online Database (Environment Australia, February 2002) and National Parks and Wildlife Service's Atlas of New South Wales Wildlife Database (NPWS February 2002) were also accessed for previous recordings of plant species of conservation significance within the Wollondilly and Campbelltown local government areas.

The area has been mapped at a 1:25,000 scale by the National Parks and Wildlife Service (NPWS 2000) as Shale/Sandstone Transition Forest (Low Sandstone Influence). This vegetation community is described as having Forest Red Gum *Eucalyptus tereticornis* as the dominant tree species. During the current survey, the woodland community was seen to have Grey Box *Eucalyptus moluccana* as the dominant species and is therefore considered to be Cumberland Plain (Shale Hills) Woodland. Shale/Sandstone Transition Forest and Cumberland Plain Woodland communities are both listed as Endangered Ecological communities by the NSW *Threatened Species Conservation Act 1995*.

3.5 Field Survey Strategy

A one day general walking survey was undertaken by John Speight on 21 February 2002 using the Random Meander Method described by Cropper (1993). The entire study area

within the boundaries of the proposed development and adjacent habitats (up to a distance of 10 metres beyond the limits of the study area) was surveyed on foot with search efforts targeting sites that had a high potential to support plant species of conservation significance. The foot survey of vegetation used the 'Random Meander Method' described by Cropper (1993). This method is considered the most effective for detecting plant species of conservation significance, and involves walking randomly throughout the study site while ensuring that the full range of potential habitats are surveyed, and recording every plant species seen (Cropper 1993). Approximately 4 hours was spent actively surveying the study area.

The extent of the project section is shown on Attachment 2. The survey area included the areas directly and potentially indirectly affected by the proposed works. The survey boundaries were the edge of the existing road pavement on the northbound carriageway, a line parallel to Appin Road and up to approximately 40 metres from the boundary fence on the western side of the road, the entrance to Ingham's Enterprises to the south and 800 metres to the north of the entrance to Ingham's Enterprises.

3.6 Limitations Of The Survey

Limitations to the current survey were restricted to the time of the year and the single "snapshot" that a one-day survey provides. The survey was undertaken in Late summer when some plant species (such as grasses and orchids) have died back and are either not able to be seen or very difficult to identify. None of the threatened species that potentially occur in the study area would have been difficult to locate or identify during the survey however, and there were therefore no significant limitations to the survey.

4. RESULTS

4.1 Plant Species

A list of plant species recorded within the study area is provided in Appendix 1. It is not a comprehensive list of all the exotic species present, but it is a comprehensive list of native species.

No species of national or state conservation significance listed by Briggs and Leigh (1996) or on the Schedules to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* or the NSW *Threatened Species Conservation Act 1995* were located during the survey.

Through consultation of the Environment Australia Online Database (Environment Australia 2001), the National Parks and Wildlife Service's Atlas of New South Wales Wildlife Database (NPWS June 2001), the Western Sydney Urban Bushland Biodiversity Survey (NPWS 1997) Wollondilly Shire Council's State of The Environment Report (2001) and Campbelltown City Council's State of The Environment Report (1999/2000), twenty-six (26) plant species of national conservation significance were identified as having been recorded in the Wollondilly and Campbelltown local government areas. For reference, these are listed in Appendix 2.

Most of the threatened species known from the district only occur on soils derived from sandstone. However, two species were considered to potentially occur in the study area based on their known habitats and the soils and woodland habitat present in the study area. These were Downy Wattle *Acacia pubescens*, and *Acacia clunies-rossiae*. None of the threatened plant species previously recorded in the district were found in the study area during the field survey.

Five (5) species of regional conservation significance in Western Sydney were recorded in the study area. These are *Rumex brownii*, Pale Vanilla Lily *Arthropodium milleflorum*, Saloop Bush *Einadia nutans* var. *nutans*, Love Creeper *Glycine microphylla* and Fuzzweed *Vittadinia*

sulcata. They occur scattered through the remnant native vegetation stand within the road reserve. Species of regional conservation significance are shown in bold in the species list.

4.2 Plant Communities

One remnant native vegetation community and an exotic grassland community created by clearing for agriculture exist within the study area.

Descriptions of these communities, and the dominant plants within each vegetation layer, are provided below.

1. Grey Box - Narrow-leaved Ironbark - Forest Red Gum Woodland

Occurrence

The road reserve on the western side of Appin Road is vegetated by remnant woodland that is part of the Cumberland Plain Woodland complex. At the northern end of the alignment corridor Grey Box and Narrow-leaved Ironbark are the most common trees, while at the southern end Narrow-leaved Ironbark is replaced by Forest Red Gum. The remnant woodland is very narrow between the edge of the road and the property boundary and is generally between about 5 metres and 8 metres wide. On private land adjacent to the road reserve, scattered trees of the same species occur but the understorey is completely cleared and agricultural grasses have been sown for livestock grazing.

Structure

Trees to 20 metres in height with a spreading, medium density canopy. A native shrub layer to 2 metres high is present and in some areas is in good condition. The groundcover varies from completely weed dominated to native grasses, herbs and twiners with sparse weeds. Weeds are most common in the roadside drainage swale where they comprise almost the entire vegetation.

Common Species (*= exotic species)

Trees

The most abundant tree species are Grey Box *Eucalyptus moluccana*, which occurs in all sections, Forest Red Gum *Eucalyptus tereticornis* and Narrow-leaved Ironbark *Eucalyptus crebra*. Rough-barked Apple *Angophora floribunda* and Thin-leaved Stringybark *Eucalyptus eugenoides* also occur at the northern end of the corridor. Shrubs

Common species of the shrub stratum, where present are Blackthorn *Bursaria* spinosa, Sickle Wattle *Acacia falcata*, Cherry Ballarat *Exocarpos cuppressiformis*, and Parramatta Green Wattle *Acacia parramattensis*.

Groundcovers

Common groundcover species are Rhodes Grass *Chloris gayana**, Happy Wanderer *Hardenbergia violaceae*, *Centella asiatica*, Common Couch *Cynodon dactylon*, Pale Vanilla Lily *Arthropodium milleflorum*, Kikuyu Grass *Pennisetum clandestinum**, Purple Top *Verbena bonariensis**, Ribwort *Plantago lanceolata**, Cobbler's Pegs *Bidens pilosa** and Common Sida *Sida rhombifolia**.

2. Exotic Grassland

Occurrence

All of the area to the west of the existing road reserve are privately owned farming properties that have been cleared and intensively grazed over many decades. While scattered native trees occur, the understorey has been cleared and only a grassland dominated by exotic species occurs. Grassland dominated by Kikuyu also occurs in patches in the road reserve, where trees do not occur.

Structure

Most of the area is a grazed or slashed area of mixed native and exotic grass species.

Common Species (*= exotic species)

Entolasia stricta, Prairie Grass Bromus catharticus*, Wild Oats Avena fatua*, Italian Ryegrass Lolium multiflorum*, Kikuyu Grass Pennisetum clandetinum*, Common Couch Cynodon dactylon, Rhodes Grass Chloris gayana* and Paspalum Paspalum dilatatum*. Common herb species are predominantly weeds including Fleabeane Conyza bonariensis*, Scotch Thistle Onopordum acanthium ssp. acanthium*, Common Sowthistle Sonchus oleraceus*, White Clover Trifolium repens* and Purple Top Verbena bonariensis*.

5. DISCUSSION

5.1 Conservation Value Of The Vegetation

The Grey Box – Narrow-leaved Ironbark – Forest Red Gum Woodland is part of the endangered Cumberland Plain Woodland complex, which is listed as endangered ecological community on Schedule 1, Part 3 of the NSW *Threatened Species Conservation Act 1995* and on Schedule 1 of the *Environment Protection and Biodiversity Conservation Act 1999*.

No plant species of state or national conservation significance (as listed on the schedules to the NSW *Threatened Species Conservation Act 1995* or the *Environment Protection and Biodiversity Conservation Act 1999*) were located within or adjacent to the study area.

Of the five species of regional conservation significance located during the survey one; *Vittadinia sulcata* is classified by the Western Sydney Urban Bushland Biodiversity Survey (NPWS 1997) as V1, the highest regional rating of vulnerable species in the Western Sydney region. The remaining four (4) species: *Rumex brownii*, Pale Vanilla Lily *Arthropodium milleflorum*, Saloop Bush *Einadia nutans* var. *nutans* and Love Creeper *Glycine microphylla* are classified as V3, being vulnerable but relatively common to widespread. These species occur scattered through most of the study area and are also known to occur in other stands of Cumberland Plain Woodland in the Wollondilly and Campbelltown local government areas. The removal of these plants from the study site is unlikely to cause a significant impact on the local population of the species.

5.2 Likely Impacts of the Proposal

The proposed widening of Appin Road would result in the removal of the remnant stand of Cumberland Plain Woodland in the corridor, with a total area of approximately 4000m². Approximately sixty (60) mature trees would be removed.

Indirect impacts on vegetation outside the construction zone would be minor since adjacent areas are mostly cleared agricultural pastures and paddocks, and slopes are low. However, any native vegetation to be retained (particularly at the northern end of the corridor) should be fenced to prevent trampling by workers and machinery.

6. EIGHT PART TEST

An eight-part test under Section 5A of the *Environmental Planning and Assessment Act* 1979 is designed to determine "whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats" listed on the Schedules to the *Threatened Species Conservation Act* 1995, and consequently, whether a Species Impact Statement is required. This eight-part test therefore refers only to those species, populations or ecological communities listed on the Schedules to the *Threatened Species Conservation Act* 1995. It does not refer to ROTAP species, or species of local or regional conservation

significance. These species have been considered in previous sections of the report. An Eight-part test has been completed below for the Cumberland Plain (Shale Hills) Woodland stands occurring in the study area.

Cumberland Plain (Shale Hills) Woodland

(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..."

No threatened plant species listed on Schedules 1 or 2 of the *Threatened Species Conservation Act 1995* occur in the Cumberland Plain Woodland stand affected by the proposed development.

(b) "...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..."

No endangered population listed on Schedule 1 (Part 2) of the *Threatened Species Conservation Act 1995* occur in the Cumberland Plain Woodland stand affected by the proposed development.

(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 stand of the endangered Cumberland Plain (Shale Hills) Woodland ecological community occurs along Appin Road between the edge of the existing pavement and the boundary fence. The total area of the vegetation to be removed is approximately 1.6 hectares ($800m \times 20m$), with the Cumberland Plain Woodland community accounting for approximately 0.4 hectares ($800m \times 5m$) or $4000m^2$. This is roughly divided in half between Wollondilly LGA and Campbelltown LGA. The area to be removed comprises about sixty (60) mature trees up to 15 metres in height with a disturbed or no native understorey. The stand is currently isolated by surrounding rural development, with open pastures the dominant land usage.

Approximately 4,362 hectares of Shale Hills Woodland remain in the Western Sydney region (NPWS 2000). However, this figure does not include areas that are mapped (incorrectly) as Shale/Sandstone Transition Forest along Appin Road and in the Appin area. Within western Sydney, an estimated 93% of the original area of Cumberland Plain Woodland has been cleared (NPWS 1997). Only approximately 25% of the remaining area is reserved (NPWS 1997).

The remnant of this community within the study area is small (approximately 4000m²) and represents approximately 0.01% of the estimated extant area of 4,362 hectares. This is not a significant proportion of the community in the regional context.

The stand is narrow and linear with a high edge-to-area ratio and is disturbed by past clearing and weed invasion. The stand is also isolated from other larger stands due to the surrounding areas having been cleared for agricultural pastures. As a result of these impacts the vegetation is unlikely to have long-term viability unless it is actively protected and restored. Very few tree saplings are present and as the larger trees senesce and die, they unlikely to be naturally replaced.

(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 stand of Cumberland Plain Woodland that is to be removed for the Proposal is only connected with other stands of the community type via the existing narrow road corridor. More substantial north-south vegetation links occur to the west of the site. Therefore, the Proposal would not result in the further isolation of any stands of Cumberland Plain Woodland.

(e) "...whether critical habitat will be affected..."

No habitat critical to the survival of a threatened species, population of a species or community of plants would be affected by proposed works.

(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..."

Shale Hills Woodland is not adequately represented in any of the nature conservation reserves in the region. However, the stands to be removed will continue to decline in health unless protected and replacement of trees and the understorey is implemented.

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

The "loss of biodiversity as a result of loss and/or degradation of habitat following clearing and fragmentation of native vegetation" has been listed as a key threatening process under Schedule 3 of the *Threatened Species Conservation Act 1995*. This includes clearing at any scale, including areas less than 2 hectares in extent that may have significant impacts on biodiversity.

The vegetation in the Appin Road corridor is degraded, fragmented and generally isolated from other more extensive stands of vegetation. The removal of the stand of Shale Hills Woodland would not result in the significant reduction in the biodiversity of the Sydney Basin Bioregion, either through the loss of local populations of plant species, or through the loss of Shale Hills Woodland.

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

The study area is near the southern limit of distribution range of the Shale Hills Woodland in the Sydney Region.

Expected Impact On Shale Hills Woodland

The proposed removal of the Shale Hills Woodland stand in the study area would not result in a significant reduction in the area of Shale Hills Woodland remaining in the Sydney Basin Bioregion, with approximately 0.01% of the known extant area of the community proposed to be removed. The stand has been, and continues to be modified and degraded by weed invasion, natural senescence, road runoff and the direct and indirect effects of agricultural and urban development. Unless active management of the stands is undertaken, they are unlikely to have long-term viability and they will continue to decline in health, and species diversity and richness. Given these factors the removal of the stand of the community is not considered to constitute a significant impact and the preparation of a flora Species Impact Statement is not considered necessary.

PART C FAUNA SURVEY

7. LITERATURE REVIEW AND FIELD GUIDES

Prior to the undertaking of any fieldwork, previous studies conducted in the region and known databases were consulted to identify the diversity of fauna species known for, or potentially occurring in the study region. These are species that may utilise the study area on occasion but were not observed, recorded or indicated during the site investigation. The undertaking of a literature search also ensures that the results from surveys conducted during different climatic, seasonal and date periods are also considered and drawn upon as required. This approach therefore increases the probability of considering the presence and possible impacts on all known and likely native species, particularly those of conservation concern.

The identification of known, or potentially occurring, native species within the study area, particularly those listed under the Schedules to the Commonwealth *Environment Protection* and *Biodiversity Conservation Act* 1999 and NSW *Threatened Species Conservation Act* 1995, also permits the tailoring of the field survey strategies to the detection of these animals, or their necessary habitat requirements, and the selection of the most appropriate survey techniques.

The studies and reports referred to include:

- Campbelltown City Council's Statement of Environmental Effects (Campbelltown Council 1999-2001);
- fauna lists prepared for the Campbelltown Local Government Area (NPWS 1997); and
- a flora and fauna assessment for the proposed bypass of the township of Appin (LesryK Environmental Consultants 1995).

In addition to these documents, the Environment Australia Online Database (Environment Australian February 2002) and National Parks and Wildlife Service's Atlas of New South Wales Wildlife Database (NPWS February 2002) (search area 10 x 10 kilometres centred on study area) were also accessed.

Other reports and documents referred to are provided within the bibliography section of this report.

These databases and reports were reviewed and drawn upon where relevant. While reviewing these documents, particular attention was paid to identifying records of species listed under the Schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the NSW *Threatened Species Conservation Act 1995*, species which have been recorded in the region and which, based on the similarities of fauna habitats in this area, may therefore occur within, or in the vicinity of, the boundaries of the study area.

Field guides and standard texts used were:

- Cogger (1992) reptiles and frogs;
- Simpson and Day (1999) birds;
- Strahan (1995) mammals; and
- Triggs (1996) identification of scats, tracks and markings.

The naming of native species recorded or known for the region follows those presented in these documents.

The conservation significance of animals observed or expected is made with reference to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the NSW *Threatened Species Conservation Act 1995*, while their regional and local status was determined through reference to the National Park's *Fauna of Western Sydney* (NPWS 1997).

8. FIELD SURVEY METHODS

A survey of the study area was undertaken by Peter Hawkins (B. Env. Eng.) on the 22 of February 2002. The climatic conditions experienced during the field investigation were clear skies, moderate south-east breezes and warm to hot temperatures. The strategy employed for the field investigation involved traversing the entire study area and adjacent habitats by foot, with detailed searches being conducted within areas that had the potential to be of value to the life cycle needs of native species.

By the completion of the site inspections, approximately two and a half (2.5) hours of active searches had been accumulated, active searches being defined as the time spent actively searching for observations/evidence of fauna species. Given the physical condition and size of the study area, this length of survey time is considered more than adequate when endeavouring to determine the diversity of native species present, their associated habitats and the conservation status of both of these.

Given the nature of the site, access to all parts of the likely development area were good, with visibility in each of the habitat types present being moderate to high. During the field survey, no limitations to the success of the field investigation were encountered.

To determine the diversity of native species present within the study area at the time of the field investigation, a number of standard survey methods were employed. These techniques were:

- The direct observation of those fauna species present within, adjacent to, or flying over the study area;
- Litter and ground debris searches for reptiles and frogs;
- · Diurnal call identifications; and
- The identification of indirect evidence, such as tracks, scratchings and scats.

While conducting the field investigations an adaptation of the 'Random Meander Method' described by Cropper (1993) was used, this method being modified so that it is suitable for fauna surveys. By undertaking the assessment using this strategy, all fauna habitats present within and adjacent to the study area were identified and surveyed, and the majority of resident species recorded.

During the searches, logs, urban refuse and other suitable ground debris material was turned and any leaf litter accumulations investigated. These habitat features were surveyed to identify any sheltering frogs or reptiles.

While undertaking the field surveys, efforts were made to document the diversity, structure and value of the habitats present within, and adjacent to, the study area for those protected, as defined under the NSW National Parks and Wildlife Act 1974, and threatened species, as indicated on the Schedules to the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the NSW Threatened Species Conservation Act 1995, observed, recorded, or expected to occur based on past studies and known distribution patterns. This involved assessing the structure of the vegetation associations and fauna habitats present and determining their significance for native species. While conducting the habitat assessments, efforts were made to identify features such as known feed trees, mature trees with hollows, connectivity of fauna corridors and other habitat features important to the life cycle requirements of those threatened species known or potentially occurring in the study region.

9. HABITAT TYPES AVAILABLE FOR NATIVE FAUNA SPECIES

During the field survey, two habitat types available for use by native species were recorded. These were:

- Eucalypt woodland; and
- Pasture grassland.

Descriptions of the structure and value of these for native species are provided below, along with an indication of their location. For reference, a photographic record of each habitat type has also been provided.

9.1 Eucalypt woodlands

The Eucalypt woodlands occur as a band of remnant vegetation 5 to 20 metres wide. This habitat type is restricted mainly to the road reserve of the study area. The width of the woodland band varies throughout the study area, in response to the extent of clearing association with the adjacent landuse practices. The woodland supports large mature trees to 15 metres in height, some of which contain hollows (to 300 mm in diameter) suitable for the roosting and breeding needs of native animals. Throughout the woodland, the tree canopy is relatively continuous. The understorey contains a sparse to medium density layer of native shrubs and saplings to 3 metres in height. The ground cover consists of a medium to high density layer of both native and exotic grasses and herbs to a height of 1 metre. Leaf litter, logs and ground debris, all important habitat features for reptiles, frogs and invertebrates, are also present within the woodland community.

To permit the construction of the proposed overtaking lane, approximately 60 of the Eucalypt trees would require removal.

The Eucalypt woodlands are considered to be of limited habitat value for native species. The woodlands would provide resources suitable for the life cycle needs of a range of tolerant and highly adaptable native species, though it is not considered that the loss of these resources would result in either the local displacement or loss of any of those animals recorded or expected. In comparison with proximate larger areas of more intact bushland, the woodland remnant within the study area is not considered an important habitat resource or fauna corridor. As such, the removal of this woodland remnant is not considered to present a significant impact on any native species, their populations, ecological communities or habitats. Therefore, the loss of this woodland would not trigger the need for a fauna Species Impact Statement or the referral of the matter to the Federal Minister for the Environment.

Given the size of the hollows present in the trees, and the context of the study site, these could potentially be used by several of the hollow dependant threatened microchiropterans (insectivorous bats) previously recorded in the region. The size of the hollows would not be suitable for any of the threatened owls, nor, given the essentially isolated condition of the site, any of the threatened arboreal mammals. In relation to the threatened bats, even though these species could potentially occur within several of the tree hollows present, in comparison with the resources provided in the nearby conservation areas, the habitats present within the study area are considered to be of limited value. Within those conservation reserves that surround the study area, individuals of several of these threatened bats have been recorded (author's field notes). The habitat resources provided by these areas are of better structure and diversity compared to those habitats within the study area. At a regional level, the loss of several hollow bearing trees that may be utilised by hollow dependant threatened bats, is not considered to present a significant impact on these species, their populations, ecological communities or habitats.

9.2 Pasture Grassland

The pasture grasslands cover the majority of the study area. The grasslands extend beyond the limits of the proposed overtaking lane, continuing east and west of the study area. The grasslands support a high-density mixture of grasses and weeds to 1 metre in height. Within the grasslands, the occasional shrub to 2 metres in height is present. The grasslands are typical of the pastures that are regularly observed throughout the Appin district.

The pasture grasslands are not considered to be of any conservation significance. No native species are considered to rely on this habitat type for any of their important life cycle

components. Several very common and adaptable native animals, which are regularly observed in cleared disturbed areas, were observed within the grasslands, but the resources present are not considered to be significant to the presence of these animals. No native animals are expected to be adversely affected by the removal or further modification of this habitat type and their removal or further modification would not trigger the need to prepare a fauna Species Impact Statement or require the referral of the matter to the Federal Minister for the Environment.

10. WILDLIFE CORRIDORS AND VEGETATION LINKS

The study area is not considered to constitute or form a component of any regionally significant fauna dispersal or movement corridors. The Eucalypt woodland is considered to be isolated, due to the clearing that has occurred east and west of the study area. Although this is the case, the eucalypt woodlands would be used by a variety of common native species, the majority of which are able to negotiate and traverse open space areas. Due to their ability to traverse open space areas, the loss of those trees from the road reserve would not affect the movement patterns of any of these fauna species.

At a regional level, the bushland that occurs to the east of the study area is expected to be the main fauna dispersal and movement corridor in this area. This bushland provides connectivity between the water catchment areas and a network of conservation reserves and protected lands. The undertaking of the proposed road works would not have a detrimental impact on the ecological value of this regionally significant fauna corridor.

Two significant fauna corridors also occur north and south of the study area, in association with Mallaty and Ousedale Creeks. These bushland corridors are important as they provide one of the last linkages between the Georges and Nepean Rivers. The east—west corridors are important for the dispersal of native species and exchange of genetic material between these two catchment areas.

The current road works occur beyond the limits of these two east-west corridors and would not have an impact on their ecological value.

11. FIELD SURVEY RESULTS

As would be expected for such a small and highly disturbed site, few native species were recorded. Species recorded were one (1) native mammal, ten (10) native birds and one (1) reptile (Appendix 3). In addition to these a number of introduced animals were also recorded, or indicated as occurring, within the study area (Appendix 3).

In regards to the detection of those native species recorded:

- the Swamp Wallaby Wallabia bicolor and the Eastern Snake-necked Turtle Chelodina longicollis were recorded as road kill specimens while conducting ground debris searches along Appin Road; and
- all birds were observed within, adjacent to or flying over the study area, or identified from their distinct calls.

Of those animals recorded by the completion of the field survey;

- one, the White-throated Needletail Hirundapus caudacutus, is listed as a migratory bird under the Schedules to the Commonwealth Environment Protection and Biodiversity Conservation Act 1999; and
- one, the Swamp Wallaby Wallabia bicolor, is listed as being of regional conservation value in the Western Sydney Region. Although this is the case, in this part of the Western Sydney Region, the Swamp Wallaby is considered to be common to

abundant and is regularly recorded in the bushland areas to the east (author field notes).

In relation to the recording of these species:

- the White-throated Needletail was observed flying over the study area; and
- a road kill Swamp Wallaby was seen adjacent to Appin Road.

The White-throated Needletail is a migratory bird that arrives in Australia around October, after having bred in the northern hemisphere (Frith 1997). In Australia, this bird is commonly associated with the east coast highlands, coastal plains and the hinterlands of arid inland Australia. Within this area, the White-throated Needletail becomes locally nomadic in response to local weather changes. The White-throated Needletail drinks and feeds on the wing, roosting during the night in trees (Tarburton 1993, Frith 1997). The White-throated Needletail has been radiotracked moving over distances greater than 30 kilometres in one foraging period (Tarburton 1993).

The construction of an overtaking lane within the study area will not have an adverse impact on any components of the life cycle requirements of this species. The overtaking lane would not remove any habitats critical to the White-throated Needletail, nor will it affect any component of this species migratory patterns. As such, it is not considered that the proposal would have a detrimental impact on this species of national conservation significance. Therefore, the matter does not require referral to the Federal Minister of the Environment for consideration or approval in terms of ecological issues that are of national conservation concern.

The Swamp Wallaby occupies a variety of habitat types including woodlands, forests and heaths. This wallaby feeds on a variety of plants, including both native and exotic species (Strahan 1995). The species requires areas of dense vegetation for daytime sheltering, emerging at night to forage within both woodlands and on open ground. Generally a solitary species, the Swamp Wallaby will occupy a home range area of around 16 hectares (Troy and Coulson 1993). Although considered to be regionally significant within Western Sydney (NPWS 1997), within this portion of the Campbelltown and Wollondilly local government areas the Swamp Wallaby is considered to be common to abundant (LesryK Environmental Consultants 1995, author's field notes). This species is known to be regularly recorded within the nearby bushland areas and the proposed overtaking lane would not have an adverse cumulative impact on any occurrences of this wallaby or its populations. The works would not have a detrimental impact on the local or regional occurrence of this wallaby, nor would they increase the chances of the species becoming locally extinct.

12. SPECIES RECORDED DURING PREVIOUS STUDIES

Fauna surveys and compilation lists prepared for the region have identified an additional forty (40) native mammals, two hundred and twelve (212) native birds, forty eight (48) reptiles, twenty five (25) frogs and one (1) threatened invertebrate (Appendix 2). Of those species previously recorded:

- Nineteen (19) are listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (Table 1);
- Thirty nine (39) are listed under the Schedules to the NSW *Threatened Species Conservation Act* 1995 (Table 1); and
- Seventy (70) are identified as being of regional conservation concern within the Western Sydney region (Appendix 3).

During the course of the field survey, the potential for resident populations of each of the threatened species listed in Table 1 to occur within the study area was considered. Each of these threatened species has a particular habitat requirement (NPWS 1999), and efforts were made to determine whether these habitats were present and whether they were of sufficient structure, size and quality to support a viable resident population of these animals. In relation to the needs of these species, the study area is either isolated and heavily disturbed or does not support the necessary habitat structures suitable for resident populations of these animals. For those species listed in Table 1, these habitats would include rainforests, wetlands, large better developed stands of woodland, exfoliated rock outcrops, pristine, incised sandstone drainage lines, significant stands of Casuarinas and so on. Some of the species listed in Table 1 may traverse the study area on occasion, particularly the flying animals or medium size ground traversing mammals, but the construction of an overtaking lane is not considered to present an significantly increased barrier to the movement patterns of these species. For the species listed in Table 1, the study area is not considered to constitute a significant local or regional habitat resource. The establishment of an overtaking lane at this site will therefore not have an adverse impact on any of these threatened species, or their life cycle requirements.

12.1 Regionally Significant Species

The restriction of the works to the proposed alignment would ensure that no habitats or dispersal corridors important to those regionally significant species previously recorded in the vicinity of the works are affected. As such, it is not considered that the proposed overtaking lane would have a significant impact on the status of any residential populations of any of the regionally significant species.

13. ECOLOGICAL ASSESSMENTS

13.1 Commonwealth Legislative Considerations

During the field investigation one species, the White-throated Needletail *Hirundapus caudacutus*, listed under the Schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* was recorded. Giving consideration to the habitat requirements of these species, and the relative size of the site in comparison to other large stands of woodland in the study region, it is not considered that the White-throated Needletail would be adversely affected by the current proposal. The current proposal would not remove any of this migratory bird's significant foraging or roosting sites, nor would it present a barrier to the movement patterns of this species. As such, the works are not considered to have a significant impact on the White-throated Needletail and therefore the matter would not require referral to the Federal Minister of the Environment for further consideration or approval.

No other species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, or their necessary habitat requirements, were recorded within the study area during the field investigation.

Table 1: Threatened species previously recorded in the study region.

SPECIES	LEGISLATION
Snails	
Cumberland Plain Land Snail Meridolum comeovirens	TSC Act
Mammals	
Spotted-tailed Quoll Dasyurus maculatus	TSC Act
Koala Phascolarctos cinereus	TSC Act
Eastern Pygmy Possum Cerartetus nanus	TSC Act
Yellow-bellied Glider Petaurus australis	TSC Act
Grey-headed Flying Fox Pteropus poliocephalus	EPBC Act and TSC Act
Large-eared Pied Bat Chalinolobus dwyeri	EPBC Act and TSC Act
Eastern False-Pipistrelle Falsistrellus tasmaniensis	TSC Act
Common Bentwing-bat Miniopterus schreibersii	EPBC Act and TSC Act
Large-footed Myotis Myotis adversus	TSC Act
Greater Broad-nosed Bat Scoteanax rueppellii	TSC Act
Eastern Freetail-bat Mormopterus norfolkensis	TSC Act
Birds	
Cattle Egret <i>Ardea ibis</i>	EPBC Act
Great Egret <i>Ardea alba</i>	EPBC Act
Black Bittern Ixobrychus flavicollis	TSC Act
Glossy Ibis Plegadis falcinellus	EPBC Act
Black-necked Stork Ephippiorhynchus asiaticus	TSC Act
Little Curlew Numenius minutus	TSC Act
Latham's Snipe Gallinago hardwickii	TSC Act
Painted Snipe Rostratula benghalensis	EPBC Act and TSC Act
Bush-stone Curlew Burhinus grallarius	TSC Act
Oriental Plover Charadrius veredus	EPBC Act
White-bellied Sea-eagle Haliaeetus leucogaster	EPBC Act
Glossy Black-Cockatoo Calyptorhynchus lathami	TSC Act
Major Mitchell's Cockatoo Cacatua leadbeateri	TSC Act
Swift Parrot Lathamus discolor	EPBC Act and TSC Act
Turquoise Parrot Neophema pulchella	TSC Act
Powerful Owl Ninox strenua	TSC Act
Sooty Owl Tyto tenebricosa	TSC Act
Masked Owl Tyto novaehollandiae	TSC Act
Rainbow Bee-eater Merops omatus	EPBC Act
Brown Treecreeper Climacteris picumnus	TSC Act
Speckled Warbler Chthinicola Sagittata	TSC Act
Regent Honeyeater Xanthomyza phrygia	EPBC Act and TSC Act
Black-eared Miner Manorina melanotis	EPBC Act and TSC Act
Red-lored Whistler Pachycephala rufogularis	EPBC Act and TSC Act
Diamond Firetail Stagonopleura guttata	TSC Act
Reptiles	130 Act
Heath Goanna <i>Varanus rosenbergi</i>	TSC Act
	TSC Act
"No Common Name" Egernia margaretae Broad-headed Snake Hoplocephalus bungaroides	EPBC Act and TSC Act
	EPBC ACI and TSC ACI
Frogs	EDDC Ast and TOC Ast
Giant Burrowing Frog Heleioporus australiacus	EPBC Act and TSC Act
Stuttering Frog Mixophyes balbus	EPBC Act and TSC Act
Red-crowned Toadlet Pseudophryne australis	TSC Act
Green and Golden Bell Frog Litoria aurea	EPBC Act and TSC Act
Littlejohns Tree Frog Litoria littlejohni	EPBC Act and TSC Act

KEY: EPBC Act = Commonwealth Environment Protection and Biodiversity Conservation Act 1999. TSC Act = NSW Threatened Species Conservation Act 1995.

13.2 State Legislative Considerations

13.2.1 State Environmental Planning Policy No. 44 - Koala Habitat Protection

The Campbelltown and Wollondilly local government areas are identified under Schedule 1 – Local Government Areas of State Environmental Planning Policy No 44 (SEPP 44) – Koala Habitat Protection. This policy seeks to encourage the proper conservation and management of areas that provide habitat for Koalas.

Within, and adjacent to the study area, two eucalypts listed under Schedule 2 (Koala feed trees) of SEPP 44 were recorded, these being the Forest Red Gum *Eucalyptus tereticornis* and Narrow-leafed Red Iron Bark *Eucalyptus crebra*. These trees combined constitute greater than 15% of the total tree canopy present within the study area. Therefore, in accordance with the definitions provided under SEPP 44, the study area is considered to constitute Potential Koala habitat. When undertaking the field investigation, efforts were made to survey each feed tree looking for signs of likely use of the study area by Koalas. Evidence sought included scratches and scats, or any indirect evidence linking the Koala to the study area. By the completion of the investigation, no evidence to suggest the presence or occasional use of the site by Koalas was found. As such, in accordance with SEPP 44, the study area is not considered to constitute Core Koala habitat.

Therefore, the proposed overtaking lane would not be considered to significantly affect any Koala populations or their habitat areas, and therefore a Plan of Management for the conservation and management of areas of Koala habitat is not required to be prepared as part of the current proposal.

For reference, it is noted that a known Koala population is present at Wedderburn to the east of the study area.

13.2.2 Section 5A of the Environmental Planning and Assessment Act 1979

As no Scheduled species were recorded or indicated as occurring within the study area, and as the habitats to be removed or temporarily affected by the proposed works are not considered significant for the life cycle requirements of any of the threatened species identified as having been previously recorded in the study region, a generic 'eight part test', as provided under Section 5A of the *Environmental Planning and Assessment Act 1979*, has been conducted. The eight part test is designed to determine "whether there is likely to be a significant effect on a threatened species, population, ecological community, or their habitats", and consequently, whether a Species Impact Statement is required.

The eight part test is usually only undertaken if a threatened species has been recorded during the field investigation, or if habitat suitable for the needs of a threatened species is likely to be removed as part of a proposal. Although this is not the case, the following assessment has been undertaken on the habitats present to ensure that greater consideration has been given to the current proposal and its potential to have an adverse impact on the natural environment and those native species that it supports.

(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 habitats present within the boundaries of the study area are not considered critical for the life cycle needs of any of the threatened fauna species previously recorded for the region. As such, the undertaking of the works are not considered to disrupt the life cycle requirements of any threatened fauna species, such that the viability of a local population of that species is likely to be placed at risk of extinction.

(b) "...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..."

There are no listed endangered populations on the site or within the sphere of influence of the proposed works.

(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 habitats present within the study area are not considered to constitute a significant area of known habitat for any of those threatened species previously recorded in the study region. The loss of a small portion of the total woodland area available in the surrounding region, including the large tracts retained within the nearby Dharawal Nature Reserve and Holsworthy Military Area, is not considered to have an impact on, or compromise, the regional distribution of any areas of habitat known to be occupied or relied upon by threatened species.

(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 development of the study area will not isolate any currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community nor would it fragment any fauna corridors or habitat areas used during critical movement periods.

(e) "...whether critical habitat will be affected..."

No habitats considered critical to the life cycle needs of those threatened fauna species previously recorded in the region occur within, or in close proximity to, the boundaries of the study area. The area is not listed as critical habitat under Part 3 Division 1 of the NSW *Threatened Species Conservation Act 1995*.

(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..."

Threatened species and their populations are known to be present within the region's conservation reserve system (authors field notes), though whether they are adequately represented in these areas is unknown. Although this is the case, it is not expected that any threatened species would significantly rely upon these habitats present within the study area such that the further disturbance of these would compromise the viability of any resident local populations.

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

Currently eight threatening processes for mainland New South Wales are listed under the NSW *Threatened Species Conservation Act 1995*, these are:

- predation by the introduced Plague Minnow Gambusia holbrookii,
- predation by the European Red Fox Vulpes vulpes,
- predation by the Feral Cat Felis catus,
- invasion by Chrysanthemoides monilifera,
- high frequency fires,

- anthropogenic climate change,
- bushrock removal and
- clearing of native vegetation.

Of the first seven of these, none are directly or indirectly applicable to the current proposal. The last threatening process, "clearing of native vegetation", is however applicable to the current proposal. Based on discussions held with R. Humphries, Manager Central Threatened Species Unit, NPWS (pers.comm. 22/11/2001), it is noted that this key threatening process only relates to its impacts on listed threatened species, populations, ecological communities or their habitats.

Within the study area, no threatened species, populations or ecological communities were recorded. Similar, no habitats important to any potentially occurring threatened species were identified.

The loss of approximately sixty native trees is not considered to have a significant impact on any of the native species recorded or expected. The loss of these trees would not result in the overall decline of the regions biodiversity. Given the he proximity of larger more intact and better conserved woodland areas, no native species are expected to be affected by the works.

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

None of the threatened fauna species previously recorded for the region are known to reach the limits of their distributions in the vicinity of the study area.

13.2.3 Expected Impact On Threatened Fauna Species

The proposed construction of an overtaking lane, north of the township of Appin, NSW, is not considered to disturb, remove, modify or fragment any habitats critical to the life cycle requirements of any threatened fauna species. No habitats were observed within the area of possible impact (including both direct and indirect impacts) that would be considered significant for the conservation and preservation of any of these animals. No fauna corridors would be disturbed, and no significant areas of local or regional habitat would be removed or isolated. As such, the expected impacts associated with the proposed works on species of conservation concern are considered to be minimal, and therefore, the preparation of a Species Impact Statement is not considered necessary.

PART D CONCLUSIONS AND RECOMMENDATIONS

14. CONCLUSIONS

Flora

While the removal of the stand of Shale Plains Woodland would result in the removal of one part of visually attractive and potentially historic tree corridor, is not considered a significant reduction in the regional occurrence of this endangered community. The removal of a number of individuals of the regionally significant species would not result in the regional or local extinction of those species.

Fauna

The proposed works would not result in any of these threatened species, populations, ecological communities, or habitats being significantly impacted upon, such that a viable population of that species would be placed at risk of extinction. Similarly, the works would not fragment, disturb or alter any movement or dispersal corridors, or isolate any proximate areas of suitable habitat.

The area is not considered Potential or Core Koala habitat. Giving consideration to the objectives of SEPP 44, it is not considered that the proposed works would require the preparation of a Plan of Management for Koalas, or the adoption of any other mitigative measures.

General Conclusions

Based on the results of the flora and fauna surveys and the literature review, it is not considered that there are any ecological constraints to the proposed construction of an overtaking lane on Appin Road, Appin, proceeding as planned. The proposed works would not significantly affect any populations of native plants or animals such that they are placed at risk of extinction. Similarly the works would not remove or significantly affect any habitats of local, regional, state or national conservation concern.

The Proposed addition of an overtaking lane to Appin Road, north of the township of Appin, NSW, is not considered to significantly affect, threaten or have an adverse impact on any of the species listed under the Schedules to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* or the NSW *Threatened Species Conservation Act 1995*. Therefore, it is not considered that the proposal would require either the referral of the matter to the Federal Minister of the Environment for consideration for approval or the preparation of a Species Impact Statement.

16. RECOMMENDATIONS

- Prior to their removal, all hollow bearing trees should first be checked for the presence of birds nesting and arboreal animals such as possums. Animals found to be occupying trees should be safely removed before clearing of the trees or shrubs. Removed animals should be relocated to adjacent woodland habitats by a qualified ecologist.
- Tree hollows should also be checked for animals after felling or pushing, and injured animals should be taken to a local vet, or the local wildlife rescue service should be notified.
- Trees should be removed and felled in such a manner that they minimise the extent of disturbance on adjacent vegetation.
- Consideration should be given to relocating individuals of the V1 plant *Vittadinia sulcata* to the new road reserve. This would need to be undertaken using a front end loader to excavate a large amount of soil with the plants and moving them immediately to the new location.

Bibliography

- Benson and McDougall (1991) Rare Plants of Western Sydney. Royal Botanic Gardens, Sydney.
- Benson (1992) Natural Vegetation of the Penrith 1:100,000 Map Sheet. In Cunninghamia 2(4).
- Campbelltown City Council (1999-2000) State of the Environment Report. Campbelltown City Council.
- Churchill, S. (1998) Australian Bats. Reed New Holland, Frenches Forest, NSW.
- Cogger, H. (1992) Reptiles and Amphibians of Australia. Reed Books, Chatswood, NSW.
- Cropper, S. (1993) Management of Endangered Plants. CSIRO, Melbourne.
- Ehmann, E. (1997) Threatened Frogs of New South Wales: Habitats, status and conservation. Frog and Tadpole Study Group, Sydney, NSW.
- Environment Australia (2002) Environment Protection and Biodiversity Conservation Act Online Databases.

 http://www.environment.gov.au/epbc/db/index.html [Accessed 26 February 2002].
- Frith, H.J. (Ed) (1997) Complete Book of Australian Birds. Readers Digest, Surry Hills, NSW.
- Hazelton, P.A. and Tille P.J. (1990) Soil Landscapes of the Wollongong-Port Hacking 1:100,000 Sheet. Soil Conservation Service of NSW, Sydney.
- LesryK Environmental Consultants (1995) Flora and Fauna Assessment of Proposed Bypass of Appin Road, Appin. Report prepared for the Roads and Traffic Authority by LesryK Environmental Consultants, Bundeena.
- National Parks and Wildlife Service (1997) Western Sydney: Urban Bushland Biodiversity Survey. National Parks and Wildlife Service, Hurstville.
- NSW National Parks and Wildlife Service (1999) *Threatened Species Management Species Information*. NSW National Parks and Wildlife Service, Hurstville, NSW.
- National Parks and Wildlife Service (2000) Native Vegetation Maps of the Cumberland Plain Western Sydney. National Parks and Wildlife Service, Hurstville.
- NSW National Parks and Wildlife Service (2002) Atlas of NSW Wildlife Database. http://wildlifeatlas.npws.gov.au [Accessed 26 February 2002].
- Simpson, K. and Day, N. (1999) Field Guide to the Birds of Australia. Version 6. Penguin Books Australia, Victoria.
- Strahan, R. (Ed) (1995) The Mammals of Australia. Reed Books, Chatswood, NSW.
- Triggs, B. (1996) *Tracks, Scats and Other Traces : A Field Guide To Australian Mammals.* Oxford University Press, Melbourne.
- Troy, s. and Coulson, G. (1993) Home range of the Swamp Wallaby *Wallabia bicolor. Wildlife Research* 20 (5) pp 571 577.
- Tarburton M.K. (1993) Radiotracking a White-throated Needletail to roost. EMU 93 (2) pp 121 124.
- Wollondilly Shire Council (2001) State of the Environment Report.



Photo 1. Looking south along the northbound carriageway and road verge to be cleared for the proposed overtaking lane. Photo taken from near the northern end of the Project section.



Photo 2. Looking south.

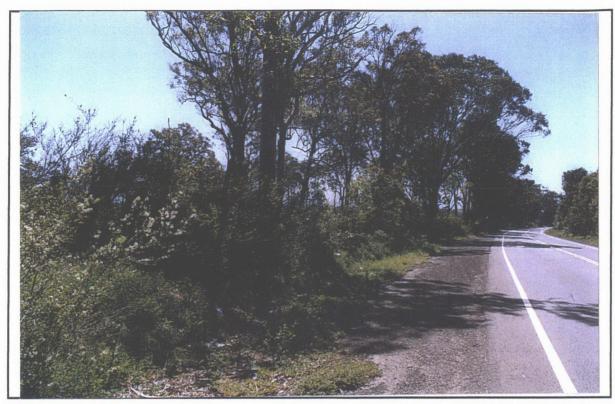


Photo 3. Looking north, showing the most densely vegetated section of the project length.

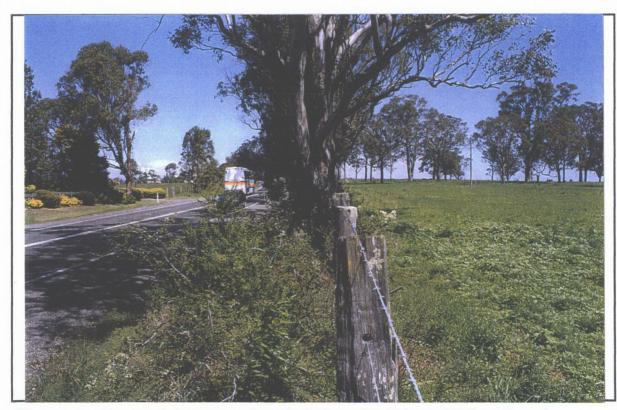
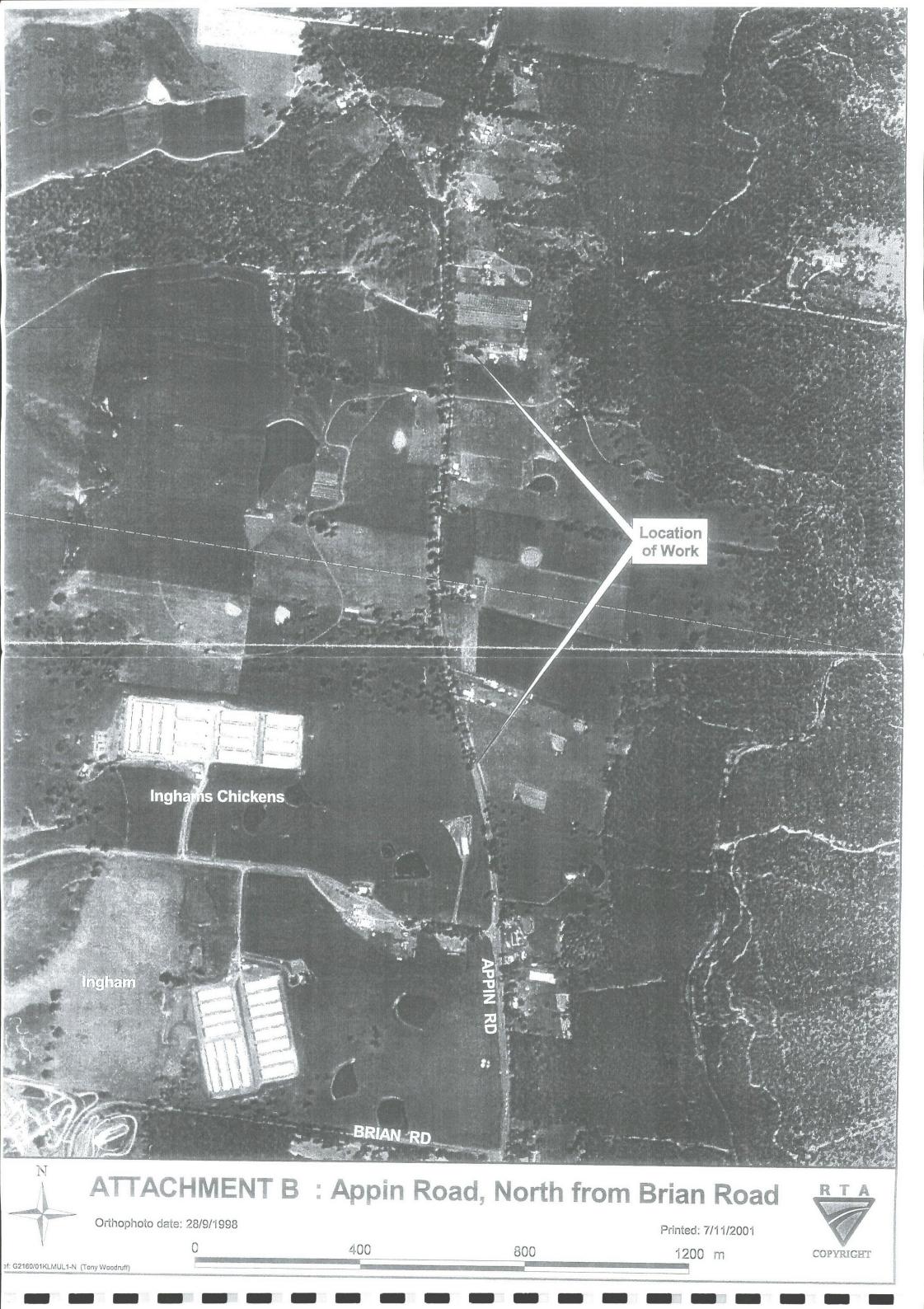


Photo 4. Looking south from approximately the boundary between Wollondilly and Campbelltown local government areas.



APPENDIX 1
Plant Species List

APPENDIX 1. PLANT SPECIES LIST Appin Road, Appin.

Species occurring in the area surveyed along the proposed widening corridor for a northbound overtaking lane Appin Road, Appin New South Wales.

KEY:

* Introduced species.

Plant species of conservation significance are printed in **bold** type. Their conservation significance is discussed in the report.

FAMILY	GENUS SPECIES
MAGNOLIOPSIDA -	
MAGNOLIIDAE	
Acanthaceae	Brunoniella australis
Apiaceae	Centella asiatica
	Foeniculum vulgare *
Asclepiadaceae	Araujia hortorum *
Asteraceae	Bidens pilosa
	Cassinia aculeata
	Cirsium vulgare*
	Conyza albida *
	Hypochaeris radicata*
	Lactuca serriola *
	Ozothamnus diosmifolium
	Senecio madagascariensis*
	Soliva pterosperma *
	Sonchus oleraceus *
	Taraxacum officinale *
	Tagetes minuta *
	Tragopogon porrifolius *
	Vittadinia sulcata (V1)
Boraginaceae	Eichium plantagineum *
Brassicaceae	Capsella bursapastoris *
Cactaceae	Opuntia stricta *
Carophyllaceae	Cerastium glomeratum *
	Polycarpon tetraphyllum *
	Stellaria media *
Casuarinaceae	Allocasuarina littoralis
Chenopodiaceae	Einadia nutans var. nutans (V3)
Convovulaceae	Dichondra repens
Fabaceae: Faboideae	Glycine clandestina
	Glycine microphylla (V3)
	Glycine tabacina
	Hardenbergia violaceae
	Indigofera australis
	Medicago sp.
	Trifolium repens *
	Vicia sativa ssp. angustifolia *
Fabaceae: Mimosoideae	Acacia falcata
	Acacia decurrens
	Acacia parramattensis
Malvaceae	Sida rhombifolia *
Myrtaceae	Angophora floribunda
	Eucalyptus crebra
	Eucalyptus eugenoides
	Eucalyptus moluccana
	Eucalyptus tereticomis
	Kunzea ambigua
Oxalidaceae	Oxalis comiculata
	Oxalis pres-caprae *
Pittosporaceae	Bursaria spinosa var. spinosa
	Pittosporum undulatum

FAMILY	GENUS SPECIES
Phytolaccaceae	Phytolacca octandra *
Plantaginaceae	Plantago lanceolata *
Polygonaceae	Rumex brownii (V3)
	Rumex crispus *
Ranunculaceae	Clematis glycinoides
Rubiaceae	Asperula conferta
Santalaceae	Exocarpos cuppressiformis
Solanaceae	Solanum nigrum *
	Solanum prinophyllum
Verbenaceae	Verbena bonariensis *
	Verbena brasiliensis *
MAGNOLIOPSIDA – LILIIDAE	
Cyperaceae	Cyperus brevifolius
Juncacae	Juncus usitatus
Lilliaceae	Arthropodium milleflorum (V3)
Phormiaceae	Dianella longifolia var. longifolia
	Stypandra glauca
Poaceae	Andropogon virginicus *
	Avena fatua *
	Axonopus affinis *
	Briza maxima *
	Briza minor *
	Bromus catharticus *
	Chloris gayana *
	Cynodon dactylon
	Entolasia stricta
	Lolium multiflorum *
	Lolium perrene *
	Paspalum dilatatum *
	Pennisetum clandestinum *
	Phalaris minor *
	Poa annua *
	Setaria spp.*
	Sporobolus africanus *
	Themeda australis

APPENDIX 2
Threatened Plants Of The Region,

APPENDIX 2: Threatened plant species known to occur within the study region.

Asclepiadaceae

Cynanchum elegans

Epacridaceae

Epacris purpurascens Leucopogon exolasius

Fabaceae (Mimosaceae)

Acacia baueri ssp. aspera Acacia clunies-rossiae Acacia flocktoniae Acacia pubescens Acacia rivalis

Fabaceae (Faboideae)

Bosssiaea oligosperma Pultenaea aristata

Gyrostemonaceae

Gyrostemon thesiodes

Myrtaceae

Darwinia peduncularis Eucalyptus benthamii Melaleuca deanei

Orchidaceae

Pterostylis saxicola

Proteaceae

Grevillea parviflora ssp. parviflora Hakea dohertyi Persoonia bargoensis Persoonia glaucescens Persoonia hirsuta ssp. hirsuta Persoonia nutans

Rhamnaceae

Pomaderris cotoneaster Pomaderris sericea Pomaderris brunnea

Santalaceae

Thesium australe

Thymelaceae

Pimelea spicata

APPENDIX 3, Fauna Species List

APPENDIX 3: Fauna observed, or known to occur within the study region.

Source of Records:

- 1 = Species recorded during present study.
- 2 = NPWS (2002).
- 3 = Campbelltown City Council (2000).
- 4 = NPWS (1997).
- 5 = LesryK Environmental Consultants (1995).

Key

- A indicates species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
- **f** migratory Family listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999.
- **B** indicates species listed under the NSW *Threatened Species Conservation Act 1995.*
- ∇- indicates species of regional conservation significance (NPWS 1997)
- * indicates introduced species.
- P preliminary determinations to the NSW Threatened Species Conservation Act 1995.

Α	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
		INVERTEBRATES						1
	X	Cumberland Plain Land Snail	Meridolum comeovirens		X			
		MAMMALS						
			Ornithorhynchidae					
		∇ Platypus	Omithorhynchus anatinus			X		
			Tachyglossidae					
		∇ Short-beaked Echidna	Tachyglossus aculeatus		X		X	
			Dasyuridae					
	X	Spotted-tailed Quoll	Dasyurus maculatus		X			
		∇ Brown Antechinus	Antechinus stuartii		X		X	
		∇ Dusky Antechinus	Antechinus swainsonii			X		
		∇ Common Dunnart	Sminthopsis murina			X		
			Peramelidae					
		V Long-nosed Bandicoot	Perameles nasuta		X			
			Phascolarctidae					
	Х	Koala	Phascolarctos cinereus		X	X	X	
			Vombatidae					
		∇ Common Wombat	Vombatus ursinus		X)
			Burramyidae					
	X	Eastern Pygmy Possum	Cerartetus nanus		X			
			Petauridae					
	X	Yellow-bellied Glider	Petaurus australis		X			
		Sugar Glider	Petaurus breviceps		Х		X)
		Squirrel Glider	Petaurus norfolcensis		X			
			Pseudocheiridae					
		∇ Greater Glider	Petauroides volans		X		X	
		Common Ringtail Possum	Pseudocheirus peregrinus		X		X	×
			Acrobatidae					
		∇ Feathertail Glider	Acrobates pygmaeus			X	X	
			Phalangeridae					
		Common Brushtail Possum	Trichosurus vulpecula		X		X	×
			Macropodidae					
		∇ Eastern Grey Kangaroo	Macropus giganteus		X		X	
		∇ Common Wallaroo	Macropus robustus		X			
		∇ Red-necked Wallaby	Macropus rufogriseus		X			×
		∇ Swamp Wallaby	Wallabia bicolor	X	X		ΧÎ	X
			Pteropodidae					

A	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
X	X	Grey-headed Flying Fox	Pteropus poliocephalus		X		X	
		Little Red Flying Fox	Pteropus scapulatus			X	X	
			Rhinolophidae					
		Eastern Horseshoe-bat	Rhinolophus megaphyllus		X			
			Vespertilioidae					
K	X	Large-eared Pied Bat	Chalinolobus dwyeri		X			
		Gould's Wattled Bat	Chalinolobus gouldii		X		X	
		Chocolate Wattled Bat	Chalinolobus morio		X			
	X	Eastern False-Pipistrelle	Falsistrellus tasmaniensis		X			
K	X	Common Bentwing-bat	Miniopterus schreibersii		X		X	
	X	Large-footed Myotis	Myotis adversus		X			
		Lesser Long-eared Bat	Nyctophilus geoffroyi		X			
		Gould's Long-eared Bat	Nyctophilus gouldi		X			
	X	Greater Broad-nosed Bat	Scoteanax rueppellii		X			
		Eastern Broad-nosed Bat	Scotorepens orion	-	X			
		Little Forest Bat	Vespadelus vultumus		X		X	
			Molossidae					
	X	Eastern Freetail-bat	Mormopterus norfolkensis		×	1		
	1	Freetail Bat	Mormopterus sp.1		X			1
		White-striped Freetail-bat	Nyctinomus australis		X			
			Muridae		1			
_		Water Rat	Hydromys chrysogaster			X		
_	1	* House Mouse	Mus musculus		X	1	X	1
	1	Bush Rat	Rattus fuscipes		X	1	X	1
-	+	Swamp Rat	Rattus lutreolus		X	1	+ ~	+
-	1	* Black Rat	Rattus rattus		X	1	×	+
	+	Didok rkat	Canidae	Parameter State of St	1	1	+ ~	+
-	-	* Fox	Vulpes vulpes		X	X	X	1
	+	* Dog	Canis familiaris		X	X	X	
	-	Dog	Felidae		+ ^	+-^	1 ^	+ '
	+	* Feral Cat	Felis catus		X	X	+	+
_		1 Clai Gat	Leporidae		+^	+-^	-	+
_	-	* Rabbit	Oryctolagus cuniculus		X	X	X)
	+		Oryclolagus cumculus		1 ^	+^	1	+ '
	-	BIRDS			-	-	-	+
			Phasianidae					
		∇ Stubble Quail	Cotumix pectoralis			×		
		∇ Brown Quail	Cotumix ypsilophora		X		X	
	+	V DIOWIT Quali	Turnicidae				-	+
	-				-	+	-	+
	-	Red-backed Button-quail	Tumix maculosa			X		-
		∇ Painted Button-quail	Tumix varia		X		X	
		Little Button Quail	Tumix velox			×		
			Pelecanidae		1			1
_	-	A			-	V	V	+
	-	Australian Pelican	Pelecanus conspicillatus		-	X	X	-
			Anhingidae					
		Darter	Anhinga melanogaster			X	X	
			Phalacrocoracidae			1		
	-	Limb Died Comment			X	-	X	
	-	Little Pied Cormorant	Phalacrocorax melanoleucos		+ ^	+	1 ^	-
		Great Cormorant	Phalacrocorax carbo			X		
		Little Black Cormorant	Phalacrocorax sulcirostris			X	X	
			Podicipedidae					
		∇ Great Crested Grebe	Podiceps cristatus			X		1
	-				+	-		+
	-	Hoary-headed Grebe	Poliocephalus poliocephalus		-	X	-	-
		Australasian Grebe	Tachybaptus novaehollandiae			X	X	
f			Anatidae					
		Black Swan	Cygnus atratus			X		-
					-	+		-
		Pacific Black Duck	Anas superciliosa		-	X	1	-
		* Mallard	Anas platyrhynchos		1	X		1

Α	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
		Grey Teal	Anas gracilis			Х		
		Chestnut Teal	Anas castanea			X		
		Hardhead	Aythya australis			X		
		Australian Wood (Maned) Duck	Chenonetta jubata		×			X
		V Musk Duck	Biziura lobata			X		
			Rallidae					
		Lewin's Rail	Rallus pectoralis			X		
		Baillon's Crake	Porzana pusilla			X		
		Australian Spotted Crake	Porzana fluminea			X		
		Dusky Moorhen	Gallinula tenebrosa			X		
		Purple Swamphen	Porphyrio porphyrio		X		X	X
		Eurasian Coot	Fulica atra			X		
		Editadian Coot	Ardeidae					
		White-necked Heron	Ardea pacifica			X.	1	
		White-faced Heron	Egretta novaehollandiae					X
X		Cattle Egret	Ardea ibis		×		1	
X		Great Egret	Ardea alba			X		
				-		X	-	+
		Little Egret ∇ Nankeen (Rufous) Night	Egretta garzetta		X		-	+
		Heron	Nycticorax caledonicus		^			
	Х	Black Bittern	Ixobrychus flavicollis			X		
			Threskiornidae					
X		Glossy Ibis	Plegadis falcinellus			X		
		Australian White (Sacred) Ibis	Threskiomis molluca			X	+	
		Straw-necked Ibis	Threskiomis spinicollis			X		
_		Royal Spoonbill	Platalea regia			X		
		Yellow-billed Spoonbill	Platalea flavipes			X	1	
		Tellow-billed Spootbill	Ciconiidae		-		1	+
	X	Black-necked Stork	Ephippiorhynchus asiaticus	1		X	-	1
f		DIACK-HECKED STOIK	Scolopacidae	-	-		+	+
-	X	VI ittle Curley	Numenius minutus	+	-	X	-	+
	X	∇ Little Curlew		-		X	-	+
**********	^	∇ Latham's Snipe	Gallinago hardwickii	-		-	+	+
X	X	D.: 1.10.:	Rostratulidae	-	-	X	-	+
^	^	Painted Snipe	Rostratula benghalensis	-		_ ^		+
			Burhinidae		- V		-	-
f	X	Bush-stone Curlew	Burhinus grallarius		X			-
1			Charadriidae		- ×		- V	-
		Masked Lapwing	Vanellus miles	-	X	-	X	X
		Banded Lapwing	Vanellus tricolor			X	-	-
X		∇ Oriental Plover	Charadrius veredus			X		-
f			Recurvirostridae				-	-
-		Black-fronted Dotterel	Elseyomis melanops			X	-	-
		Black-winged Stilt	Himantopus himantopus			X		
			Laridae					
		Silver Gull	Larus novaehollandiae			X		
		White-fronted Tern	Stema striata			X		
f			Accipitridae					
		∇ Pacific Baza	Aviceda subcristata			X	Х	
		Black-shouldered Kite	Elanus axillaris		X		X	
		Black Kite	Milvus migrans				X	1
		∇ Whistling Kite	Haliastur sphenurus		X		X	
K		∇ White-bellied Sea-eagle	Haliaeetus leucogaster		×			1

Α	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
		∇ Wedge-tailed Eagle	Aquila audax		X		X	
		∇ Little Eagle	Hieraaetus morphnoides				X	
		Brown Goshawk	Accipiter fasciatus		X		X	
		Collared Sparrowhawk	Accipiter cirrhocephalus		X		Х	
		∇ Grey Goshawk	Accipiter novaehollandiae					X
		Spotted Harrier	Circus assimilis			X	X	
		Swamp Harrier	Circus approximans			Х		
f			Falconidae					
		∇ Peregrine Falcon	Falco pergrinus		X		X	
		Australian Hobby	Falco longipennis			X		
		Brown Falcon	Falco berigora		X		X	
		Nankeen Kestrel	Falco cenchroides		X		Х	
			Columbidae					
		* Rock Dove	Columba livia				X	X
		* Spotted Turtle-dove	Streptopelia chinensis	X	Х		Х	X
		∇ Brown Cuckoo-dove	Macropygia amboinensis			X	X	
		∇ Peaceful Dove	Geopelia striata		X		X	
		Diamond Dove	Geopelia cuneata				X	
		∇ Bar-shouldered Dove	Geopelia humeralis		X			1
		∇ Common Bronzewing	Phaps chalcoptera		X		X	X
		Brush Bronzewing	Phaps elegans		X		1	1
		Crested Pigeon	Ocyphaps lophotes		X	1	X	X
		Wonga Pigeon	Leucosarcia melanoleuca		X			1
		vvenga i igeon	Cacatuidae		1			1
	Х	Glossy Black-Cockatoo	Calyptorhynchus lathami		X	1	X	1
		Yellow-tailed Black Cockatoo	Calyptorhynchus funereus		X	1	X	×
		Gang-Gang Cockatoo	Callocephalon fimbriatum			X	X	
		Galah	Eolophus roseicpilla		X	-	X	X
		Long-billed Corella	Cacatua tenuirostris		1	X		+
		Little Corella	Cacatua tendirostris Cacatua sanguinea		X		X	1
	Х	Major Mitchell's Cockatoo	Cacatua sarigumea Cacatua leadbeateri			X	X	1
		Sulphur-crested Cockatoo	Cacctua galerita	X	X		X	1
		Sulphur-crested Cockatoo	Psittacidae		-	+		+
		Rainbow Lorikeet	Trichoglossus haematodus		X	-	X	X
		Scaly-breasted Lorikeet			X	+	1	+
		Musk Lorikeet	Trichoglossus chlorolepidotus		X		X	+
			Glossopsitta concinna Glossopsitta pusilla		X		X	+
		Little Lorikeet		-	X	+	X	X
		Australian King Parrot Cockatiel	Alisterus scapularis	-	+^	X	+^	+-^
x	х		Nymphicus hollandicus		-	X	X	+
		Swift Parrot	Lathamus discolor		X	_^	X	X
-		Crimson Rosella	Platycercus elegans	X	X	+	X	X
		Eastern Rosella	Platycercus eximius	^			+	-
		Australian Ringneck	Barnardius zonarius			X	X	1
		Red-rumped Parrot	Psephotus haematonotus		V		X	X
		Pallid Cuckoo	Cuculus pallidus	-	X		X	-
		Brush Cuckoo	Cuculus variolosus		X	-	X	-
		Fan-tailed Cuckoo	Cuculus flabelliformis		X	-	X	X
		Horsfield's Bronze-Cuckoo	Chrysococcyx basalis		X	-	X	-
		Shining Bronze-Cuckoo	Chrysococcyx lucidus		-	-	X	-
		Common Koel	Eudynamys scopopacea		X	1	X	

Α	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
	X	Turquoise Parrot	Neophema pulchella			Х		
			Cuculidae					
		Pallid Cuckoo	Cuculus pallidus			X		
		Brush Cuckoo	Cuculus variolosus			X		
		Fan-tailed Cuckoo	Cuculus flabelliformis			X		
		Horsfield's Bronze-Cuckoo	Chrysococcyx basalis			X		
		Shining Bronze-Cuckoo	Chrysococcyx lucidus			X		
		Common Koel	Eudynamys scopopacea			X		
		Channel-billed Cuckoo	Scthrops novaehollandiae			X		
			Centropodidae					
		∇ Pheasant Coucal	Centropus phasianinus			X		
			Strigidae					
	Х	Powerful Owl	Ninox strenua		X		X	X
		Southern Boobook	Ninox novaeseelandiae		X		X	
			Tytonidae					
	X	Sooty Owl	Tyto tenebricosa		X			
	х	Masked Owl	Tyto novaehollandiae			Х		
		Barn Owl	Tyto alba			X	X	
		Tawny Frogmouth	Podargus strigoides		X		X	×
		White-throated Nightjar	Eurostopodus mysticalis		Х			
		Australian Owlet-nightjar	Aegotheles cristatus		Х		X	
			Apodidae					
Х		∇ White-throated Needletail	Hirundapus caudacutus	×	X		X	
			Alcedinidae					
		Azure Kingfisher	Alcedo azurea		X	X	X	
		Laughing Kookaburra	Dacelo naxaeguineae		Х		Х	X
		Sacred Kingfisher	Todiramphus sanctus		X		X	×
			Meropidae					
X		Rainbow Bee-eater	Merops omatus			X	X	
			Coraciidae					
		Dollar bird	Eurystomus orientalis		X		X	
			Menuridae					
		Superb Lyrebird	Menura novaehollandiae		X		X	
			Neosittidae					
		Varied Sittella	Daphoenositta chrysoptera		X			
			Climacteridae					
		White-throated Treecreeper	Comobates leucophaeus		X		Х	
		Red-browed Treecreeper	Climacteris erythrops		X			
	Х	Brown Treecreeper	Climacteris picumnus		X			
		2	Maluridae					
		Superb Fairy-wren	Malurus cyaneus		X		X	X
		Variegated Fairy-wren	Malurus lamberti		X		X	
		∇ Southern Emu-wren	Stipiturus malachurus		X			
		V Codificini Lina Wich	Pardalotidae					
		Spotted Pardalote	Pardalotus punctatus		X		X	X
		Striated Pardalote	Pardalotus striatus		X		X	
		Pilotbird	Pycnoptilus floccosus		X			
		∇ Rock Warbler	Origma solitaria	-	X	1	X	-
		Large-billed Scrubwren	Sericomis magnirostris		1	X		-
		White-browed Scrubwren	Sericomis magnirosms Sericomis frontalis		X		1 X	1
-		Yellow-throated Scrubwren	Sericomis citreogularis		+	+	+	X

Α	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
		∇ Chestnut-rumped Heathwren	Hylacola pyrrhopygia		X		X	
	X	Speckled Warbler	Chthinicola Sagittata			X		
		Weebill	Smicromis brevirostris		X		X	
		White-throated Gerygone	Gerygone olivacea		X		X	
		Brown Gerygone	Gerygone mouki		X		X	
		Brown Thornbill	Acanthiza pusilla		X		X	
		Yellow Thornbill	Acanthiza nana		Х		X	
		Striated Thornbill	Acanthiza lineata		X		X	
		∇ Buff-rumped Thornbill	Acanthiza reguloides		X		X	
		∇ Yellow-rumped Thornbill	Acanthiza chrysorrhoa		X		X	
		Southern Whiteface	Apehelocephala leucopsis			X		
			Meliphagidae					
		Red Wattlebird	Anthochaera carunculata		X		X	
		Little (Brush) Wattlebird	Anthochaera chrysoptera		X		X	
		Noisy Friarbird	Philemon comiculatus		X		X	
X	X	Regent Honeyeater	Xanthomyza phrygia		X			
		Bell Miner	Manorina melanophrys			X		
		Noisy Miner	Manorina melanocephala	X	X		X	X
X	X	Black-eared Miner	Manorina melanotis		X			
		Lewin's Honeyeater	Meliphaga lewinii		X		X	X
		Yellow-faced Honeyeater	Lichenostomus chrysops		X		X	X
		White-eared Honeyeater	Lichenostomus leucotis	1	X	1	X	
		Yellow-tufted Honeyeater	Lichenostomus melanops		X		X	X
		∇ Fuscous Honeyeater	Lichenostomus fuscus		X		X	
		White-plumed Honeyeater	Lichenostomus pencillatus		X		X	1
		∇ Black-chinned Honeyeater	Melithreptus gularis			X		
-		Brown-headed Honeyeater	Melithreptus brevirostris		X		X	1
		White-naped Honeyeater	Melithreptus lunatus		X		X	1
		White-cheeked Honeyeater	Phylidonyris nigra		X	1	X	
		New Holland Honeyeater	Phylidonryis novaehollandiae		X	1	X	1
		Tawny-crowned Honeyeater	Phylidonryis melanops		X			
		Eastern Spinebill	Acanthorhynchus tenuirostris		X	1	X	X
		Scarlet Honeyeater	Myzomela sanguinolenta		X	1	X	1
		∇ White-fronted Chat	Epthianura albifrons			X		1
		7 Williamond Shar	Orthonychidae	-		1		
		Eastern Whipbird	Psophodes olivaceus		X	1	X	X
		Lusterii vviipbiid	Neosittidae			+		
_		Varied Sittella	Daphoenositta chrysoptera		-	X		
		varied Ottella	Cinclosomatidae		-		-	1
-		Spotted Quail-thrush	Cinclosoma punctatum		X	-	X	
-		opotica Quali-tiliusii	Petroicidae	-			1	1
		Rose Robin	Petroica rosea			X	X	1
		∇ Flame Robin	Petroica phoenicea	-	X	+	+ ~	+
		∇ Scarlet Robin	Petroica multicolor		X	+	X	X
		∨ Scarlet Robin ∇ Red-capped Robin	Petroica mullicolor Petroica goodenovii	-	+	X	1	1
		∨ Red-capped Robin ∨ Hooded Robin				X		
		Eastern Yellow Robin	Melanodryas cucullata		X	1	X	X
			Eopsaltria australis		1	X	×	1
_		∇ Jacky Winter	Microeca fascinans			1	^	-
		V Crosted Shrike tit	Pachycephalidae Folgunaulus frontatus	-	X		V	-
		∇ Crested Shrike-tit Grey Shrike-thrush	Falcunculus frontatus Colluricincla harmonica	-	×	-	X	X

A	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
		Golden Whistler	Pachycephala pectoralis		X		X	X
X	X	Red-lored Whistler	Pachycephala rufogularis		X			
		Rufous Whistler	Pachycephala rufiventris			X	X	
			Dicruridae					
		Grey Fantail	Rhipidura fuliginosa		X		X	X
		Rufous Fantail	Rhipidura rufifrons		X		X	
		Willie Wagtail	Rhipidura leucophrys		Х		X	X
		Leaden Flycatcher	Myiagra rubecula		X		X	
		Satin Flycatcher	Myiagra cyanoleuca		X		X	
		∇ Restless Flycatcher	Myiagra inquieta		X		X	
		Black-faced Monarch	Monarcha melanopsis			X	X	
		Magpie Lark	Grallina cyanoleuca	X	Х		X	X
		Spangled Drongo	Dicrurus bracteatus			X		
			Oriolidae					
		Olive-backed Oriole	Oriolus sagittatus		Х		X	X
			Ptilonorhynchidae					
		Satin Bowerbird	Ptilonorhychus violaceus		X		X	
			Campephagidae					
		Black-faced Cuckoo-shrike	Coracina novaehollandiae	X	X		X	×
		∇ White-bellied Cuckoo-shrike	Coracina papuensis		Х		Х	
		Cicadabird	Coracina tenuirostris		X		X	
		∇ White-winged Triller	Lalage sueurii			X	X	
			Artamidae					
		White-breasted Woodswallow	Artamus leucorynchus	X				
		Masked Woodswallow	Artamus personatus			X	X	
		White-browed Woodswallow	Artamus superciliosus		X		Х	
		Dusky Woodswallow	Artamus cyanopterus		X		X	
		Grey Butcherbird	Cracticus torquatus		X		X	×
		Pied Butcherbird	Cracticus nigrogularis		X			
		Australian Magpie	Gymnorhina tibicen	X	X		X	×
		Pied Currawong	Strepera graculina		X		X	×
		Grey Currawong	Strepera versicolor		X		X	
			Corvidae					
		Australian Raven	Corvus coronoides	X	X		Х	×
		*	Corcoracidae					
		∇ White-winged Chough	Corcorax melanorhamphos				Х	
			Hirundinidae					
		Welcome Swallow	Hirundo neoxena	×	X		X	X
		Tree Martin	Hirundo nigricans		X			
			Motacillidae					
		Richard's Pipit	Anthus naovaeseelandiae				X	
			Sylviidae					
		Clamorous Reed-warbler	Acrocephalus stentoreus				X	
			Passeridae					
		* House Sparrow	Passer domesticus		X		X	X
			Fringillidae					
		* European Greenfinch	Carduelis carduelis				X	
			Ploceidae					
		Double-barred Finch	Taeniopygia bichenovii	+	X		X	
-	-	Red-browed Finch	Neochmia temporalis		X		۴X	×
		∇ Beautiful Firetail	Stagonopleura bella	-	X	-	-	-

	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
	Х	Diamond Firetail	Stagonopleura guttata				X	
			Dicaeidae					
		Mistletoebird	Dicaeum hirundinaceum		X		×	
_		Michieleconia	Zosteropidae					
		Cilconnection			X		X	
-	-	Silvereye	Zosterops lateralis	+	+ ^	-	-	-
			Pycnonotidae	-		-		-
		* Red-whiskered Bulbul	Pycnonotus jocosus		X		X	
			Muscicapidae					
		* Common Blackbird	Turdus merula		X		X	
			Sturnidae					
		* Common Starling	Stumus vulgaris	1	X		X)
-		* Common Myna	Acridotheres tristis	X	X		X	1
		REPTILES	Actidotheres tristis	+		-		+
		INCI TIEES	Chelidae	+		+		1
		Eastern Snake-necked Turtle	Chelodina longicollis	X	X	-		+
		Eastern Grake needed runie	Gekkonidae	+ ^	+ ~		1	
		Wood Gecko	Diplodactylus vittatus		X		X	
_		∇ Lesueur's Velvet Gecko	Oedura lesueurii		X		X	
		Southern Leaf-tailed Gecko	Phyllurus platurus		X			1
		∇ Thick-tailed Gecko	Underwoodisaurus milii		×			
			Pygopodidae					
		∇ Burton's Snake-lizard	Lialis burtonis			×		
		∇ Common Scaly-foot	Pygopus lepidopodus			X		
			Agamidae					
		Jacky Lizard	Amphibolurus muricatus		×	X	X	
		Eastern Water Dragon	Physignathus lesueurii		X		×	
		∇ Bearded Dragon	Pogona barbata		X			
		Mountain Dragon	Tympanocryptis diemensis		X			
			Varanidae					
	X	Heath (Rosenberg's) Goanna	Varanus rosenbergi		X		-	
		∇ Lace Monitor	Varanus varius		X		X	
			Scincidae					-
		Red-throated Skink	Bassiana platynota	-	X	-	-	+
_		Wall Skink	Cryptoblepharus virgatus	-	X	-	X	+
		Striped Skink	Ctenotus robustus		X		X	+
		Copper-tailed Skink Casuarina Skink	Ctenotus taeniolatus Cyclodomorphus casuarinae	-	X	X	X	-
-		"No Common Name"	Cyclodomorphous michaeli	-	X		-	+
_		Cunningham's Skink	Egemia cunninghami	+	1	X		+
	X	"No Common Name"	Egemia margaretae		X	1		+
		White's Skink	Egemia whitii		1	X	X	1
		Black Rock Skink	Egemia saxatilis		X			
		Yellow-bellied Skink	Eulamprus tenuis		X		X	
		Eastern Water Skink	Eulamprus quoyii		×		X	
		Grass Skink	Lampropholis delicata		X			
		Garden Skink	Lampropholis guichenoti		X		X	
		Weasel Skink	Saproscincus mustelinus		X			
		Eastern Blue-tongued	Tiliqua scincoides		X			-
		∇ Rainbow Litter Skink	Lygisaurus foliorum		X			
		Eastern Blue-tongued	Tiliqua scincoides		-	X		-
		Three-toed Skink	Saiphos equalis			X	X	-
		Di: 1 M	Typhlopidae		-			-
		Blind or Worm Snake	Ramphotyphlops nigrescens	-	X	-	-	-
		55: 15:	Boidae				-	-
		∇ Diamond Python	Morelia spilota spilota	-	X		-	-
			Colubridae	-	-	-		-
		∇ Brown Tree Snake	Boiga irregularis	-	X	-	-	-
	1	Common Tree Snake	Dendrelaphis punctulata	1	X		PX	

Α	В	COMMON NAME	SCIENTIFIC NAME	1	2	3	4	5
		∇ Common Death Adder	Acanthophis antarcticus		X			
		Golden Crowned Snake	Cacophis squamulosus			×		
		Yellow-faced Whip Snake	Demansia psammophis		X			X
		∇ Mustard-bellied Snake	Drysdalia rhodogaster			X		
		∇ Red-naped Snake	Furina diadema		X		X	
		Black-bellied Swamp Snake	Hemiaspis signata		X			1
X	X	Broad-headed Snake	Hoplocephalus bungaroides		X	1	X	
		∇ Eastern Tiger Snake	Notechis scutatus			X		
-		Blue-bellied Black Snake	Pseudechis guttatus		X			
		Eastern Brown Snake	Pseudonaja textilis		X			1
		Eastern Small-eyed Snake	Rhinoplocephalus nigrescens		X			
		Bandy Bandy	Vermicella annulata		X		X	
		AMPHIBIANS						
			Myobatrachidae					
		Common Eastern Froglet	Crinia signifera	1	×		X	X
X	X	Giant Burrowing Frog	Heleioporus australiacus		X		X	
	-	Eastern Banjo Frog	Limnodynastes dumerilii		X			1
		Striped Marsh Frog	Limnodynastes peronii		X		X	
		Spotted Grass Frog	Limnodynastes tasmaniensis			X	X	
X	X	Stuttering Frog	Mixophyes balbus			X		
		∇ Haswell's Frog	Paracrinia haswelli		×		X	1
	X	Red-crowned Toadlet	Pseudophryne australis	1	×		×	1
		∇ Brown Toadlet	Pseudophryne bibronii	1	X			1
		∇ Smooth Toadlet	Uperoleia laevigata	1	X			
		V Childett Foudiet	Hylidae		1	1		1
X	X	Green and Golden Bell Frog	Litoria aurea		1	X	1	+
		∇ Green Tree Frog	Litoria caerulea	1		X		1
_		Blue Mountains Tree Frog	Litoria citropa	-	X	-		1
		Bleating Tree Frog	Litoria dentata	1	X		1	+
		Brown Tree Frog	Litoria ewingii	+	+^	X	1	+
		Eastern Dwarf Tree Frog	Litoria fallax	-	X	1 ^		+
		Freycinet's Frog	Litoria freycineti	1	X		X	1
		Jervis Bay Tree Frog	Litoria jervisiensis	+	+ ~	X	1	
		Broad-palmed Frog	Litoria latopalmata		×	X	X	1
		Leseur's Tree Frog	Litoria lesueuri	1	X	1	1	
X	X	∇ Littlejohns Tree Frog	Litoria littlejohni		1	X		1
-,		Peron's Tree Frog	Litoria peronii		×	1		1
		Leaf Green Tree Frog	Litoria phyllochroa		X			1
		Tyler's Tree Frog	Litoria tyleri		X			
		Verreaux's Tree Frog	Litoria verreauxii	+	X			1



Appendix E

Noise and Vibration Assessment



Noise and Vibration Assessment

Proposed Passing Lane MR177 Appin Road

Approximately 450m North of the Entrance to Inghams Enterprises



Prepared for:

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Business Unit	Environmental Monitoring					
Project No.	000541 NM MR177 – Appin Road					
Document description	Noise and Vibration Assessment: Proposed Passing Lane MR177 Appin Road					
	Name	Signed	Date			
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Location	CARMS File
G:\Ops\Environ\PROJECTS\Proj0102\0541 H36331Appin Rd REF\Noise\AppinRd.doc	-

Client Reference	Status	Date
	Final	8 May 2002



NOISE AND VIBRATION ASSESSMENT Proposed Passing Lane MR177 Appin Road May, 2002

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Glossary of Terms

EPA NSW Environment Protection Authority

REF Review of Environmental Factors

RTA NSW Roads and Traffic Authority

dB The is the abbreviation used for decibel which is the measure of

sound pressure level

dBA The "A" denotes that the sound pressure level has been A

weighted so that the scale approximates the response of the human ear. The ear is less sensitive to high and low frequency sounds than it is to sounds in the midrange. Most community noise is

measured in "A" weighted decibels.

L₁₀ dBA This is the noise level in dBA exceeded for 10% of a specified

time period. For a 1 hour period the level would be exceeded for 6 minutes but would be less for the remaining 54 minutes. This is

sometimes written as LA10

L₉₀ dBA This is the noise level in dBA exceeded for 90% of a specified

time period. For a 1 hour period the level would be exceeded for 54 minutes but would be less for the remaining 6 minutes. This approximates the average minimum noise level and is often referred to as the background noise level and is sometimes written

as L_{A90}

L_{eq} The Leq represents the average noise energy during the

measurement period. When the energy level is A weighted it may

be written as L_{Aeq}

 L_{Aeq} (9 hr) The logarithmic average of the hourly L_{Aeq} measurements recorded

between 10 pm and 7 am. (Current NSW EPA night time

objective)

 L_{Aeq} (15 hr) The logarithmic average of the hourly L_{Aeq} measurements recorded

between 7 am and 10 pm. (Current NSW EPA daytime objective)

Tenth Percentile Background Noise Level

This is the background L₉₀ noise level calculated according to the 10th percentile method described in the NSW EPA *Industrial Noise*

Policy (2000) for the proposed construction hours.

1 Introduction

The Roads & Traffic Authority (RTA) has proposed the construction of a passing lane on a section of Main Road 177 (MR177) Appin Road, approximately 450m north of the entrance to Inghams Enterprises. Appin Road is the main route between Appin and Campbelltown and is a two lane two way single carriageway, with a posted speed of 90km/hr. The proposed passing lane involves the construction of an additional lane and adjacent shoulder on the western side of Appin Road over a length of approximately 800m.

1.1 Scope and Objectives

This report assists in the environmental assessment of the proposed passing lane on MR177 by meeting the following objectives:

- Determination of the existing road traffic noise levels and assessment of ambient noise conditions in the study area;
- Prediction of the environmental impacts of construction noise and vibration and future operational noise levels that would result from the proposed realignment;
- Identification of the relevant assessment criteria for the scope of the proposed work.

2 Study Area & Proposed Works

The study area is that section of MR177 in the immediate vicinity of the township of Appin. The proposed passing lane is located approximately 3.2km to 4.1km north of Appin, which spans from the Local Government Area of Campbelltown to Wollondilly as shown in Figure 2.1. An aerial photograph of the study area showing the location of the proposed passing lane is attached in Appendix A.

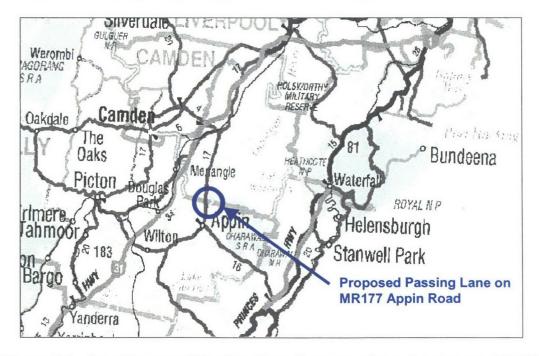


Figure 2.1 – Locality map of the location of proposed passing lane on MR177

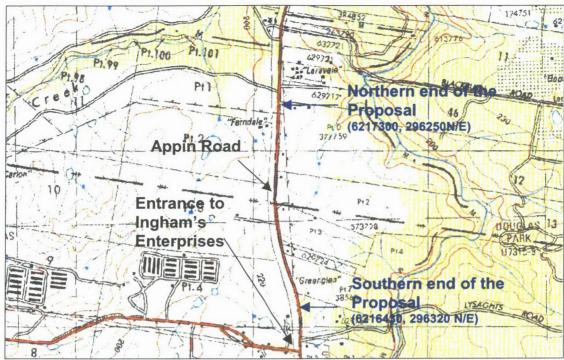


Figure 2.2 - Location for Proposed Works

2.1 Scope of Works

The proposed passing lane involves the construction of an additional lane and adjacent shoulder on the western side of Appin Road. The new additional lane would be used for northbound traffic where the existing two lane road would be used for southbound traffic with the proposed passing lane.

It would be expected that construction equipment for the Proposal would include:

- Woodchippers
- Stump grinders
- Chainsaws
- Bulldozers
- Backhoes
- Excavators
- Front end loaders
- Grader
- Vibrating rollers
- Static rollers

- · Paving machines
- Jackhammers
- Heavy transport
- Concrete agitater trucks
- Water tanker
- · Road sweeper
- Linemarking vehicles
- Truck delivery of construction materials
- Light commercial and passenger vehicles.

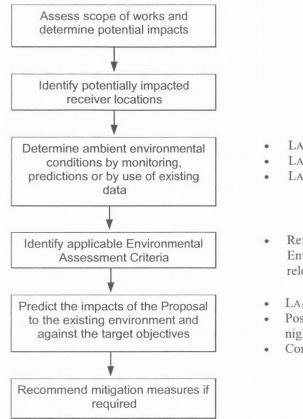
2.2 Traffic Data

The Annual Average Daily Traffic (AADT) volume recorded at the closest traffic count station 07.750 in the study area was 8906 vehicles per day in 2000, and 8363 vehicles per day in 1997.

3 Methodology

The methodology of the study can be summarised as follow:

Methodology



- LA_{eq} (15 hours) day time
- LA_{eq} (9 hours) night-time
- LA₉₀ background noise level
- References from EPA's ECRTN, RTA's Environmental Noise Management Manual, relevant Standards and guidelines
- LA₁₀ for construction noise assessment
- Post Construction LA_{eq} (day time 15 hours & night-time 9 hours)
- Construction vibration levels

3.1 Identification of Potentially Impacted Receivers

Residential properties are located on the eastern side of Appin Road. There are 3 isolated potentially impacted receivers in the study area with access to MR177. These properties are located approximately 15 m from the roadway.

Table 3.1 - Potentially Impacted Receiver Locations

Location	Receiver Type	Distance from Road/Work (m)	Potential Impact Source
A	Residence ¹	15	Construction
В	Residence	15	Construction
С	Residence	15	Construction

¹ Monitoring was undertaken at this residence and is recorded as Site A.

4 Assessment Criteria

Environmental criteria applicable to road proposals generally falls into two categories, being:

- that which is a result of construction activities, and;
- that which is generated from operational use of the final product.

Discussion of the criteria applicable to these two categories within the terms of reference of this report are given in Sections 4.1 to 4.3.

4.1 Construction Noise

The NSW Environment Protection Authority (EPA) *Environmental Noise Control Manual* (ENCM), Chapter 171, sets out noise criteria applicable to construction site noise for the purpose of defining intrusive noise impacts.

The EPA guidelines for construction noise are summarised in Table 4.1.

Table 4.1 - Construction Site Noise Control Guidelines

Total Construction Period	Acceptable LA ₁₀ Noise Level ¹
4 weeks and under	Background LA ₉₀ plus 20 dBA
4 weeks to 26 weeks	Background LA ₉₀ plus 10 dBA
Greater than 26 weeks	Background LA ₉₀ plus 5 dBA

¹ Applicable between the hours of 7.00am and 6.00pm Monday to Friday, and 8.00am to 1.00pm Saturdays, or 7.00am to 1.00pm if not audible at residential premises. For all other times construction noise must be inaudible at the receiver. No construction work is to take place on Sundays or Public Holidays.

4.2 Construction Vibration

German Standard DIN 4150 (1986) which sets conservative vibration levels for structural damage at 5mm/second is generally recognised as setting the most appropriate criteria for architectural assessment. A lower level of 2mm/second is often adopted for heritage structures. These levels would rarely be exceeded by roadworks, however human perception and comfort levels are usually reached at a much lower level. In this regard the British Standard BS6472 provides the most authoritative criteria for assessment of the impacts of construction vibration on the community as given in Tables 4.2 and 4.3.

Table 4.2 - Vertical Vibration Levels and Human Perception

Approximate Vibration Level	Degree of Perception
0.10 mm/s	Not Felt
0.15 mm/s	Threshold of Perception
0.35 mm/s	Barely Noticeable
1.0 mm/s	Noticeable
2.2 mm/s	Easily Noticeable
6 mm/s	Strongly Noticeable
14 mm/s	Very Strongly Noticeable

Note: These approximate vibration levels (in floors of buildings) are for vibration having a frequency content in the range of 8Hz to 80Hz.

Table 4.3 - Vibration Dose Values (mm/s^{1.75}) Versus Degrees of Adverse Comment Expected in Residential Buildings

Location	Low Probability of Adverse Comment	Adverse Comment Possible	Adverse Comment Probable
Residential buildings 16 hour day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hour night	0.13	0.26	0.51

4.3 Operational Noise

The NSW Government's "Environmental Criteria for Road Traffic Noise" (ECRTN) (May 1999) provides the assessment criteria for road traffic noise in NSW. Tables 1 and 2 of these Criteria contain various classifications for road construction.

According to the definitions supplied, the scope of this project which does not provide for significant changes in alignment or a design increase in traffic volumes or mix is such that it is not subject to noise level targets. This interpretation is confirmed by reference to the flow chart for selecting criteria given in Practice Note 1, (page 82) of the RTAs *Environmental Noise Management Manual*.

5 Instrumentation

An Acoustic Research Laboratories Noise Logger was used during the monitoring period. This instrument satisfies the requirements of Australian Standard AS1259-1990 for Type 1 instrumentation and was operated using the A-weighted setting and RMS detector time set to "fast". Data was collected in 15 minutes intervals and reported in 1hr intervals. The instruments were field calibrated before and after measurements with a Bruel & Kjaer Type 4231 acoustic calibrator (Serial No. 432371). The field calibration levels were within the acceptable limit of variation of $\pm\,0.5$ dBA. The noise logger and the acoustic calibrator used for field calibration had current NATA calibration. The reference pressure for all sound pressure level measurements is 20 μPa .

6 Results

Noise monitoring was conducted over a period of 5 days from Tuesday 26 February 2002 to Saturday 2 March 2002 inclusive. Noise measurements were obtained by placing the noise logger 1.5 m from the closest facade at the residence approximately 15 m away from the MR177 Appin Road (refer to site data sheet in Appendix B).

Table 6.1 - Instrument Location

Site	Location	Noise Logger Number
A	400 Appin Road, Appin	No. 410

An extract of the hourly noise measurements for the site is presented in Table 6.2 below, together with calculated arithmetic means over the measurement period. The complete hourly measurement results can be found in Appendix C.

Table 6.2 - Measured Noise Levels at Site A: 400 Appin Road, Appin

Days	Date	L _{Aeq} (9hr) dBA	L _{Aeq} (15hr) dBA
Tuesday	26/02/2002	59.7	62.8
Wednesday	27/02/2002	58.3	62.4
Thursday	28/02/2002	57.7	63.3
Friday	· ·		62.6
Saturday	02/03/2002	59.7	63.7
M	Means		63.0
EPA OI	EPA Objectives ¹		60.0

¹ EPA ECRTN's non-mandatory targets for existing roads that are not subject to redevelopment for the classification of "existing freeway/ arterial"

Note: results are reported to the nearest 1 decimal

As the proposed passing lane on MR177 Appin Road does not provide for significant changes in the design and alignment to increase traffic volumes or mix, there will be no significant change in operational noise to any residence identified in this study due to the proposed works. Since residences are located on the eastern side of Appin Road, the inclusion of the proposed passing lane on the southbound traffic and the relocation of the northbound traffic towards the west would imply that residences would be further away from the northbound traffic. It would be expected that the new lane configuration with the proposed passing lane would result in a minor reduction in the operational road traffic noise at the identified receiver locations. In addition, the use of Dense Grade Asphaltic Concrete (DGAC) for the proposed works as a replacement for the existing 14mm flush seal pavement would also improve the operational road traffic noise. The overall operational noise level would be expected to decrease by approximately 2 to 4 dBA.

The background L₉₀ noise level was also recorded for each 15 minutes interval during the monitoring period. As it is proposed to conduct all work during normal working hours, the daytime (7am to 6pm) background noise level for the site was calculated by following the "tenth percentile method" described in Appendix B of the *NSW Industrial Noise Policy 2000*. Background noise level is presented in Table 6.3. Detailed calculations of background noise level are attached in Appendix D.

Table 6.3 – Tenth Percentile Background Noise Levels L90 dBA

Site	Location	Background Noise Level LA90
A	400 Appin Road, Appin	40

7 Construction Noise

The proposed construction duration of the proposed passing lane on MR177 is estimated to be six months. However, due to the progressive nature of the construction works of the additional lane on Appin Road, it is unlikely that construction equipment would be used in front of the identified receivers for the full duration of work. Therefore, it is more appropriate to assess the predicted construction noise against the 4-26 weeks EPA Construction Noise criteria, i.e., the measured background noise plus 10 dB. Table 7.1 summarises the measured background noise level and the EPA daytime working hours construction noise goal for the estimated construction duration in the study area. The monitored site is located at similar setbacks from MR177 as the other identified residences. Therefore it is reasonable to assume the background levels at Sites B – C will not be less than that measured at Site A.

Table 7.1 – Measured Background Noise Level and EPA Construction Noise

Site	Background Noise Level Day LA ₉₀ (0700 – 1800)	EPA Construction Noise Goal ¹ LA ₁₀ (0700 – 1800)
A	40	50 (40 + 10)

¹⁾ $L_{90} + 5$ dB for receivers where work is likely to be > 26 weeks duration.

It is often recognised that the daytime construction noise goals are very stringent and are sometimes unachievable particularly where noise sensitive receptors are located in close proximity to construction works and background noise levels are relatively low. Where daytime goals are likely to be exceeded, a performance approach should be followed that allows the implementation of best management practice in reducing construction noise levels towards the goals. Close consultation with the affected community is essential where it is expected that construction works will exceed EPA criteria, with consultation protocols (RTA Community Involvement Practice Notes and Resource Manual, 1998) being followed.

7.1 Construction Noise Predictions

Table 7.2 lists typical sound power levels of the type of construction plant items provided in the proposed schedule of works for the construction. Appendix E details calculations determined for the study area.

Table 7.2 - Typical sound power levels of construction plant items (AS 2436 – 1981, Table D2)

Item	Sound Power Level dBA
Batch Plant	107 - 121
Excavator	108 - 118
Rock Hammer	110 - 119
Compressor	98 - 100
Vibratory Roller	100 - 104
20t Truck	103 - 108
Grader	114 - 120

Calculations performed in Appendix E used mean values from Table 7.2 for a range of assumed construction equipment to predict the sound pressure level at the monitoring site as identified in Table 6.1. Experience shows that the L_{10} is generally between 5 and 12 dB less than the sound pressure level predicted from sound power levels and this can be discounted by a further 2 dB because all equipment will not be working at the same time. Table 7.3 shows the predicted L_{10} that has been conservatively discounted by a total of 7 dB and compares against calculated guideline and reasonable criteria for the identified receiver.

 $L_{90} + 10$ dB for receivers where work is likely to be 4 - 26 weeks duration.

 $L_{90} + 20$ dB for receivers where work is likely to be < 4 weeks duration.

Table 7.3 – Construction Noise Level Objectives and Predicted Levels at Identified Receivers

Site	EPA Construction Noise Goal Day LA ₁₀ (0700 – 1800)	Predicted Construction Noise LA ₁₀ (0700 – 1800)	Exceedance of EPA Goal dB
A	50	80	+30
В	50	80	+30
С	50	80	+30

Due to conservative estimating, the error range is likely to be +2/-9 dB for predictions of noise levels from the Construction Site for the assumed equipment use.

7.2 Construction Noise Impact

While daytime construction activities are predicted to exceed the current EPA Criteria by up to 30 dB, it is not expected that these levels would cause adverse comment, however, it is recommended that best practice work methods be adopted to ensure that potential impacts would be minimised. A procedure for dealing with complaints should also be developed. Section 7.3 references techniques for controlling construction noise which may be included in an Environmental Management Plan.

7.3 Construction Noise Management

While the following list of noise management options is not exhaustive, it will assist in reducing impacts. These and any other available options should be considered when planning works, and should be implemented where practical and cost-effective. The RTAs *Environmental Noise Management Manual* should be consulted prior to the development of any noise management strategies.

Source controls

Time constraints

Limit work to daylight hours.

Scheduling

Perform noisy work during less sensitive time periods.

• Equipment restrictions

Select low-noise plant and equipment.

Ensure equipment has quality mufflers installed.

• Emission restrictions

Establish stringent noise emission limits for specified plant and equipment. Implement noise monitoring audit program to ensure equipment remains within specified limits.

Substitute methods

Use quieter and less vibration emitting construction methods where possible. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration reduction benefits.

• Limit equipment on site

Only have necessary equipment on site.

Limit activity duration

Where possible, concentrate noisy activities at one location and move to another as quickly as possible.

Site access

Vehicle movements outside construction hours, including loading and unloading operations, should be minimised and avoided where possible.

• Equipment maintenance

Ensure equipment is well maintained and fitted with adequately maintained silencers which meet the design specifications.

• Reduced equipment

• Power Use only necessary size and power.

Quieter work practices For example, implement work-site induction training, educating staff on noise sensitive issues and the need to make as little noise as possible.

Reversing alarms

Consider alternatives, such as manually adjustable or ambient noise sensitive types ("smart" reversing alarms). Alternative site management strategies can be developed, in accordance with the *Occupational Health and Safety Plan*, with the concurrence of the Occupational Health and Safety Officer.

Path controls

Noise barriers

Consider installing temporary construction noise barriers.

Install any permanent noise barriers required to minimise road traffic noise as early as possible in the construction process.

Locate equipment to take advantage of the noise barriers provided by existing site features and structures, such as embankments and storage sheds.

Enclosures

Install noise-control kits for noisy mobile equipment and shrouds around stationary plant, as necessary.

Increased distance

Locate noisy plant as far away from noise-sensitive receptors as possible.

Site access

Select and locate site access roads as far away as possible from noise-sensitive areas.

Receptor controls

Architectural treatment

Upgrade the glazing or window shutters of affected bedrooms.

Consultation

Community consultation, information, participation and complaint responses are essential aspects of all construction noise management programs.

They typically involve:

- A community information program before construction and/or high risk activities are commenced. This usually involves a leaflet distribution and direct discussions and negotiations with affected residents, explaining the type, time and duration of expected noise emissions.
- The involvement of affected residents in the development of acceptable noise management strategies.
- A nominated community liaison officer with a contact telephone number.
- A complaints hotline.
- Timely responses to complaints, providing information on planned actions and progress towards the resolution of concerns

It is recommended that:

- A detailed noise assessment should be undertaken based on a detailed construction workplan when available. As a minimum, the noise assessment should include a discussion of all the noise mitigation options identified above and their associated effect in reducing noise levels.
- Best management practice should be applied in development of a noise and vibration management plan (NVMP).
- Where work is conducted outside normal working hours and noise goal exceedances are predicted, all feasible and reasonable noise mitigation measures should be evaluated and included in the NVMP. If after the application of all feasible and reasonable noise mitigation measures, it is still predicted that there will be noise goals exceedances the RTA's out of normal hours construction programming and consultation protocols should be followed.

8 Construction Vibration

From experience it may be expected that the residences located 20 m from road construction work would experience vibration levels up to 3 mm/sec when vibratory rolling is being undertaken at the closest point to the residence. While this level of vibration is well below levels that may cause architectural damage, it would be at a level that would be likely to cause adverse comment. It is therefore recommended that mitigation measures be considered in the vicinity of residences located at Sites A - C.

9 Conclusion

This study has been prepared using all available information and is based on an assumed scope of works. The parameters of Construction Noise, Construction Vibration and Operational Noise and are summarised separately below.

9.1 Construction Noise

Current NSW EPA Criteria for Construction Noise do not provide a satisfactory basis for determining workable limits in a rural environment, therefore while, it is likely that construction activities would exceed EPA objectives, it is not expected that construction noise levels would cause any level of discomfort or result in adverse comment from identified residences.

The EMP should include a strategy for but not limited to:

- Utilising best practical technology and means to achieve noise mitigation by use of
 - Source controls
 - Path Controls
 - Receptor Controls
- Planning of noisy activities for parts of the day when they will have the least impact.
- Provision of a line of communication between the Community and Project Management.

9.2 Construction Vibration

While it has not been proposed to undertake any blasting as part of the construction techniques, it is expected that construction vibration experienced at Sites A-C would be sufficient to cause adverse comment. It is therefore recommended that mitigation strategies be developed and best management practices be adopted that are consistent with those described in the RTA's Environmental Noise Management Manual.

9.3 Operational Noise

As the proposed passing lane on MR177 Appin Road does not provide for significant changes in the design and alignment to increase traffic volumes or mix, there will be no increase in operational noise to any residence identified in this study due to the proposed works. Since residences are located on the eastern side of Appin Road, the inclusion of the proposed passing lane on the southbound traffic and the relocation of the northbound traffic towards the west would imply that residences would be further away from the northbound traffic. It would be expected that the new lane configuration with the proposed passing lane would result in minor reduction in the operational road traffic noise at all identified receiver locations. In addition, the use of Dense Grade Asphaltic Concrete (DGAC) for the proposed works as a replacement for the existing 14mm flush seal pavement would also improve the operational road traffic noise. The overall operational noise level would be expected to improve and decrease by approximately 2 to 4 dBA. It is therefore determined that there is no requirement to further consider operational road traffic noise for this project.

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10 References

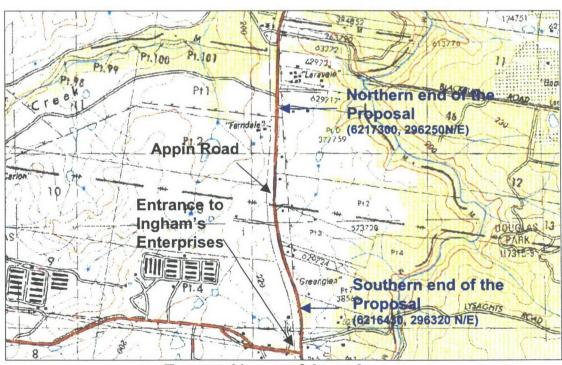
- Environment Protection Authority NSW. (1999). *Environmental Criteria for Road Traffic Noise*, EPA, Sydney.
- Environmental Protection Authority NSW (2000). NSW Industrial Noise Policy, EPA, Sydney.
- Roads and Traffic Authority, (2001). *Environmental Noise Management Manual*. RTA, Sydney.
- Roads and Traffic Authority, (1999). *Traffic Volume Data for Northern Region* 1998, RTA, NSW.
- Standards Australia, (1990). AS 1259.2 Acoustics Sound Level Meters. Part 2 Integrating averaging. Standards Australia, Sydney.
- Standards Australia, (1997). AS 1055.2 Acoustics Description and measurement of environmental noise. Part 2 Application to specific situations. Standards Australia, Sydney.
- Standards Australia, (1981). AS 2436 1981 Guide to noise control on construction, maintenance and demolition sites. Standards Australia, Sydney.

Appendix A

Site Photographs and Maps



Aerial photograph of the study area, MR177 Appin Road, Appin



Topographic map of the study area

Location: 400 Appin Road, Appin



Photograph 1: Front view of property 400 Appin Road, Appin



Photograph 2: View looking south in front of property 400 Appin Road

Appendix B

Site Data Sheets

Project: Proposed Passing Lane Appin Road

Location: 400 Appin Road, Appin

FI	Logger No.	410	Calibrator No.	432371
F	Reading Before	94.1	Reading After	94

No. of Lanes	2	7mm Flush Seal	,
Grade	-	14mm Flush Seal	
Speed .	90	Dense Grade	
Volume		Open Grade	
% Heavy		Concrete	
Weather		Other	

Ground Cover

Paved	5	Technician	JP
Gravel/C-pact Earth		Date	
Lawn	10	Computer File	
Long Grass		Photo	
Other		4	

Measurements

A 1.0	B 1.5	C 1.5	D 15	E	F
G	Н	I	J	K	L
M	N	0	P	Q	

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Appendix C

Hourly Measurement Results

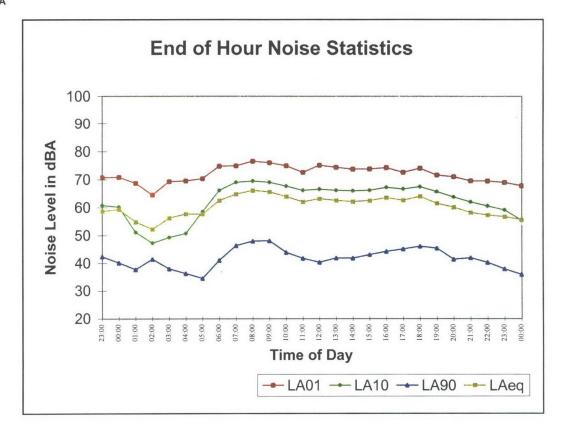
Date: 26/02/2002
File Name: Appin1.xls
Weather: Fine

Logger Serial Number 16-498-410

Comments: Weekend:

					_
Hour Ending	L _{A01}	L _{A10}	L _{A90}	L _{Aeq}	
23:00	70.7	60.7	42.3	58.7	
00:00	70.8	60.2	40.1	59.3	
01:00	68.7	51.1	37.7	54.8	
02:00	64.5	47.2	41.4	52.2	
03:00	69.3	49.2	37.9	56.2	
04:00	69.5	50.7	36.2	57.7	
05:00	70.3	58.5	34.4	57.7	
06:00	74.7	66.1	41.0	62.5	
07:00	74.9	69.0	46.3	64.8	
08:00	76.5	69.4	47.9	66.1	
09:00	75.9	69.0	48.0	65.6	
10:00	74.9	67.6	43.9	63.9	
11:00	72.5	66.1	41.7	62.0	
12:00	75.0	66.5	40.3	63.1	
13:00	74.3	66.1	41.8	62.5	
14:00	73.6	65.9	41.8	62.1	
15:00	73.7	66.1	43.0	62.4	
16:00	74.2	67.2	44.2	63.5	
17:00	72.5	66.6	45.1	62.5	
18:00	73.9	67.4	46.0	63.9	
19:00	71.5	65.6	45.4	61.4	
20:00	71.0	63.7	41.3	60.0	
21:00	69.4	61.9	41.9	58.2	
22:00	69.4	60.5	40.2	57.2	
23:00	68.9	59.1	37.9	56.7	
00:00	67.7	55.3	35.8	55.5	

Descriptor	Period	Noise	Level
L _{dn}	00:00 - 24:00	66.1	dBA
L _{A90} (Background)	07:00 - 18:00	44.0	dBA
L _{Aeq} (9 Hours)	22:00 - 07:00	59.7	dBA
L _{Aeq} (15 Hours)	07:00 - 22:00	62.8	dBA
L _{Aeq} (24 Hours)	00:00 - 24:00	61.8	dBA
L _{Aeq} (8 Hours)	22:00 - 06:00	58.3	dBA



Location: Appin Rd Date: 27/02/2002

File Name: Appin1.xls

Weather: Fine

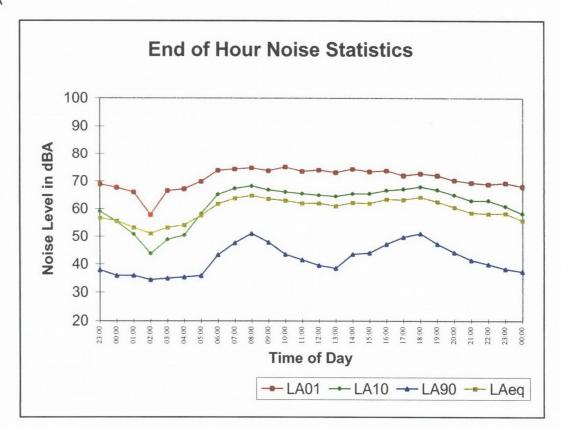
Logger Serial Number 16-498-410

Comments:

Weekend:

Hour Ending	L _{A01}	L _{A10}	L _{A90}	L _{Aeq}
23:00	68.9	59.1	37.9	56.7
00:00	67.7	55.3	35.8	55.5
01:00	66.0	50.8	35.9	53.2
02:00	57.8	43.7	34.4	51.0
03:00	66.5	48.9	34.9	53.2
04:00	67.2	50.4	35.3	54.1
05:00	69.9	58.2	35.8	57.5
06:00	73.8	65.2	43.3	61.8
07:00	74.4	67.3	47.6	63.8
08:00	74.8	68.2	51.0	64.7
09:00	73.7	66.9	47.9	63.6
10:00	75.2	66.1	43.5	62.9
11:00	73.5	65.5	41.5	62.0
12:00	74.0	64.9	39.5	62.0
13:00	73.1	64.5	38.5	61.0
14:00	74.4	65.4	43.6	62.2
15:00	73.4	65.5	44.0	62.0
16:00	73.8	66.6	47.2	63.4
17:00	72.0	67.1	49.7	63.2
18:00	72.7	67.9	51.0	64.2
19:00	72.0	66.8	47.2	62.6
20:00	70.2	65.0	44.2	60.5
21:00	69.4	62.9	41.4	58.5
22:00	68.8	63.0	39.9	58.2
23:00	69.3	60.9	38.2	58.3
00:00	68.0	58.2	37.3	55.7

Descriptor	Period	Noise	Level
L _{dn}	00:00 - 24:00	65.2	dBA
L _{A90} (Background)	07:00 - 18:00	45.2	dBA
L _{Aeq} (9 Hours)	22:00 - 07:00	58.3	dBA
L _{Aeq} (15 Hours)	07:00 - 22:00	62.4	dBA
L _{Aeq} (24 Hours)	00:00 - 24:00	61.3	dBA
L _{Aeq} (8 Hours)	22:00 - 06:00	56.6	dBA



Date: 28/02/2002

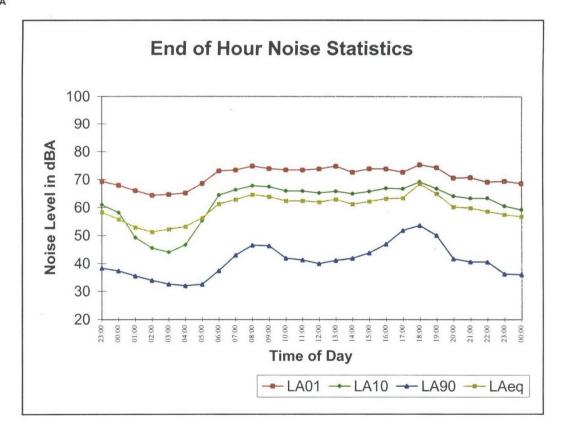
File Name: Appin1.xls Weather: Fine

Logger Serial Number 16-498-410

Comments: Weekend:

Hour Ending	L _{A01}	L _{A10}	L _{A90}	L _{Aeq}
23:00	69.3	60.9	38.2	58.3
00:00	68.0	58.2	37.3	55.7
01:00	66.0	49.2	35.5	52.8
02:00	64.3	45.5	33.9	51.2
03:00	64.6	44.0	32.6	52.2
04:00	65.1	46.6	32.0	53.1
05:00	68.6	55.3	32.5	56.2
06:00	73.1	64.4	37.3	61.2
07:00	73.4	66.3	42.9	62.7
08:00	74.8	67.7	46.5	64.5
09:00	73.9	67.4	46.3	63.8
10:00	73.4	65.9	41.8	62.3
11:00	73.3	65.8	41.2	62.3
12:00	73.8	65.1	39.9	61.8
13:00	74.7	65.7	41.0	62.8
14:00	72.5	64.8	41.8	61.1
15:00	73.8	65.6	43.7	62.1
16:00	73.8	66.8	46.8	63.1
17:00	72.6	66.6	51.7	63.3
18:00	75.2	69.1	53.5	68.4
19:00	74.2	66.7	49.9	64.8
20:00	70.5	64.0	41.6	60.1
21:00	70.6	63.2	40.5	59.7
22:00	69.0	63.3	40.5	58.5
23:00	69.4	60.4	36.1	57.4
00:00	68.5	59.1	35.9	56.6

Descriptor	Period	Noise	Level
L _{dn}	00:00 - 24:00	65.0	dBA
L _{A90} (Background)	07:00 - 18:00	44.9	dBA
L _{Aeq} (9 Hours)	22:00 - 07:00	57.7	dBA
L _{Aeq} (15 Hours)	07:00 - 22:00	63.3	dBA
L _{Aeq} (24 Hours)	00:00 - 24:00	61.9	dBA
L _{Aeq} (8 Hours)	22:00 - 06:00	56.4	dBA



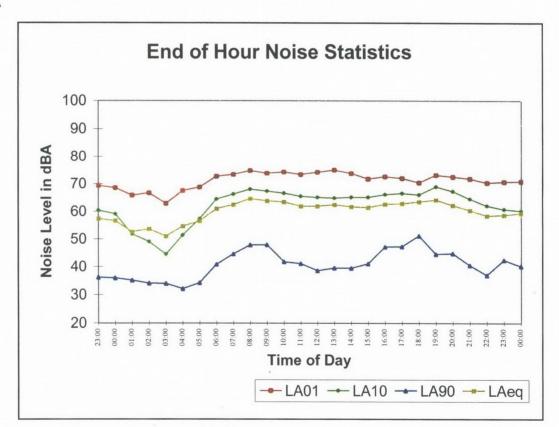
Date: 01/03/2002
File Name: Appin1.xls
Weather: Fine

Logger Serial Number 16-498-410

Comments: Weekend:

Hour Ending	L _{A01}	L _{A10}	L _{A90}	L _{Aeq}
23:00	69.4	60.4	36.1	57.4
00:00	68.5	59.1	35.9	56.6
01:00	65.8	51.8	35.1	52.6
02:00	66.7	49.0	34.0	53.6
03:00	62.8	44.4	34.0	50.9
04:00	67.5	51.4	32.1	54.6
05:00	68.8	57.3	34.2	56.5
06:00	72.7	64.4	40.8	61.0
07:00	73.3	66.2	44.5	62.4
08:00	74.8	68.0	47.8	64.6
09:00	73.8	67.3	47.9	63.8
10:00	74.3	66.6	41.7	63.4
11:00	73.4	65.5	41.1	61.9
12:00	74.2	65.1	38.5	61.9
13:00	75.0	64.8	39.5	62.4
14:00	73.8	65.1	39.4	61.7
15:00	71.8	65.1	41.0	61.5
16:00	72.6	66.1	47.1	62.6
17:00	72.0	66.5	47.3	62.8
18:00	70.4	66.0	51.1	63.5
19:00	73.1	68.9	44.5	64.1
20:00	72.5	67.2	44.7	62.2
21:00	71.8	64.5	40.5	60.4
22:00	70.4	62.0	36.9	58.4
23:00	70.7	60.7	42.3	58.7
00:00	70.8	60.2	40.1	59.3

Descriptor	Period	Noise	Level
L _{dn}	00:00 - 24:00	64.7	dBA
L _{A90} (Background)	07:00 - 18:00	43.8	dBA
L _{Aeq} (9 Hours)	22:00 - 07:00	57.7	dBA
L _{Aeq} (15 Hours)	07:00 - 22:00	62.6	dBA
L _{Aeq} (24 Hours)	00:00 - 24:00	61.4	dBA
L _{Aeq} (8 Hours)	22:00 - 06:00	56.5	dBA



Date: 02/03/2002 File Name: Appin1.xls

Weather: Fine

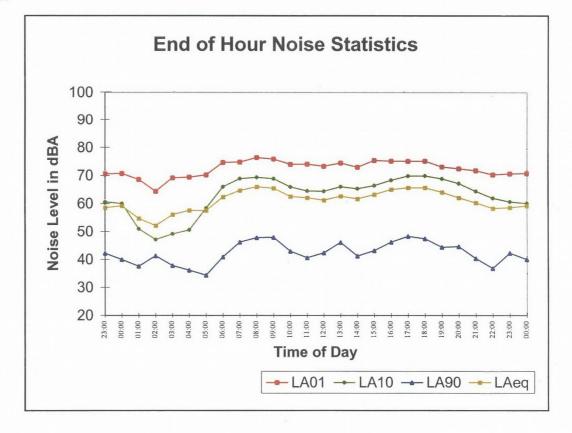
Logger Serial Number 16-498-410

Comments:

Weekend: YES (Saturday)

Descriptor	Period	Noise	Level
L _{dn}	00:00 - 24:00	66.4	dBA
L _{A90} (Background)	07:00 - 18:00	45.0	dBA
L _{Aeq} (9 Hours)	22:00 - 07:00	59.7	dBA
L _{Aeq} (15 Hours)	07:00 - 22:00	63.7	dBA
L _{Aeq} (24 Hours)	00:00 - 24:00	62.6	dBA
L _{Aeq} (8 Hours)	22:00 - 06:00	58.3	dBA

Hour Ending	L _{A01}	L _{A10}	L _{A90}	LAeq
23:00	70.7	60.7	42.3	58.7
00:00	70.8	60.2	40.1	59.3
01:00	68.7	51.1	37.7	54.8
02:00	64.5	47.2	41.4	52.2
03:00	69.3	49.2	37.9	56.2
04:00	69.5	50.7	36.2	57.7
05:00	70.3	58.5	34.4	57.7
06:00	74.7	66.1	41.0	62.5
07:00	74.9	69.0	46.3	64.8
08:00	76.5	69.4	47.9	66.1
09:00	75.9	69.0	48.0	65.6
10:00	74.0	66.0	43.0	62.7
11:00	74.1	64.6	40.7	62.2
12:00	73.4	64.5	42.4	61.3
13:00	74.5	66.1	46.2	62.7
14:00	73.0	65.4	41.3	61.8
15:00	75.4	66.5	43.2	63.4
16:00	75.2	68.4	46.3	65.1
17:00	75.1	69.9	48.4	65.8
18:00	75.2	70.0	47.5	65.8
19:00	73.1	68.9	44.5	64.1
20:00	72.5	67.2	44.7	62.2
21:00	71.8	64.5	40.5	60.4
22:00	70.4	62.0	36.9	58.4
23:00	70.7	60.7	42.3	58.7
00:00	70.8	60.2	40.1	59.3



Date: 03/03/2002
File Name: Appin1.xls
Weather: Fine

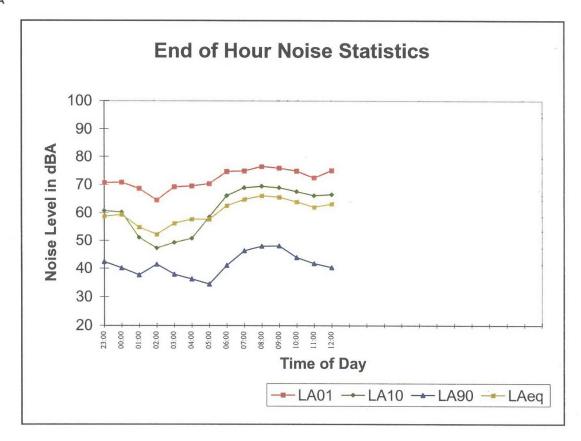
Logger Serial Number 16-498-410

Comments:

Weekend: YES (Sunday)

Hour Ending	L _{A01}	L _{A10}	L _{A90}	L _{Aeq}
23:00	70.7	60.7	42.3	58.7
00:00	70.8	60.2	40.1	59.3
01:00	68.7	51.1	37.7	54.8
02:00	64.5	47.2	41.4	52.2
03:00	69.3	49.2	37.9	56.2
04:00	69.5	50.7	36.2	57.7
05:00	70.3	58.5	34.4	57.7
06:00	74.7	66.1	41.0	62.5
07:00	74.9	69.0	46.3	64.8
08:00	76.5	69.4	47.9	66.1
09:00	75.9	69.0	48.0	65.6
10:00	74.9	67.6	43.9	63.9
11:00	72.5	66.1	41.7	62.0
12:00	75.0	66.5	40.3	63.1

Descriptor	Period	Noise	Level
L _{dn}	00:00 - 24:00	68.3	dBA
L _{A90} (Background)	07:00 - 18:00	37.0	dBA
L _{Aeq} (9 Hours)	22:00 - 07:00	59.7	dBA
L _{Aeq} (15 Hours)	07:00 - 22:00	64.4	dBA
L _{Aeq} (24 Hours)	00:00 - 24:00	62.3	dBA
L _{Aeq} (8 Hours)	22:00 - 06:00	58.3	dBA



							1
300,000,000,000,000,000,000,000,000,000							
Location: Appin Rd							
Logger Serial Number 16-498-410							
						1	
		Day	Date	Leq(8hr)	Leq(9hr)	Leq(15hr)	Leq(24hr)
A second	Day No.1	Tuesday	26/02/2002	58.3	59.7	62.8	61.8
		Wednesday	27/02/2002	56.6	58.3	62.4	61.3
	Day No.3	Thursday	28/02/2002	56.4	57.7	63.3	61.9
	Day No.4	de la communicación de la	01/03/2002	56.5	57.7	62.6	61.4
	the state of the s	Saturday	02/03/2002	1	59.7	63.7	62.6
from the second with a source of the second control of the second		means	100	57.2	58.6	63.0	

Appendix D

Background Noise Level Calculations

Method for Determining the Tenth Percentile Background Noise Level

The background L₉₀ noise level was recorded for each 15 minutes interval during the monitoring period. As it is proposed to conduct all work during normal working hours, the daytime (7am to 6pm) background noise level for the site was calculated by following the "tenth percentile method" described in Appendix B Table B1 of the *NSW Industrial Noise Policy 2000*.

Table B1. Method for determining the tenth percentile

Step 1	Sort the L_ASO, 15 minutes data in each assessment period in ascending order.
Step 2	Work out the tenth per cent position of the number of samples in the assessment period. This can be calculated by multiplying the number of L _{AUD, 15 minutes} values in the assessment period by 0.1.
Step 3	Determine the tenth percentile (essentially the lowest tenth per cent value):
	If the tenth per cent position (from Step 2) is an integer, then the tenth percentile is determined by taking the arithmetic average of the value of the L _{A00, 15 moute} at the tenth per cent position and the next highest value.
	If the tenth per cent position (from Step 2) is not an integer, then the tenth percentile is the next highest L _{ANO, 15 merods} value above the value at the tenth per cent position.
	Examples:
	 For a data set of size 40, the tenth per cent position is 4 (i.e. 0.1 x 40). As this is an integer, the tenth percentile is the average of the values at the 4th position and the 5th position, counting from the lowest value of the sorted data (from Step 1).
	 For a data set of size 44, the tenth per cent position is 4.4 (i.e. 0.1 x 44). As this value is not an integer, the tenth percentile is the value at the 5th position counting from the lowest value of the sorted data (from Step 1).

Tenth Percentile Background Noise Level (L90)

Date	Time	L90	Date	Time	L90	Date	Time	L90	Date	Time	L90	
1/03/2002	17:45	59.6	2/03/2002	16:45	47.3	26/02/20	15:45	43.8	28/02/2002	10:00	40.7	
28/02/2002	17:45	55.9	28/02/2002	7:45	47.2	27/02/20	10:00	43.6	1/03/2002	11:30	40.7	
28/02/2002	16:45	55.2	1/03/2002	16:30	47.2	27/02/20		43.4	28/02/2002	14:15	40.6	
27/02/2002	17:30	55.1	2/03/2002	12:30	47.2	2/03/20		43.4	26/02/2002	12:30	40.5	
28/02/2002	17:15	55	27/02/2002	9:00	47.1	27/02/20		43.3	28/02/2002	13:30	40.5	
28/02/2002	18:00	53.9		14:45	47.1							
	A		2/03/2002			27/02/20		43.3	2/03/2002	14:30	40.5	
2/03/2002	16:15	53	26/02/2002	16:15	47	28/02/20		43.2	1/03/2002	12:45	40.3	
27/02/2002	17:00	52.5	27/02/2002	8:45	46.9	26/02/20		43.1	28/02/2002	11:00	40.2	
28/02/2002	16:30	52.2	2/03/2002	12:15	46.9	26/02/20		43	1/03/2002	13:45	40.2	
27/02/2002	8:00	52.1	28/02/2002	7:15	46.8	26/02/20)2 15:15	43	1/03/2002	14:45	40.2	
28/02/2002	17:00	52.1	28/02/2002	8:45	46.8	26/02/20	9:45	42.9	1/03/2002	14:00	40.1	
27/02/2002	17:15	51.9	28/02/2002	15:15	46.7	26/02/20		42.9	2/03/2002	11:30	40.1	
27/02/2002	7:30	51.5	2/03/2002	15:30	46.7	26/02/20		42.9	28/02/2002	11:45	40	
1/03/2002	8:15	51.2	2/03/2002	17:15	46.7	27/02/20		42.9	28/02/2002	10:30	39.9	
	8:15			40.00								
27/02/2002	The second secon	50.8	2/03/2002	17:30	46.7	28/02/20		42.9	27/02/2002	11:45	39.8	
27/02/2002	7:45	50.3	27/02/2002	8:30	46.6	28/02/20		42.8	2/03/2002	10:15	39.8	
26/02/2002	8:00	50.2	1/03/2002	16:00	46.6	28/02/20		42.7	2/03/2002	14:00	39.8	
27/02/2002	7:15	50.2	28/02/2002	15:30	46.4	2/03/20		42.7	26/02/2002	11:45	39.7	
2/03/2002	8:00	50.2	26/02/2002	18:00	46.2	27/02/20	13:15	42.6	1/03/2002	13:15	39.7	
1/03/2002	7:30	50	1/03/2002	17:00	46.2	2/03/20		42.6	27/02/2002	12:30	39.6	
26/02/2002	8:15	49.9	27/02/2002	15:15	46.1	26/02/20		42.5	28/02/2002	12:00	39.6	
2/03/2002	8:15	49.9	1/03/2002	7:45	46.1	27/02/20		42.5	1/03/2002	12:15		10th Percentile Result
27/02/2002	16:00	49.6	1/03/2002	15:15	46	1/03/20		42.4			39.6	
									1/03/2002	14:30		
1/03/2002	8:00	49.4	28/02/2002	15:45	45.9	2/03/20		42.4	27/02/2002	12:45	39.4	
26/02/2002	7:45	49.3	28/02/2002	14:00	45.8	26/02/20		42.2	1/03/2002	11:00	39.3	
2/03/2002	7:45	49.3	2/03/2002	12:00	45.8	27/02/20		42.2	27/02/2002	11:00	39.2	
28/02/2002	17:30	49.1	2/03/2002	17:00	45.8	1/03/20	9:30	42.2	1/03/2002	10:00	39.2	
1/03/2002	18:00	49.1	26/02/2002	15:00	45.7	1/03/20	02 10:45	42.1	1/03/2002	11:15	39.2	
2/03/2002	18:00	49.1	28/02/2002	14:45	45.7	2/03/20	02 10:45	42	1/03/2002	13:00	39.2	
26/02/2002	8:30	49	1/03/2002	7:15	45.7	2/03/20		42	27/02/2002	12:00	39	
27/02/2002	16:15	49	26/02/2002	9:00	45.6	2/03/20		42	28/02/2002	13:15	39	
2/03/2002	8:30	49	26/02/2002	16:00	45.6	26/02/20		41.9	2/03/2002	10:30	39	
27/02/2002				9:00	45.6	2/03/20		41.9	28/02/2002	11:30	38.8	
	16:45	48.8	2/03/2002									
27/02/2002	17:45	48.8	27/02/2002	14:30	45.4	27/02/20		41.8	28/02/2002	12:45	38.8	
28/02/2002	8:15	48.5	26/02/2002	16:30	45.3	1/03/20		41.8	1/03/2002	12:30	38.8	
2/03/2002	16:00	48.5	27/02/2002	14:00	45.3	26/02/20		41.7	26/02/2002	10:30	38.7	
27/02/2002	16:30	48.4	27/02/2002	15:30	45.2	27/02/20		41.7	26/02/2002	12:00	38.6	
2/03/2002	15:45	48.4	26/02/2002	9:15	45.1	28/02/20	02 13:45	41.7	27/02/2002	11:30	38.4	
26/02/2002	17:45	48.3	28/02/2002	9:00	45.1	2/03/20	15:15	41.7	27/02/2002	12:15	38.2	
27/02/2002	18:00	48.3	2/03/2002	9:15	45.1	26/02/20		41.5	1/03/2002	11:45	38.2	
28/02/2002	16:00	48.2	26/02/2002	16:45	45	1/03/20		41.5	1/03/2002	13:30	37.6	
1/03/2002	8:30	48.1	26/02/2002	9:30	44.9	28/02/20		41.4	27/02/2002	13:00	36.6	
1/03/2002	8:45	48.1	26/02/2002	17:30	44.9	28/02/20		41.4	1/03/2002	12:00	35.9	
1/03/2002	15:45	48	2/03/2002	9:30	44.9	1/03/20		41.4				
1/03/2002	16:15	48	26/02/2002	17:15	44.6	26/02/20		41.3				
1/03/2002	17:15	48	28/02/2002	8:30	44.6	26/02/20	02 14:15	41.3				
2/03/2002	12:45	48	27/02/2002	9:30	44.5	1/03/20		41.3				
1/03/2002	15:30	47.9	26/02/2002	7:15	44.4	2/03/20		41.3	1			
28/02/2002				7:15	44.4	26/02/20		41.1		2		
	8:00	47.8	2/03/2002					and the same of th				
1/03/2002	17:30	47.8	27/02/2002	14:15	44.3	2/03/20		41.1				
26/02/2002	7:30	47.7	28/02/2002	14:30	44.3	26/02/20		41				
27/02/2002	15:45	47.7	26/02/2002	14:45	44.2	28/02/20		41				
2/03/2002	7:30	47.7	26/02/2002	15:30	44.2	28/02/20		41				
26/02/2002	8:45	47.6	28/02/2002	7:30	44.2	28/02/20		41				
1/03/2002	16:45	47.6	26/02/2002	12:45	44.1	2/03/20		41				
2/03/2002	8:45	47.6	27/02/2002	13:30	44.1	26/02/20		40.9				
					and the state of t			40.9				
2/03/2002	16:30	47.5	1/03/2002	9:15	44.1	27/02/20						
2/03/2002	17:45	47.5	28/02/2002	15:00	44	26/02/20		40.8				
28/02/2002	16:15	47.3	1/03/2002	9:00	44	2/03/20	02 9:45	40.8				

Appendix E

Construction Noise Predictions

Acoustic Calculations

Noise Propagation from Construction Site

The calculations below follow procedures outlined in AS2436-1981. Assumptions made in the calculations include:

- No barrier attenuation
- No ground effect attenuation
- The number of machines on construction site
- Attenuation due to hemispherical spreading

Table E1 – Predictions of Noise Levels from Construction Equipment

Construction Machine	Sound Power Level (dBA) ¹	Number of machines	Total Power Level (dBA) ²	Cumulative ³
Grader	117	1	117	117
Rock Hammer	115	1	115	119
Trucks	105	2	108	119
Roller	102	2	105	119

¹ mean values from sound power levels (dBA) as suggested from Table D2 of AS2436-1981

The sound level at a receiving position distant R from the geometric centre of a machine or process if sound is radiated uniformly in all directions over flat, open ground is given by the following formula (Appendix B3 of AS2436-1981):

PWL was found to be 119dBA with the assumed number and types of construction equipment for the proposed works as shown in the above table.

The monitoring site selected for this study is located approximately 15m from the MR177 Appin Road, i.e. R = 15 m

Therefore, the sound pressure level at the monitoring site with the proposed construction is predicted to be:

$$SPL = 119 - 20 \log 15 - 8$$
$$= 87 dBA$$

Experience shows that the L_{10} is generally between 5 and 12 dB less than the sound pressure level predicted from sound power levels and this can be discounted by a further 2 dB because all equipment will not be working at the same time. The L_{10} can be approximately calculated by deducting 7 dB from the sound pressure level.

Therefore, the L_{10} at the monitoring site is calculated to be:

$$L_{10} = 87 \text{ dB} - 7 \text{ dB}$$

= **80 dB**

² The total power level from each machine type, calculated with reference to Table B2 of AS2436-1981

³ Cumulative sound power levels from different types of machines, calculated with reference to Table B2 of AS2436-1981

Table E2 - Predicted Noise Levels at Identified Locations

Site	Distance from Construction (m)			Predicted Construction Noise LA ₁₀ (0700 – 1800)	Exceedance of EPA Goal
A	15	40	50 (40+10)	80	30
В	15	40	50 (40+10)	80	30
С	15	40	50 (40+10)	80	30

8

Appendix F

Database Search Results

Online Database

Report created on: Thursday, Apr 11 2002

Report on: threatened ecological communities, threatened species, marine protected species,

migratory species and , Ramsar sites, Commonwealth areas, World Heritage Areas

Search type: line

Approx buffer : 10 km (minimum buffer is approx 1km)

Coordinates used:

Longitude Latitude

150.790 -34.15

150.791 -34.15

150.791 -34.14

150.790 -34.14

150.79 -34.14

150.790 -34.14



view map

Threatened ecological communities

2 communities

Threatened species

28 species

Migratory species

8 species

Marine protected species

8 species

World Heritage Areas [dataset information]

None found

Ramsar sites [dataset information]

Within Catchment of Towra Point Nature Reserve

Commonwealth areas

Note: The database on Commonwealth areas is incomplete and includes only Commonwealth

marine areas and Commonwealth reserves

None found

Extra Information

Conservation reserves [dataset information]

None found

Regional Forest Agreements

Note: all RFA areas including those still under consideration have been included [dataset

information]

None found

Species and Community Report

This report provides a general indication of the species and threatened communities that may occur in your nominated area

Threatened ecological communities

Community Name	Status	Type of Presence
Cumberland Plain Woodlands	Endangered	Community known to occur within area
Shale/Sandstone Transition Forest	Endangered	Community known to occur within area

Threatened species

	Scientific Name	Common Name	Type of Presence	Status
Amphibia	Heleioporus australiacus (1973)	Giant Burrowing Frog	Species or species habitat likely to occur within area	Vulnerable
Amphibia	Litoria aurea (1870)	Green and Golden Bell Frog	Species or species habitat likely to occur within area	Vulnerable
Amphibia	Litoria littlejohni (64733)	Littlejohn's Tree Frog	Species or species habitat likely to occur within area	Vulnerable
Amphibia	Mixophyes balbus (1942)	Stuttering Frog	Species or species habitat likely to occur within area	Vulnerable
Aves	Lathamus discolor (744)	Swift Parrot	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree	Endangered
Aves	Xanthomyza phrygia (430)	Regent Honeyeater	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree	Endangered
Mammalia	Chalinolobus dwyeri (183)	Large-eared Pied Bat, Large Pied Bat	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree	Vulnerable
Mammalia	Dasyurus maculatus maculatus (s. lat.) (64476)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (south-east mainland and Tasmanian subspecies)	2	Vulnerable
Mammalia	Isoodon obesulus obesulus (68050)	Southern Brown Bandicoot	Species or species habitat likely to occur within area	Endangered

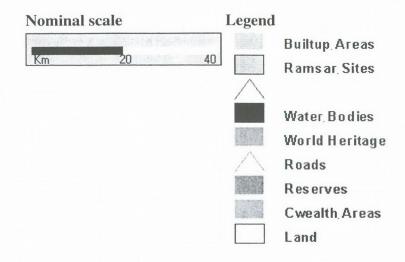
Mammalia	Petrogale penicillata (225)	Brush-tailed Rock-wallaby	Species or species habitat likely to occur within area - Derived from a general Vulnerable distribution map > 1 degree
Mammalia	Potorous tridactylus tridactylus (66645)	Long-nosed Potoroo (SE mainland)	Species or species habitat likely to occur within area - Derived from a general Vulnerable distribution map > 1 degree
Osteichthyes	Macquaria australasica (66632)	Macquarie Perch	Species or species habitat likely to occur within area Endangered
Osteichthyes	Prototroctes maraena (26179)	Australian Grayling	Species or species habitat likely to occur within area Vulnerable
Plant	Acacia bynoeana (8575)	Bynoe's Wattle, Tiny Wattle	Species or species habitat likely to occur within area
Plant	Caladenia tessellata (2119)	Thick-lipped Spider- orchid, Daddy Long-legs	Species or species habitat likely to occur within area Vulnerable
Plant	Cryptostylis hunteriana (19533)	Leafless Tongue-orchid	Species or species habitat likely to occur within area Vulnerable
Plant	Cynanchum elegans (12533)	White-flowered Wax Plant	Species or species habitat likely to occur within area Endangered
Plant	Eucalyptus benthamii (2821)	Camden White Gum, Nepean River Gum	Species or species habitat likely to occur within area Vulnerable
Plant	Grevillea parviflora subsp. parviflora (64910)		Species or species habitat likely to occur within area Vulnerable
Plant	Leucopogon exolasius (14251)	-	Species or species habitat likely to occur within area Vulnerable
Plant	Melaleuca deanei (5818)	Deane's Melaleuca	Species or species habitat likely to occur within area
Plant	Persoonia bargoensis (56267)		Species or species habitat likely to occur within area Vulnerable
Plant	Persoonia nutans (18119)		Species or species habitat likely to occur within area Endangered
Plant	Pimelea spicata (20834)		Species or species habitat likely to occur within area Endangered
Plant	Pomaderris brunnea (16845)	Rufous Pomaderris	Species or species habitat relikely to occur within area Vulnerable

Plant	Pterostylis saxicola (64537)	Sydney Plains Greenhood	Species or species habitat likely to occur within area Endangered
Plant	Pultenaea aristata (18062)) in the second	Species or species habitat likely to occur within area Vulnerable
Reptilia	Hoplocephalus bungaroides (1182)	Broad-headed Snake	Species or species habitat likely to occur within area Vulnerable

Terrestrial species cov	ered by migrator	ry provisions of the EPBC Act, 1999
Scientific Name	Common Name	Type of Presence
Aves Haliaeetus leucogaster (943)	White-bellied Sea-Eagle	Species or species habitat likely to occur within area
Aves Hirundapus caudacutus (682)	White-throated Needletail	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree
Aves Monarcha melanopsis (609)	Black-faced Monarch	Breeding or breeding habitat likely to occur within area - Derived from a general distribution map > 1 degree
Aves Myiagra cyanoleuca (612)	Satin Flycatcher	Breeding or breeding habitat likely to occur within area
Aves Rhipidura rufifrons (592)	Rufous Fantail	Breeding or breeding habitat likely to occur within area - Derived from a general distribution map > 1 degree
Aves Xanthomyza phrygia (430)	Regent Honeyeater	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree

Wetland species cover	red by migratory p	provisions of the EPBC Act, 1999
Scientific Name	Common Name	Type of Presence
Aves Gallinago hardwickii (863)	Latham's Snipe, Japanese Snipe	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree
Aves Rostratula benghalensis (889)	Painted Snipe	Species or species habitat likely to occur within area - Derived from a general distribution map > 1 degree

Species covered by marine provisions of the EPBC Act, 1999



Aknowledgements

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

- o New South Wales National Parks and Wildlife Service
- o Department of Natural Resources and Environment, Victoria (Secretary)
- o Department of Primary Industries, Water and Environment, Tasmania
- o Department of Environment and Heritage, South Australia Planning SA
- o Parks and Wildlife Commission of the Northern Territory
- o Queensland Environment Protection Agency
- o Birds Australia
- o Australian Bird and Bat Banding Scheme
- o Australian National Wildlife Collection
- o Natural history museums of Australia
- o Queensland Herbarium
- o Royal Botanic Gardens and National Herbarium of NSW
- o Royal Botanic Gardens and National Herbarium of Victoria
- o Tasmanian Herbarium
- o State Herbarium of South Australia
- o Northern Territory Herbarium
- o Western Australian Herbarium
- o Australian National Herbarium, Atherton and Canberra
- o University of New England
- o 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.

See log of system/dataset changes

For further information see http://www.environment.gov.au/epbc

BOSWORTH Nigel

From: Sarah.Kamarudin@npws.nsw.gov.au

Sent: Thursday, 21 March 2002 12:12

To: BOSWORTH Nigel

Subject: Atlas Data

Dear Nigel,

Please find attached threatened fauna and flora data for the North Richmond area:

Min E:

283360

Min N:

6277080

Max E:

293360

Max N:

6287080

The records are saved in tab delimited files.

If you have any problems opening or receiving data please contact me on 02 9585 6684.

Kind Regards,

Sarah.

Sarah Kamarudin A/Data Exchange Officer GIS Group National Parks and Wildlife Service 02) 9585 6684 (direct phone) 02) 9585 6466 (fax) sarah.kamarudin@npws.nsw.gov.au

This message is intended for the addressee named and may contain confidential information. If you are not the intended recipient, please

delete it and notify the sender. Views expressed in this message may be

those of the individual sender, and are not necessarily the views of the

NSW National Parks and Wildlife Service.

The Atlas of New South Wales Wildlife contains data from sources including government agencies, non-government organisations and private individuals.

These data are only indicative and cannot be considered as a comprehensive inventory, and may contain errors and omissions.

sSightingKey	Scientific Name	Common Name	Species Code Legal Status	Number Obs Type	First Date	Last Date Observer	Rel Type	Zone Fa	sting	Northing I	Man No	Acc ldx F	Reserve Name Reserve Type
56478-HO	Bufo marinus	Cane Toad	3269 U	1 0		21/12/1993 Godfrey	P	4	56	U	6280500	9030	2
94670-035	Botaurus poiciloptilus	Australasian Bittern	197 V	10		28/10/1991 Cox	В	4	56		6280500	9030	3
SSGH96061401	Streptopelia chinensis	Spotted Turtle-Dove	989 U	15 O		31/12/1994 Australian Museum	В	5	56	289000	6277400	9030	2
SSGH9606111U	Streptopelia chinensis	Spotted Turtle-Dove	989 U	0		13/04/1996 Jones	Н	5	56		6280600	9030	2
SPXEI0137546	Streptopelia chinensis	Spotted Turtle-Dove	989 U	1 W		12/05/1996 Turner	R	4	56	284800	6280600	9030	3
SPXEI0137671	Streptopelia chinensis	Spotted Turtle-Dove	989 U	1 W		12/05/1996 Turner	R	4	56	285400	6281250	9030	3
96975-035	Polytelis swainsonii	Superb Parrot	277 V	20		29/02/1988 Smedley	D	4	56	291000	6278000	9030	3
SSGH96061406	Ninox connivens	Barking Owl	246 V	10		31/12/1994 Australian Museum	В	5	56	289000	6277400	9030	2
SMCE9703200H	Ninox strenua	Powerful Owl	248 V	10		11/11/1996 Burcher	D	5	56	292900	6287050	9030	2
SDMP9607260F	Pyrrholaemus sagittatus	Speckled Warbler	504 V	2 0		12/12/1995 Saunders	Т	1	56	291000	6278500	9030	4
SDMP10000254	Xanthomyza phrygia	Regent Honeyeater	603 E1	10		23/10/1960 McGill	Λ	5	56	291224	6279914	9030	4
SDMP10000254	Xanthomyza phrygia	Regent Honeyeater	603 E1	30 O	27/10/1981	6/12/1981 McGill	^	5	56	291104	6285460	9030	4
106333-035	, , , , ,	Nutmeg Mannikin	983 U	30 0		3/10/1992 Burton	A .	1	56	292000	6280500	9030	3
SSGH96061412	Lonchura punctulata Pycnonotus jocosus	Red-whiskered Bulbul	990 U	1 0		31/12/1994 Australian Museum	В	5	56	289000	6277400	9030	2
SDMP9909082N		Red-whiskered Bulbul	990 U	0		23/07/1997 Ecotone Ecological Consultants	D	5	56	285100	6277500	9030	2
SSGH96061413	Pycnonotus jocosus Acridotheres tristis	Common Myna	990 U	7.0		31/12/1994 Australian Museum	В	5	56	289000	6277400	9030	2
SSGH9606111X				0			Н	5	56	290600	6280600	9030	2
SPXEI0137981	Acridotheres tristis Acridotheres tristis	Common Myna Common Myna	998 U 998 U	1 W		13/04/1996 Jones	R	3	56	284800	6283000	9030	3
SDMP96071996	The state of the s					11/05/1996 Turner	R	4	56	285100	6280600	9030	3
SPXEI0137672	Acridotheres tristis	Common Myna	998 U	1 0		27/05/1996 Turner	R	4	56		6281250	9030	3
SSGH96061418	Acridotheres tristis	Common Myna	998 U 999 U	1 W 2 O		27/05/1996 Tumer 31/12/1994 Australian Museum	B	5	56	285400 289000	6277400	9030	2
SPXEI0137982	Sturnus vulgaris	Common Starling		1 W			B	5	56	284800	6283000	9030	3
SDMP96071995	Sturnus vulgaris	Common Starling Common Starling	999 U 999 U	1 W		11/05/1996 Turner	R	4	56	285100	6280600	9030	3
SPXEI0137983	Sturnus vulgaris			1 W		27/05/1996 Turner	R	4	56	284800	6283000	9030	3
SSYK0102150T	Sturnus vulgaris	Common Starling	999 U			21/05/1996 Turner	П	5	56	283368	6285286	9030	2
	Phascolarctos cinereus	Koala	1162 V	0		1/12/1934 Aust. Museum	_	5			6278500	9030	3
WD66	Phascolarctos cinereus	Koala	1162 V	20		8/12/1949 Sombee	E	_	56	286500			
WD47761	Phascolarctos cinereus	Koala	1162 V	0		13/08/1956 Hallstrom	E	5	56	284500	6284500	9030	3
SMCE9703200E	Petaurus australis	Yellow-bellied Glider	1136 V	1 W		11/11/1996 Burcher	P	5	56	292900	6287050	9030	2
SSYK0102090U	Petaurus australis	Yellow-bellied Glider	1136 V	0	3/04/2000		_	5	56	284000	6285000	9030	3
27188-HO	Petaurus norfolcensis	Squirrel Glider	1137 V	3 C		13/09/1992 Brookhouse	P	4	56	286500	6285800	9030	3
SSYK0102090Y	Petaurus norfolcensis	Squirrel Glider	1137 V	0		19/09/2000 Conacher Travers Environmental	Ô	5	56	285000	6280000	9030	2
SSYK0102090P	Mormopterus norfolkensis	East Coast Freetail Bat	1329 V	0		12/09/2000 Conacher Travers Environmental		5	56	285000	6280000	9030	2
SSYK0102090N	Mormopterus norfolkensis	East Coast Freetail Bat	1329 V	0	3/04/2000	5/04/2000 Conacher Travers Environmental	Ů.	5	56	284000	6285000	9030	3
SDMP99090820	Miniopterus schreibersii	Common Bent-wing Bat	1341 V	M		23/07/1997 Ecotone Ecological Consultants	Ů.	5	56	285100	6277500	9030	2
SSYK0102090F	Miniopterus schreibersii	Common Bent-wing Bat	1341 V	0		5/04/2000 Conacher Travers Environmental		5	56	284000	6285000	9030	3
SSYK0102090S	Myotis adversus	Large-footed Myotis	1357 V	0		12/09/2000 Conacher Travers Environmental		5	56	285000	6280000	9030	2
SDMP96071767	Oryctolagus cuniculus	Rabbit	1510 U	10 P		22/05/1996 Tumer	R	4	56	285400	6281250	9030	3
SDMP9607231T	Oryctolagus cuniculus	Rabbit	1510 U	0		30/05/1996 O'Brien	D	5	56	285000	6280400	9030	3
SPXEI0137512	Oryctolagus cuniculus	Rabbit	1510 U	1 0		30/06/1996 O'Brien	D	4	56	285000	6280400	9030	3
SDMP99090825	Oryctolagus cuniculus	Rabbit	1510 U	0		23/07/1997 Ecotone Ecological Consultants		5	56	285100	6277500	9030	2
SDMP99090824	Canis familiaris	Dingo and Dog (feral)	1531 U	0		23/07/1997 Ecotone Ecological Consultants		5	56	285100	6277500	9030	2
SSGH96061415	Vulpes vulpes	Fox	1532 U	20		31/12/1994 Australian Museum	В	5	56	289000	6277400	9030	2
SDMP99090823	Vulpes vulpes	Fox	1532 U	0	24/06/1997	23/07/1997 Ecotone Ecological Consultants		5	56	285100	6277500	9030	2

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These data are only indicative and cannot be considered as a comprehensive inventory, and may contain errors and omissions.

sSightingKey	Family Name	Scientific Name	Legal Status	First Date	Last Date	Observer	Rel Type	Zone	Easting	Northing	Map No	Acc Idx	Reserve N. Reserve Ty
594	Fabaceae (Mimosoideae)	Acacia bynoeana	E1	2/05/1903	2/05/1903	Betche, E	1	56	290995	6279508	9030	3	
SDMP97012306	Fabaceae (Mimosoideae)	Acacia bynoeana	E1	1/09/1995	30/09/1995	Douglas, S	1	56	283535	6277892	9030	2	
2330	Myrtaceae	Eucalyptus benthamii	V	11/09/1906	11/09/1906	Maiden, J	1	56	285346	6277996	9030	3	
2331R	Myrtaceae	Eucalyptus benthamii	V	11/09/1906	11/09/1906	Maiden, J	1	56	285502	6278499	9030	3	
2175R	Myrtaceae	Micromyrtus minutiflora	V	11/06/1887	11/06/1887	Deane, H	1	56	290000	6279497	9030	4	
2024R	Myrtaceae	Micromyrtus minutiflora	V	16/09/1906	16/09/1906	Unknown,?	1	56	288000	6278000	9030	3	
2025R	Myrtaceae	Micromyrtus minutiflora	V	25/09/1906	25/09/1906	Unknown,?	1	56	291752	6278004	9030	3	
2177R	Myrtaceae	Micromyrtus minutiflora	V	20/12/1963	20/12/1963	Black, D	1	56	289352	6278207	9030	3	
269	Proteaceae	Persoonia nutans	E1	01/01/1881	01/01/1881	Woods, W	1	56	290995	6279508	9030	4	
267	Proteaceae	Persoonia nutans	E1	10/12/1892	10/12/1892	Fletcher, J	1	56	290995	6279508	9030	4	
268	Proteaceae	Persoonia nutans	E1	1/01/1901	1/01/1901	BROWN, R	1	56	290995	6279508	9030	4	
263	Proteaceae	Persoonia nutans	E1	1/09/1906	1/09/1906	Maiden, J	1	56	285000	6278510	9030	3	
264	Proteaceae	Persoonia nutans	E1	16/03/1910	16/03/1910	Greenwood, W	1	56	290496	6277244	9030	3	
236R	Thymelaeaceae	Pimelea spicata	E1	25/10/1906	25/10/1906	Carne, W	1	56	288002	6281750	9030	3	

31 January 2002

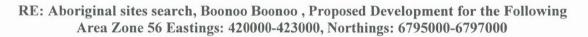
RTA Operations - Environmental Technology Octagon Bldg, Level 5, 99 Phillip Street Parramatta NSW 2150

Attention: Belinda Randall

Our Ref: AHIMS#5357

Your Ref:

Dear Sir/Madam,



Reference is made to your recent enquiry in respect to whether any Aboriginal sites are registered at the above location.

A search of the National Parks and Wildlife Service's (NPWS) Aboriginal Sites Register database has shown that NO known Aboriginal sites are currently recorded in or near the proposed development area (refer attached report for any site details & the area that was searched).

The following qualifications apply to the Aboriginal Sites Register database;

- The database only includes recorded sites.
- Large areas of New South Wales have not been the subject of systematic survey or the recording of Aboriginal history. These areas may contain sites which are not currently listed on the Aboriginal Sites Register.
- Site records come from a variety of sources and are variable in their accuracy. When a
 database search identifies sites in or near the area it is recommended that the exact location
 of the sites be determined by relocation on the ground.
- The criteria used to search the database are derived from information provided by the client and assume that this information is correct.
- This information can only be used for the purpose it was requested for not to made available to public.

You should be aware that all Aboriginal sites are protected under the *National Parks and Wildlife Act 1974*, regardless of their inclusion on the Sites Register, and it is an offence to damage or destroy them without the prior permission of the Director-General of the NPWS.

In determining development applications under the *Environmental Planning and Assessment Act 1979*, local councils must include matters relating to Aboriginal heritage in the decision making process. As part of this process, the NPWS may be asked for advice on whether an area proposed for development should be subject to Aboriginal heritage assessment. NPWS are advice is broadly based on the following criteria;

1) The NPWS would normally recommend an Aboriginal heritage assessment under the following circumstances: 2220 Australia Tel: (02) 9585

PARKS & WILDLIAM SERVICE

NSW NATIONAL PARKS AND WILDLIFE SERVICE

ABN 30 841 387 271

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

- the Sites Register identifies sites in or near the development area, and these could be impacted during or after the development (this includes indirect impacts, such as increased run-off or sedimentation, changes in visitation, etc).
- the proposed development is likely to impact areas of bushland or undisturbed ground.
- the proposed development is likely to impact areas containing sandstone outcrops (greater than 1m²), rock shelters and overhangs, old growth trees, sand bodies, and ground adjacent to creeks, rivers, lakes and swamps.
- the proposed development is likely to impact an area of importance to the Aboriginal community not included in the above (eg. story places, buildings, missions, etc)
- 2) The NPWS would <u>not</u> normally recommend an Aboriginal heritage assessment under the following circumstances:
- the proposed development is within land previously subject to intensive ground disturbance, such as quarrying, repeated market gardening, earthworks for pipelines, roads, sports fields etc. However it should be noted that sites could still occur in these context for example, ploughing generally impacts the top 20cm of ground and there is potential that undisturbed archaeological deposit may occur in areas where soil depth exceeds 20cm. Scarred trees may be located within road reserves and adjacent sport fields, etc.
- the development is within an existing residential or industrial area, or the redevelopment of an existing building is proposed, and the above criteria (listed in section 1) do not apply.

An Aboriginal heritage assessment would provide you with information about the location and significance of sites or sensitive areas, as well as advice on appropriate management options for these areas. It is recommended that an Aboriginal heritage assessment be carried out by a person qualified in undertaking Aboriginal heritage assessments. It is also recommended that the Aboriginal community (Local Aboriginal Land Council, Tribal Council etc) is contacted and its views sought on possible impacts to Aboriginal heritage.

If the proposed development area is found to contain an Aboriginal site, reference should be made to the NPWS requirements for Aboriginal heritage under the Integrated Development Approval Process (*Environmental Planning & Assessment Amendment Act 1997*).

If you wish to discuss this further, please contact Archaeologist, Rebecca Edwards-Booth (02) 6659 8225

Yours faithfully

Rebecca Simon

Aboriginal Sites Registrar

Cultural Heritage Service Division



Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Full) Boonoo Boonoo

Grid Reference Type = AMG Zone = 56 Easting From = 420000 Easting to = 423000 Northing From = 6795000 Northing to = 6797000

Site Id	Site Name	AMG/GDA	Zone	Easting	Northing	Ac	Access Restrictions		Primary Trustee	Primary Report ID
					Gende	er	General	Location		

31 January 2002

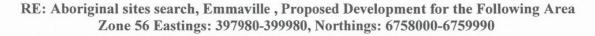
RTA Operations - Environmental Technology Octagon Bldg, Level 5, 99 Phillip Street Parramatta NSW 2150

Attention: Belinda Randall

Our Ref: AHIMS#5357

Your Ref:

Dear Sir/Madam,



Reference is made to your recent enquiry in respect to whether any Aboriginal sites are registered at the above location.

A search of the National Parks and Wildlife Service's (NPWS) Aboriginal Sites Register database has shown that 1 known Aboriginal sites are currently recorded in or near the proposed development area (refer attached report for any site details & the area that was searched).

The following qualifications apply to the Aboriginal Sites Register database;

- The database only includes recorded sites.
- Large areas of New South Wales have not been the subject of systematic survey or the recording of Aboriginal history. These areas may contain sites which are not currently listed on the Aboriginal Sites Register.
- Site records come from a variety of sources and are variable in their accuracy. When a database search identifies sites in or near the area it is recommended that the exact location of the sites be determined by relocation on the ground.
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In determining development applications under the *Environmental Planning and Assessment Act 1979*, local councils must include matters relating to Aboriginal heritage in the decision making process. As part of this process, the NPWS may be asked for advice on whether an area proposed for development should be subject to Aboriginal heritage assessment. NPWS advice is broadly based on the following criteria;

NPWS Bridge Street PO Box 1967

1) The NPWS would normally recommend an Aboriginal heritage assessment under the following circumstances: 2220 Australia Tel: (02) 9585

PARKS & WILDLIAM OF THE PARKS

NSW NATIONAL PARKS ANL WILDLIFE SERVICE

ABN 30 841 387 271

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



Aboriginal Heritage Information Management System

National Park and Wildlife Services, NSW

List of Sites (Full)

Emmavile Search

Grid Reference Type = AMG Zone = 56 Easting From = 397980 Easting to = 399980 Northing From = 6758000 Northing to = 6759990

Site Id Site Name	AMG/GDA	AMG/GDA Zone		Northing Access Restrictions		tions	Primary Trustee	Primary Report ID
				Gender	General	Location		
12-1-0005 Bolivia;	AMG	56	399000	6758400 None				
List of Features				List of	Permits			
Type of Feature	First Fea Recorded Nu	ature mber						
Ceremonial Ring (Stone or Earth)	01/01/1974							
ist of Recorders								
Recorded Recorder		Primary Recorder?						
01/01/1974 McBryde,I		No						

State Heritage Inventory - Item View

Humewood Forest

Item

Name of Item:

Humewood Forest

Address:

Appin Road, Gilead

Parish:

Menangle

Local Government Area:

Campbelltown

Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Click <u>here</u> to view the SHR criteria. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing	Listing	Gazette	Gazette	Gazette
	Title	Number	Date	Number	Page
Local Environmental Plan			27 Apr 87	73	2

References

None

Source of information for this entry

Name:

NSW Heritage Office

Email:

watters@heritage.nsw.gov.au

Web Page:

www.heritage.nsw.gov.au

Administration

Heritage Database Number:

5001140

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Home



State Heritage Inventory - Item View

Humewood Forest

Item

Name of Item:

Humewood Forest

Address:

Appin Road, Gilead

Parish:

Menangle

Local Government Area:

Campbelltown

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Listings

Heritage Listing	Listing	Listing	Gazette	Gazette	Gazette
	Title	Number	Date	Number	Page
Local Environmental Plan			27 Apr 87	73	2

References

None

Source of information for this entry

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Home



State Heritage Inventory - Item View

Humewood Forest

Item

Name of Item:

Humewood Forest

Address:

Appin Road, Gilead

Parish:

Menangle

Local Government Area:

Campbelltown

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Listings

Heritage Listing	Listing	Listing	Gazette	Gazette	Gazette
	Title	Number	Date	Number	Page
Local Environmental Plan			27 Apr 87	73	2

References

None

Source of information for this entry

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watters@heritage.nsw.gov.au

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Administration

Heritage Database Number:

5001140

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State Heritage Inventory - Item View

Glenlorne

Item

Name of Item:

Glenlorne

Address:

Appin Road, Gilead

Local Government Area:

Campbelltown

Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Click <u>here</u> to view the SHR criteria. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing	Listing	Gazette	Gazette	Gazette
	Title	Number	Date	Number	Page
Local Environmental Plan			01 Jan 97		

References

None

Source of information for this entry

Name:

NSW Heritage Office

Email:

watters@heritage.nsw.gov.au

Web Page:

www.heritage.nsw.gov.au

Administration

Heritage Database Number:

5001152

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State Heritage Inventory - Item View

Brookdale

Item

Name of Item:

Brookdale

Address:

Appin Road, Gilead

Local Government Area:

Campbelltown

Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Click <u>here</u> to view the SHR criteria. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan			26 Jun 98	97	4956
Local Environmental Plan - Lapsed			01 Jan 97		

References

None

Source of information for this entry

Name:

NSW Heritage Office

Email:

watters@heritage.nsw.gov.au

Web Page:

www.heritage.nsw.gov.au

Administration

Heritage Database Number:

5001151

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State Heritage Inventory - Item View

Denfield

Item

Name of Item:

Denfield

Type of Item:

Built

Address:

Appin Road, Campbelltown, NSW 2560

Parish:

Menangle

County:

Cumberland

Local Government Area:

Campbelltown

Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Click <u>here</u> to view the SHR criteria. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		00540	02 Apr 99	27	1546
Heritage Act - Permanent Conservation Order - former		00540	09 Oct 87	159	5765
Register of the National Estate			21 Mar 78		

References

None

Source of information for this entry

Name:

NSW Heritage Office

Email:

watters@heritage.nsw.gov.au

Web Page:

www.heritage.nsw.gov.au

Administration

Heritage Database Number:

5045029

Central Registry Number:

S90/03441 & HC 33410

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State Heritage Inventory - Item View

Mount Gilead group

Item

Name of Item:

Mount Gilead group

Type of Item:

Area/Complex/Group

Address:

Appin Road, Gilead

Local Government Area:

Campbelltown

Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Click <u>here</u> to view the SHR criteria. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Local Environmental Plan			26 Jun 98	97	4956
Local Environmental Plan - Lapsed			01 Jan 97		

References

None

Source of information for this entry

Name:

NSW Heritage Office

Email:

watters@heritage.nsw.gov.au

Web Page:

www.heritage.nsw.gov.au

Administration

Heritage Database Number:

5001154

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State Heritage Inventory - Item View

St Helen's Park

Item

Name of Item:

St Helen's Park

Type of Item:

Built

Address:

Appin Road, Bradbury, NSW 2560

Parish:

St Peter

County:

Cumberland

Local Government Area:

Campbelltown

Items are assessed against the State Heritage Register (SHR) Criteria to determine the level of significance. Click here to view the SHR criteria. Refer to the Listings below for the level of statutory protection.

Listings

Heritage Listing	Listing Title	Listing Number	Gazette Date	Gazette Number	Gazette Page
Heritage Act - State Heritage Register		00406	02 Apr 99	27	1546
Heritage Act - Permanent Conservation Order - former		00406	16 May 86	81	2195

References

None

Source of information for this entry

Name:

NSW Heritage Office

Email:

watters@heritage.nsw.gov.au

Web Page:

www.heritage.nsw.gov.au

Administration

Heritage Database Number:

5045441

Central Registry Number:

S90/03589 & HC 33297

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