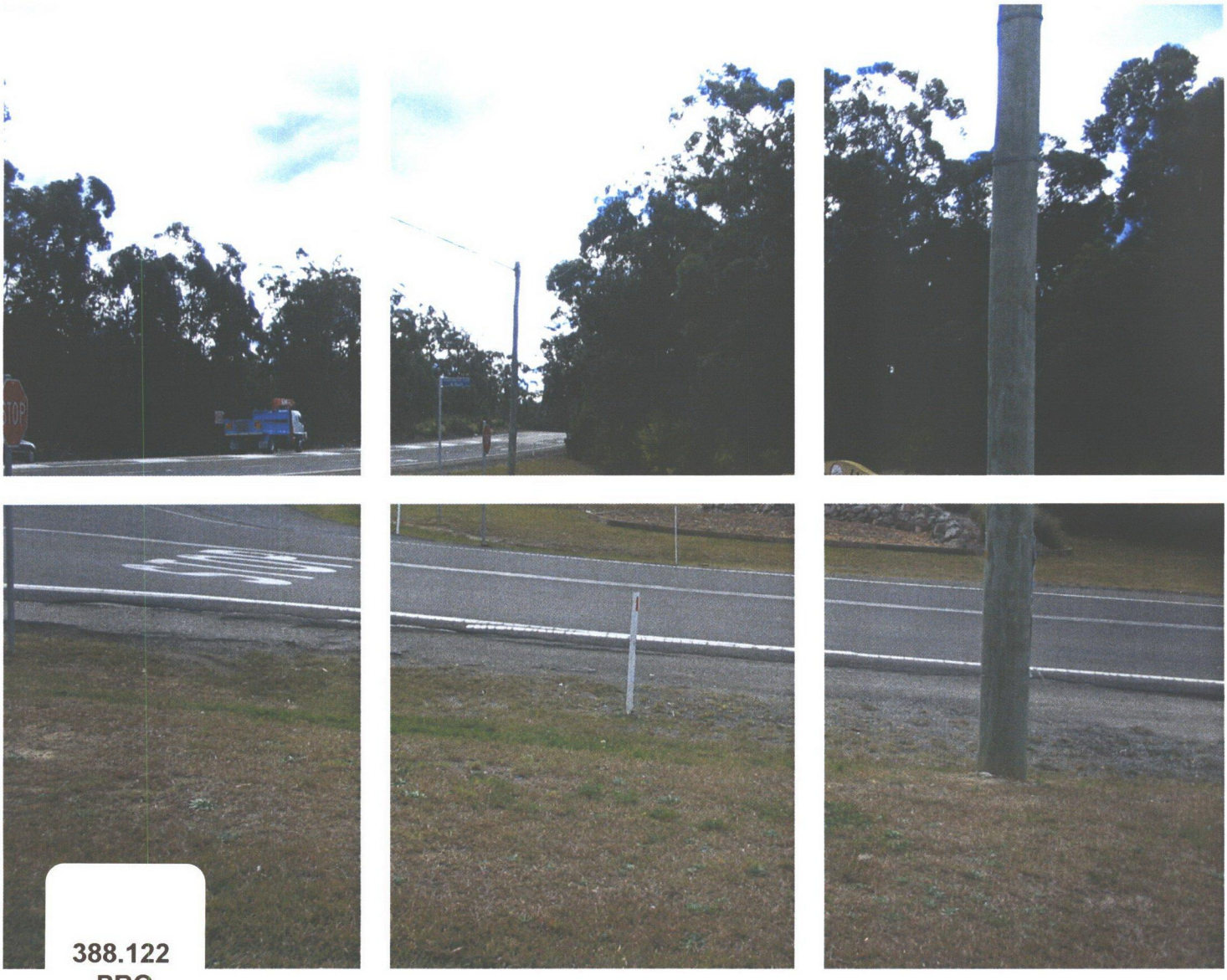
Proposed upgrade: intersection of Sussex Inlet Road and Princes Highway, Wandandian

Review of Environmental Factors

RTA ENVIRONMENTAL TECHNOLOGY

DECEMBER 2005



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Proposed upgrade: intersection of Sussex Inlet Road and Princes Highway, Wandandian.

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Shoalhaven

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Southern Region

1.4 Introduction

The NSW Roads and Traffic Authority (RTA) proposes to carry out an upgrade of the intersection of Sussex Inlet Road and Princes Highway, Wandandian.

This Proforma 1 Review of Environmental Factors (REF) has been prepared by RTA Environmental Technology on behalf of RTA Operations and Services, Southern Region. For the purposes of these works, the RTA is the proponent and the determining authority under Part 5 of the *nvironmental Planning and Assessment (P&A) Act 1979*.

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

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

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

The findings of the REF would be considered when assessing:

- Whether the Proposal is likely to have a significant impact on the environment and therefore the necessity for an Environmental Impact Statement (EIS) under Section 112 of the EP&A Act.
- The significance of any impact on threatened species as defined by the TSC Act, in Section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement (SIS).

- The potential for the Proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Commonwealth Environment Minister in accordance with the EPBC Act.

1.5 Background

In December 2004 the NSW Minister for Roads announced a package worth over $30 million of road safety improvements for the Princes Highway. The aim of the package is to reduce the number and severity of crashes on the highway.

A five-year road safety analysis between 1999 and 2003 has been undertaken over the length of the Princes Highway from 800m north to 200m south of its intersection with Sussex Inlet Road. The analysis identified 11 reported accidents within this section of road, and found that accidents at the intersection account for almost half of the number of accidents reported. Therefore it is proposed to upgrade the intersection. This REF addresses the potential environmental impacts of the proposed upgrade.

1.6 Methodology

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

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

2. An RTA Environmental Technology representative undertook a site visit on 10 August 2005 to provide an overview of the Proposal and to discuss any issues relevant to the completion of the REF.

3. The following agencies and RTA personnel were notified and/or consulted:
   - RTA's Regional Environmental Adviser, Southern Region;
   - RTA's Aboriginal Program Consultant, Southern Region;
   - Shoalhaven City Council;
   - Jerringa Local Aboriginal Land Council (LALC); and
   - NSW National Parks and Wildlife Service (NPWS)/Department of Environment and Conservation (DEC).

4. A desktop search was conducted on the following databases to identify any potential issues:
   - Australian Heritage Database;
   - NSW Heritage Office State Heritage Register and State Heritage Inventory;
   - National Native Title Claims Search;
   - DEC Aboriginal Heritage Information Management System (AHIMS);
   - DEC Atlas of NSW Wildlife - Threatened Flora and Fauna Records;
   - DEH Protected Matters (EPBC Act) Database;
   - DEC Contaminated Land Records;
   - DEC Air Quality Records;
   - DNR Acid Sulphate Soils Risk Map;
   - DEH National Pollutant Inventory; and

- DPI Noxious Weeds List.

5. As part of the environmental assessment undertaken for this REF, an ecological specialist study was undertaken to identify the Proposal constraints and to provide environmental safeguards. Details and findings from the investigation are further discussed in Chapter 8 of this REF with a copy of the specialist study included as **Appendix E** to this REF.

6. A literature review and review of documentation was undertaken with regards to the following:
   - Landform, Geology, and Soils;
   - Potential Acid Sulphate Soils;
   - Salinity;
   - Local Environment Plans;
   - Regional Environmental Plans; and
   - State Environmental Planning Policies.

2 Description of Proposal Site and Study Area

2.1 Location

The Proposal site is the area that would be directly impacted as a result of the proposed works. The study area is a slightly larger area that may be indirectly impacted as a result of the proposed works, and is the Proposal site with a buffer of 5m. Refer to **Appendix A** for photos of the study area.

The Proposal site is located along the Princes Highway (SH1) at its intersection with Sussex Inlet Road, Wandandian, approximately 26km southwest of Nowra. The popular tourist destinations of St Georges Basin and Jervis Bay are located 7.5km and 18km east of the Proposal site respectively. Conjola National Park is located immediately southwest, and Corramy State Conservation Area is located north and northeast of the Proposal site (refer to Figure 2.1).

The Proposal site extends from 800m north to 200m south along the Princes Highway from its intersection with Sussex Inlet Road (refer to **Appendix B**). The construction footprint is contained within the existing road reserve, with the exception of a strip of land located along the western side of the Princes Highway and a small parcel of land to the immediate northeast of the intersection, which would require acquisition from NPWS prior to commencement of construction of the Proposal (refer to **Appendix B**).

2.2 Description of the Existing Environment

2.2.1 General

The study area is located within road reserve and private property, with Conjola National Park located to the east and south, and Corramy State Conservation Area to the west and east. All of the study area has been disturbed by past clearing, although it has largely regrown. The study area has been disturbed by the construction of the Princes Highway, laying of telecommunications cables, and fire (in 2001). The Princes Highway is two lanes south and one lane north, with a separate lane for vehicles turning right into Sussex Inlet Road at the intersection of the Princes Highway with Sussex Inlet Road.

2.2.2 Topography and Landform

The topography of the Proposal site is hillslope under a woodland shrub understorey (DIPNR 2004), with an east facing slope.

2.2.3 Geology and Soils

The geology of the study area is the Conjola Formation (conglomerate, sandstone and silty sandstone), from the Shoalhaven Group (NSW Department of Mines (undated)). Soil types are Yellow Kurosols and Yellow Podzolic Soil (DIPNR 2004). Soil characteristics of the Proposal site include:

- Loose surface condition;
- Moderately well drained profile;
- High erosion hazard; and
- No evident salting.

2.2.4 Climate

The closest weather station to the Proposal site is located at Jervis Bay (Point Perpendicular Lighthouse), approximately 29km east of the study area. The mean daily maximum temperature ranges from 15.1°C in July to 23.9°C in February and mean daily minimum temperature ranges from 9.2°°C in July to 18.0°C in February. Mean rainfall ranges from 78.9mm in September to 133.4mm in May (BOM 2005).

2.2.5 Drainage and Watercourses

Tributaries to Wandandian Creek are located approximately 160m northwest and upslope of the Proposal site. Tullarwalla Creek, which connects to Tullarwalla Lagoon, is located approximately 700m southeast and downslope of the Proposal site. Runoff from the Princes Highway and Sussex Inlet Road pools in unformed table drains, eventually entering the local stormwater system, which drains to Tullarwalla Creek. The majority of the land near the Proposal site is protected as either a National Park or State Conservation Area. Several scattered rural properties in the vicinity of the Proposal site suggest that the main use of water in the area would be for agricultural activities. The study site is within the land area managed by the Southern Rivers Catchment Management Authority (CMA).

2.2.6 Biodiversity

The Proposal site is bounded by Conjola National Park to the southwest and Corramy State Conservation Area to the east and northeast. A Flora and Fauna Assessment was prepared for the Proposal by ngh environmental (2005) and is included as **Appendix E** to this REF.

Flora

Vegetation of the study area is intermediate in species composition between two common and relatively widespread communities: Shoalhaven Sandstone Forest (DSF148) and Currambene Lowlands Forest (DSF85) (as described by Tindall *et al.* 2005).

Vegetation of the study area consists of young Red Bloodwood (*Corymbia gummifera*) and Thin-leaved Stringybark (*ucalyptus eugenioides*), smaller Turpentines (*Syncarpia glomulifera*) and Black Sheoak (*Allocasuarina littoralis*). The shrub layer consists of *Lambertia formosa*, *Daviesia mimosoides, Leptospemum trinervium*, *Bossiaea obcordate*, *Hakea laevipes*, *Acacia myrtifolia* and *Banksia spinulosa*. Groundcover is patchy and consists of *Mirbelia rubiifolia*, *Pultenaea linophylla*, *P. retusa* and *Rhytidosporum procumbens*, grasses including *ntolasia stricta*, *Austrostipa ?pubescens* and occasionally *Themeda triandra*, *Lepidosperma* spp., *Caustis flexuosa* and *Lomandra* spp., and the forb *Xanthosia tridentata*.

Common weeds present within the study area include *Hypochaeris radicata* and *Richardia* species. The noxious Fireweed (*Senecio madagascariensis*) is present in low numbers, scattered along the table drain. No rare or threatened species were identified during the flora and fauna survey. The threatened terrestrial orchids *Caladenia tesssellata* and *Cryptostylis hunteriana* were not detected within the study area and have a low potential of occurring within the area.

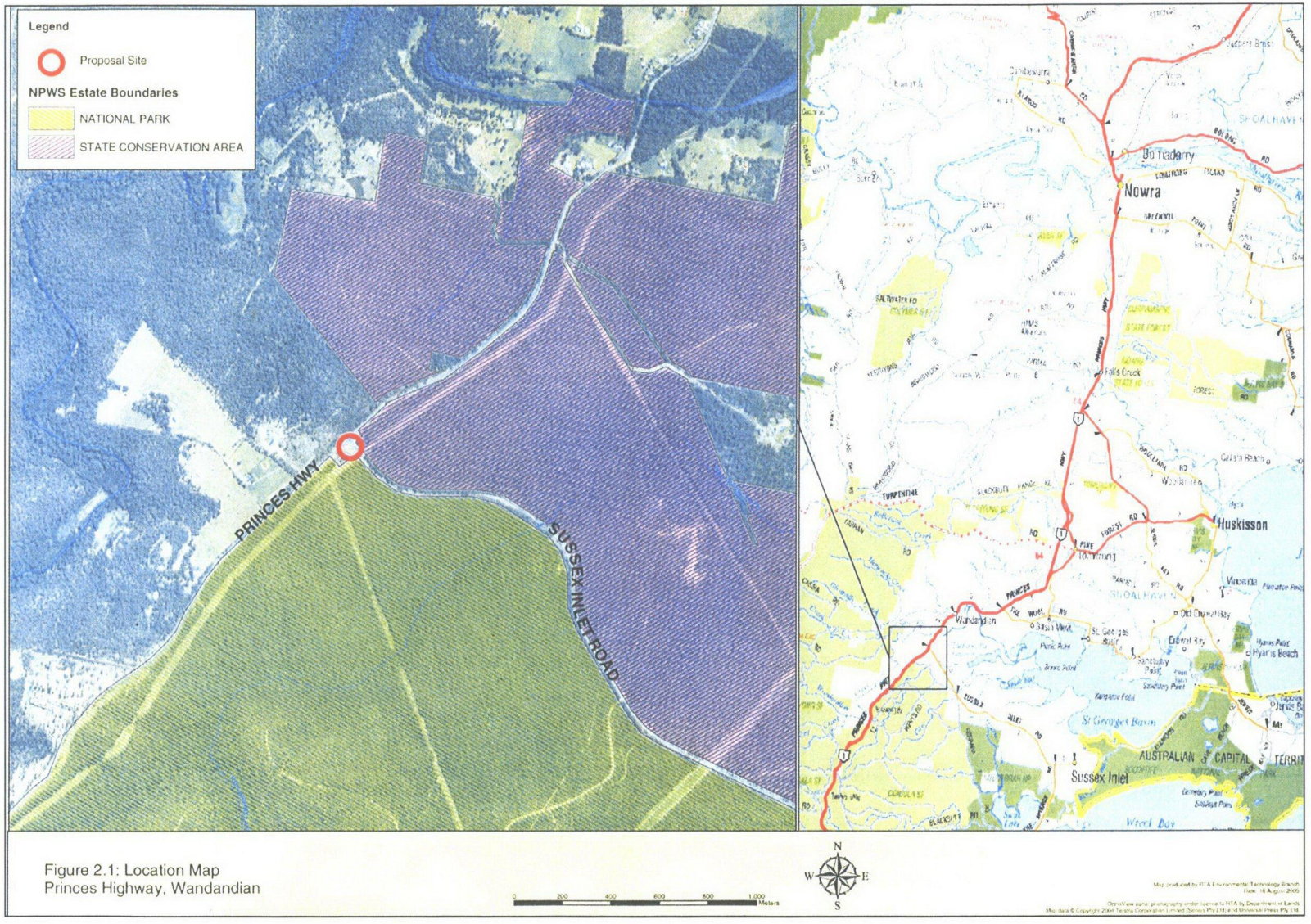

Figure 2.1: Location Map
Princes Highway, Wandandian

Fauna

No hollow bearing trees suitable for fauna habitat were identified within the Proposal site, however the flora and fauna assessment identified hollow-bearing trees within the study area *i.e.* in the land adjacent to the Proposal site. It is most likely that fauna species occasionally utilise the study area for foraging. Fauna species identified within, and adjacent to, the study area include Sugar Glider (*Petaurus breviceps*) (sighted), Long-nosed Bandicoot (*Perameles nasuta*) (aurally), Striated Thornbill (*Acanthiza lineata*), White-throated Treecreeper (*Cormobates leucophaeus*), Noisy Friarbird (*Philemon corniculatus*), Red Wattlebird (*Anthochaera carunculata*), Eastern Spinebill (*Acanthorhynchus tenuirostris*), Rainbow Lorikeet (*Trichoglossus haematodus*), Pied Currawong (*Strepera graculina*), Australian Magpie (*Gymnorhina tibicen*), Laughing Kookaburra (*Dacelo novaeguineae*), Superb Fairy Wren (*Malurus cyaneus*), and White-browed Scrub Wren (*Sericornis frontalis*). Old V-notches, characteristic of Yellow-Bellied Gliders, were observed in the bark of Red Bloodwood trees within the study area. Road-kill European Rabbits, Eastern Grey Kangaroos (*Macropus giganteus*) and Swamp Wallabies (*Wallabia bicolour*) were identified within the study area.

In addition, potential Yellow-bellied Glider (*Petaurus australis*) feed trees were identified in the land adjacent to the study area. The location of these potential feed trees, along with hollow bearing trees (all located outside the Proposal site) are mapped in Figure 2.2.6 below.

In addition to hollow bearing trees, a burrow was identified during the flora and fauna survey by ngh environmental (2005; included as **Appendix E** to this REF), located approximately 150m north of the Sussex Inlet Road intersection and close to the western boundary of the construction footprint. It is a few metres from the Geodetic Survey marker, which is well-marked with paint and flagging tape. This burrow was most likely made by a small mammal or possibly a goanna.

2.2.7 Sensitive Noise Receptors

The nearest sensitive noise receptor is located approximately 500m southwest of the intersection of Sussex Inlet Road and the Princes Highway – a farmhouse.

The main noise source within the study area is heavy vehicle traffic on the Princes Highway (heavy vehicles comprise approximately 7% of the traffic along this stretch of the Princes Highway).

2.2.8 Air Quality

The air quality of the study area is considered to be good, given its remoteness from urban development and industry. The main source of air pollution at the Proposal site would be diesel exhaust fumes from trucks and other heavy vehicle traffic on the Princes Highway.

2.2.9 Visual Amenity

Visual amenity of the study area would be moderate, given its bushland setting and situation along a major highway. The surrounding bushland has a high visual amenity, however this is reduced by the low visual amenity of the Princes Highway.

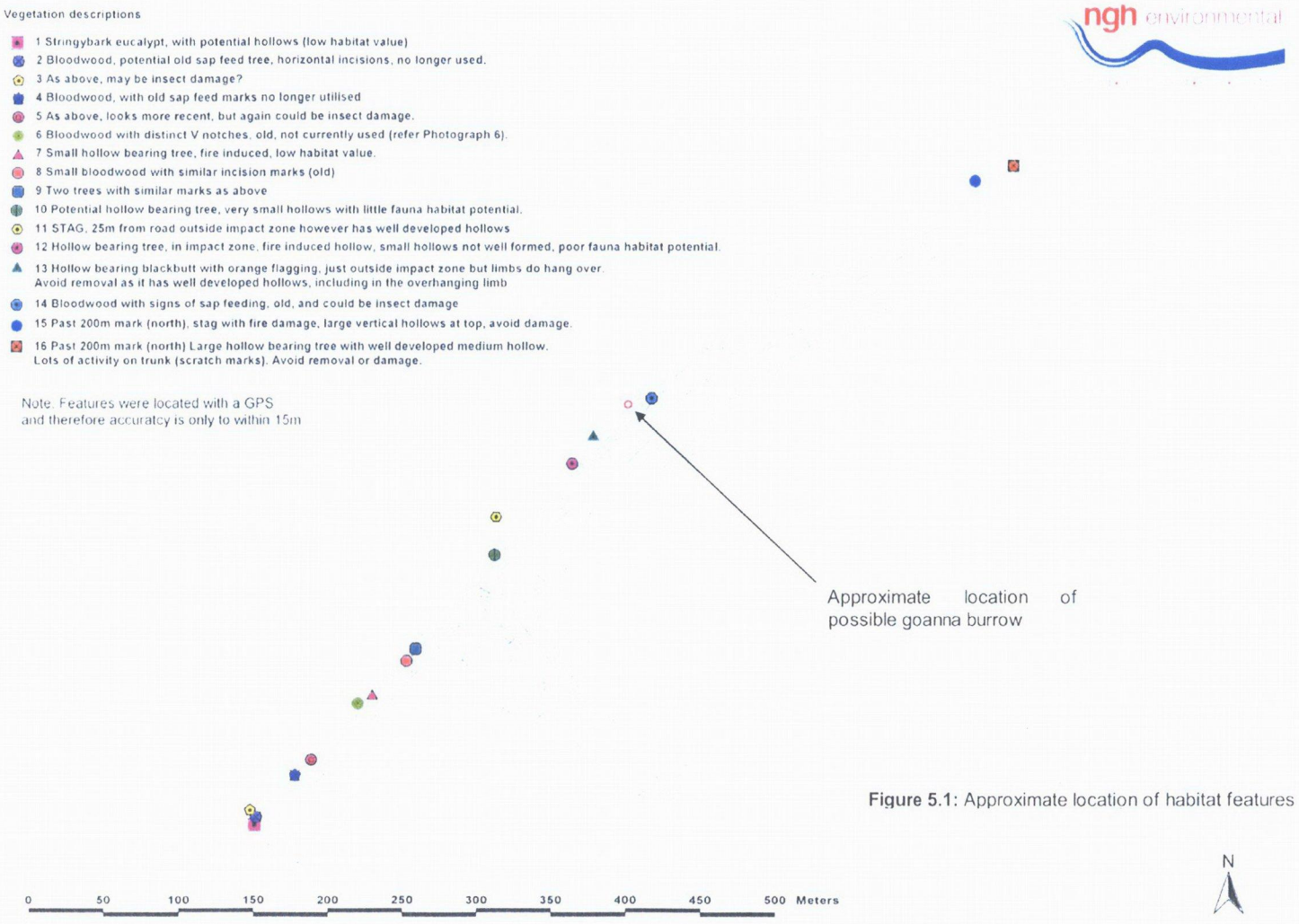

Figure 5.1: Approximate location of habitat features

Figure 2.2.6. Location of fauna habitat features (ngh environmental 2005)

2.2.10 Existing and Forecasted Traffic

The Annual Average Daily Traffic (AADT) of Sussex Inlet Road is 9,089, with heavy vehicles comprising 7% (RTA 2003). The traffic growth experienced at this location between 1990 and 2003 was 3%.

2.2.11 Utilities

Telecommunications and street lighting utilities are present within the Proposal site.

3 Description of the Proposal

3.1 Description of the Proposal

The Proposal is the upgrade of the intersection of the Princes Highway and Sussex Inlet Road. This involves the construction of a seagull intersection to provide a dedicated lane for northbound vehicles turning from Sussex Inlet Road to the Princes Highway, and the segregation of southbound traffic on the Princes Highway by the provision of a separate slip lane for traffic entering Sussex Inlet Road (refer to **Appendix B**). Although the majority of the proposed works would be within the existing road reserve, some property acquisition would be required on the western side of the Princes Highway, and to the immediate northeast of the intersection (refer to **Appendix B**).

3.2 Construction Activities

3.2.1 Preconstruction Activities

The relocation of utilities, by arrangement with the utility service providers, would be undertaken prior to commencement of proposed works. The telecommunications utilities would be relocated to approximately 2m from the edge of the cut slope. Street lighting utilities would be relocated over the entire length of the Proposal site and would be located within the cleared area which is to be 4m from the edge of the cut slope. (Refer to **Appendix B** for details of utility relocations.) All property acquisition would be undertaken prior to the commencement of construction activities, by negotiation between the RTA and the DEC (NPWS). No adjustments to fences on the western side of the Princes Highway have been identified. However, any adjustments to fences would be subject to negotiations with the adjacent landowners during the property acquisition phase of the Proposal.

3.2.2 Construction Processes and Work Methodology

The Proposal would involve the following activities.

- Implementation of environmental safeguards outlined in the Construction Environmental Management Plan (CEMP).
- Establishment of site compound, stockpile sites and working areas.
- Clearing and grubbing: approximately 0.4ha.
- Stripping of topsoil: approximately 300m^3.
- Drainage works:
  - Existing stormwater drainage would be extended with 375mm and 525mm diameter RCPC at the Princes Highway and Sussex Inlet Road, respectively.
  - Precast headwalls would be installed on the downstream side of the drainage lines.
  - Reno mattresses (150mm thick, approximately 3m^2) would be installed to provide scour protection.
  - Existing table drains would be graded to drain into newly constructed pits.
- Pavement construction:
  - Excavated material would be re-used where it is deemed suitable as select material for sub-grade and sub-base. All other surplus material would be stockpiled.
  - Earthworks would involve trimming with graders and compaction by rollers.
  - Imported material would be used to construct the road pavement.

- A final wearing surface of approximately 8,000m^2 (asphaltic concrete of spray seal) would be applied by pavers and rollers.
- Linemarking.
- Revegetation and rehabilitation of Proposal site.

3.2.3 Construction Equipment

Plant and equipment required for the construction of the Proposal include:

- Excavator;
- Trucks;
- Loaders
- Grader;
- Rollers;
- Water tankers;
- Profiler;
- Light vehicles;
- Backhoe;
- Chipper;
- Chainsaw; and
- Tippers.

3.2.4 Access

Construction vehicles would access the Proposal site from the Princes Highway. A Traffic Management Plan would be prepared for the Proposal to provide for two-way traffic flow and turning movements. At times during the construction stage, traffic may be restricted to one lane under Stop/Go traffic control.

3.2.5 Utilities

Telecommunications and street lighting utilities are present within the Proposal site, and would require relocation as part of the Proposal. Relocation of utilities would be undertaken by the utility service providers prior to commencement of works.

3.2.6 Property Acquisition

The requirement for acquisition of land has been identified on the western side of the Princes Highway, and to the immediate northeast of the intersection. Negotiations with landowners would be undertaken prior to the commencement of works. All property valuations and acquisitions would be carried out in accordance with the RTA *Land Acquisition Policy* and the *Land Acquisition (Just Terms Compensation) Act 1991*.

3.2.7 Source of Material

Drainage and concrete materials would be sourced from local suppliers. Pavement materials would be sourced from local quarries.

3.2.8 Additional Truck Movements

On average, it is expected that there would be 10—20 additional truck movements per day, with a maximum of 30 truck movements within one day. Approximately 500 truck movements are expected throughout the duration of the Proposal. However, it is likely that the increase in heavy vehicle traffic along the Princes Highway due to the construction of the Proposal would be minor, given the substantial number of heavy vehicles already using this travel route (refer to section 2.2.10).

3.2.9 Stockpile and Compound Sites

The likely location of the stockpile/compound site for the Proposal is within a cleared area immediately south of the Proposal site, on the eastern side of the Princes Highway. Extra spoil generated from the Proposal would be stockpiled at either one of two existing RTA stockpile sites: one approximately 0.5km north of Wool Road, and the other approximately 2.3km south of Sussex Inlet Road.

3.3 Workforce and Working Hours

The workforce would comprise approximately 10 personnel.

It is anticipated that work for the Proposal would be undertaken during standard working hours adopted by the RTA as detailed below:

Standard Working Hours:

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

Should work be required outside of the standard working hours, the procedure contained in the RTA's *nvironmental Noise Management Manual 2001*, "*Practice Note vii – Roadworks Outside of Normal Working Hours*" would be followed.

3.4 Commencement of Works

Work is scheduled to commence in late February 2006.

3.5 Period of Construction

Construction works are expected to be three months in duration.

3.6 Proposal Cost and Source of Funds

The cost of the Proposal is approximately $2,500,000, funded by the State Government's *Princes Highway Safety Strategy.*

4 Statutory Position

4.1 Local Environmental Plans

The Proposal is located within the Shoalhaven Local Government Area (LGA). Shoalhaven City Council regulates land use within this LGA through the *Shoalhaven Local nvironmental Plan 1985*. Within the Proposal site, the Proposal passes through two land use zonings. The land use zoning applicable to the Proposal site includes:

1(b) Rural "B" (Arterial and Main Road Protection) zone.
The objectives of this zone are:

- *To minimise the direct and accumulative impact of development on the efficiency and safety of existing or proposed main and arterial roads;*
- *To promote a high level of scenic quality adjacent to existing or proposed main or arterial roads; and*
- *To encourage, where possible, the use of existing or proposed side roads as an alternative to direct vehicular access to an existing or proposed main or arterial road.*

The Proposal is not prohibited under zone 1(b) of the LEP.

1(f) Rural "F" (Forest) Zone.
The objectives of this zone are:

- *To conserve forest resources of State-wide significance,*
- *To foster the harvesting of forest resources in a manner which is both economic and ecologically sustainable,*
- *To encourage recreational use of forest resources where such use is compatible with timber production, and*
- *To recognise the role of forest resources in providing habitat corridors and in maintaining water quality in the catchments of the City.*

The Proposal is not prohibited under zone 1(f) of the LEP.

Within the land use zonings 1(b) and 1(f), development consent from Shoalhaven City Council is required for the purposes of the proposed upgrade of the intersection of Sussex Inlet Road and the Princes Highway, Wandandian.

However, Clause 54G of the LEP states:

1. *If, in the absence of this clause, development for the purpose of a classified road or tollway, or a proposed classified road or tollway, may be carried out with development consent, the development may be carried out without that consent.*
2. *In this clause:*

classified road *means a classified road within the meaning of the Roads Act 1993.*
tollway *means a work declared to be a tollway under section 52 of the Roads Act 1993.*

Thus Clause 54G of the LEP removes the requirement for Council consent for the Proposal.

4.2 State Environmental Planning Policies (SEPPs)

State Environmental Planning Policy No. 44 (SEPP 44) – Koala Habitat Protection

The Shoalhaven Local Government Area (LGA) is listed under Schedule 1 of SEPP 44 as land to which this SEPP applies. Although the RTA is not bound by the provisions of SEPP 44 for a Part 5 assessment, the provisions of this SEPP are considered by the RTA, in principle, during its environmental assessments. Given the lack of koala feed tree species (as listed under Schedule 2 of SEPP 44) at the Proposal site, it is not considered to be potential koala habitat under the provisions of the policy, and as such SEPP 44 is not applicable to the Proposal.

4.3 Confirmation of Part 5 Position

All relevant statutory planning instruments have been examined for the Proposal. It is concluded that Clause 54G of the *Shoalhaven L P 1985* removes the development consent requirements, thereby permitting assessment of the Proposal under Part 5 of the EP&A Act.

5 Strategic Stage

5.1 Strategic Planning

The Princes Highway is the major arterial road linking the regional centres of Wollongong, Nowra, Batemans Bay, Bega and Eden. Travelling on the Princes Highway from Yallah to the Victorian border is a journey of approximately 430km.

In response to a series of serious crashes on the highway from August 2003, the RTA prepared a review of road safety on the Princes Highway between Yallah and the Victorian border. In December 2004 the Minister for Roads released the *Princes Highway Safety Review* and announced a package of over $30 million to fund road safety improvement projects on the Princes Highway over the following three years.

Strategic goals for the Princes Highway are to:

- Continue the upgrading of the highway and the supporting network to an appropriate, safe standard;
- Facilitate the safer operation of two-way single carriageway sections;
- Implement an integrated speed management regime incorporating best practice road design and construction, consistent and effective guidance to road users, and a carefully managed enforcement program;
- Provide better guidance and warning to road users on highway conditions;
- Provide a forgiving roadside environment to lessen the impact of crashes; and
- Improve road safety for vulnerable users with a particular focus on pedestrian safety.

In line with these strategic goals, projects would involve:

- Improving road alignment;
- Improving junctions;
- Increasing skid resistance of the roadway;
- Enhancing the separation of opposing traffic – including the use of median barriers such as wire rope;
- Installation of safety barriers and warning signs;
- Shoulder and curve widening; and
- Speed management and pedestrian safety measures.

A five-year road safety analysis between 1999 and 2003 has been undertaken over the length of the Princes Highway from 800m north to 200m south of its intersection with Sussex Inlet Road. The analysis identified 11 reported accidents within this section of road, and found that accidents at the intersection account for almost half of the number of accidents reported.

5.2 Need for the Proposal

The Princes Highway is a major tourism route along the south coast of NSW, and also serves as a link for local and commuter traffic. It is a significant freight route, with relatively high numbers of heavy vehicle traffic (10%). Traffic volumes along the route from Yallah to the Victorian border are increasing between 2% and 5% per annum. Population along the route is growing at 1-2%, a substantial proportion of which are aged over 65.

A five-year road safety analysis between 1999 and 2003 has been undertaken over the length of the Princes Highway from 800m north to 200m south of its intersection with Sussex Inlet Road. The analysis identified 11 reported accidents within this section of road, and found that accidents at the intersection account for almost half of the number of accidents reported.

The Proposal is to upgrade the intersection of the Princes Highway and Sussex Inlet Road, Wandandian, by construction of a seagull intersection, which would limit southbound traffic to one lane at the intersection to improve access to and from Sussex Inlet Road. A separate slip lane for southbound traffic entering Sussex Inlet Road, and a merge lane for northbound traffic exiting Sussex Inlet Road would also be provided. The Proposal would improve safety at the intersection and improve traffic efficiency by reducing delays and reducing travel time on the Princes Highway in the area.

6 Concept Stage

6.1 Proposal Objectives

The Proposal objectives are to:

- Improve safety at the intersection of Sussex Inlet Road and the Princes Highway, Wandandian.
- Reduce delays to traffic in the area.
- Ensure that the project is delivered in accordance with the Princes Highway Safety Review.

6.2 Options Considered

Option 1 – Do Nothing:

The Do Nothing option involves no upgrade at the intersection of the Princes Highway and Sussex Inlet Road, Wandandian. Traffic travelling on the Princes Highway would have to slow down for vehicles turning into and from Sussex Inlet Road, reducing road safety in this area. This option is not in line with the State Government's strategy for the improvement of road safety on the Princes Highway between Yallah and the Victorian border. The 'Do Nothing' option does nothing to address the Proposal objectives.

Option 2 – Construction of seagull intersection at junction of Sussex Inlet Road and Princes Highway (Preferred Option)

This option involves the construction of a seagull intersection to provide a dedicated lane for northbound vehicles turning from Sussex Inlet Road to the Princes Highway, and the segregation of southbound traffic on the Princes Highway by the provision of a separate slip lane for traffic entering Sussex Inlet Road. This is the preferred option as it is in line with the recommendations of the Princes Highway Safety Review, by providing a mechanism for traffic turning into and from Sussex Inlet Road to integrate with existing traffic on the Princes Highway with less disruption to traffic on each road, thereby improving safety at this intersection.

Other options considered

No other options regarding the intersection treatment were considered. However, variations to the Proposal were examined including the option for two southbound lanes passing through the intersection. This created sight distance issues and required greater land acquisition, and as such was not further investigated. Two types of left slip lanes were also reviewed:

1. A high angle left slip lane which segregated left turning vehicles on the Princes Highway sooner; and
2. A lower angle left slip lane which provided vehicles their own lane to negotiate the left hand turn and then safely merge into Sussex Inlet Road approximately 150m from the intersection.

The first option would cause confusion for motorists in the slip lane as they would have been required to give way to northbound motorists turning right into Sussex Inlet Road. There has been a history of accidents with this type of arrangement at other sites and as such deemed unsuitable for the current Proposal.

The second option had a disadvantage in that southbound traffic was not segregated early enough before reaching the intersection, resulting in confusion for motorises turning right from Sussex Inlet Road onto the Princes Highway. The Preferred Option (Option 2 above) resulted from a combination of these two options.

7 Background Investigations and Consultation

7.1 Background Investigations and Database Searches

The following results were obtained from desktop database searches conducted for the study area. The information below provides a summary of the search results. Copies of all the search results are provided in **Appendix C**.

Australian Heritage Database

The DEH Australian Heritage Database was searched on 4 July 2005 for the Shoalhaven LGA. The search returned 105 listings, none of which are within the Proposal site. The closest listing is the Swan Lake/Cudmirrah Area, Sussex Inlet Road, Sussex Inlet, approximately 10km southeast of the Proposal site. This area is listed on the Register of the National Estate (RNE). The Proposal is minor in nature and would not impact upon the qualities of the Swan Lake/Cudmirrah Area for which it is listed on the RNE.

NSW Heritage Office State Heritage Register/Inventory

The NSW Heritage Office State Heritage Register/Inventory was searched on 3 August 2005 for the Shoalhaven LGA. Eight items were listed under the NSW *Heritage Act 1977*, and 68 items were listed by Local Government and State agencies. The nearest listing is the Point Perpendicular Lighthouse Group, located approximately 29km east of the Proposal site. No listed item would be impacted upon by the Proposal.

National Native Title Tribunal

A search of the National Native Title Tribunal database was conducted on 24 August 2005. There are no Native Title claims within 10km of the Proposal site.

NSW DEC Aboriginal Heritage Information Management System (AHIMS)

The NSW DEC AHIMS database was searched on 9 August 2005. The search returned three records of Aboriginal objects and places within 2km of the Proposal site: one open camp site and two objects, none of which would be impacted upon by the Proposal.

NSW DEC Atlas of NSW Wildlife - Threatened Flora and Fauna Records

The DEC Atlas of NSW Wildlife database was searched on 24 August 2005. Five threatened fauna species and two threatened flora species have been recorded within 5km of the Proposal site. The nearest flora record (*Melaleuca biconvexa*) is approximately 2.6km northwest of the Proposal site, and the nearest fauna record (Glossy Black-cockatoo) is approximately 3km southeast of the Proposal site. A specialist ecological assessment was prepared for the Proposal (refer to Sections 2.2.6, 8.5 and **Appendix E**). The Proposal is not expected to impact upon any threatened species of flora or fauna listed under the TSC Act.

DEH Protected Matters (EPBC Act) Database

The DEH Protected Matters (EPBC Act) database was searched on 3 August 2005 for the Proposal site with a buffer of 5km. The results are

World Heritage Properties:	None found
National Heritage Places:	None found
Wetlands of International Significance (Ramsar Sites):	None found
Commonwealth Marine Areas:	None found
Threatened Ecological Communities:	None found
Threatened Species:	22 potentially occurring
Migratory Species:	Eight potentially occurring
Critical Habitats:	None found
Places on the RNE:	None found
Regional Forest Agreements:	One found

These results are further discussed in Chapter 8 of this REF.

NSW DPI Noxious Weeds List

The NSW DPI Noxious Weeds List was searched for the Shoalhaven control area. Forty-one species are listed for the Shoalhaven control area. A complete list is included in **Appendix C**. One species listed as W2, Fireweed (*Senecio madagascariensis*), was identified within the Proposal site. Refer to Section 8.4 of this REF.

NSW DEC Contaminated Land Records

The NSW DEC Contaminated Land Records were searched on 3 August 2005 for the Shoalhaven LGA. One notice relating to the Nowra Gasworks, approximately 25km north of the Proposal site was returned, and the Proposal would have no impact on this.

The DEH National Pollutant Inventory

The DEH NPI was searched on 14 September 2005 for the Shoalhaven LGA. A summary of the results is as follows:

- 34 substances from 20 sources were found.
- 14 facilities were reported to the NPI.
- Diffuse data was collected for 11 sources.

Refer to **Appendix C** for more details.

DNR Acid Sulphate Soil Risk Mapping

A search of DNR's Acid Sulphate Soil Risk Mapping was conducted on 24 August 2005. There is no known occurrence of acid sulphate soils within the study area.

7.2 Government and Community Consultation and Involvement

7.2.1 Government and stakeholder consultation

Relevant state government agencies and stakeholders were contacted and provided with the opportunity to comment on the Proposal. Table 7.2 lists the government agencies and stakeholders that were invited to comment on the Proposal for this REF. Responses received are summarised in column 1, while column 2 identifies the Section in the REF where addressed. Copies of all correspondences are provided **Appendix D.**

Table 7.2: Summary of issues raised by government agencies and stakeholders.

Summarised Issues	Comment/Section in REF Where Addressed
Shoalhaven City Council	
A response to the consultation letter dated 23 August 2005 was received on the 7 October. Shoalhaven City Council had the following comments to make with regard to the proposed works.	
• Council supports the implementation of the Proposal.	Noted
• Council landscape architect staff will contact the RTA directly to finalise design and other requirements for the landscape relocation.	Noted
• Council suggested that the RTA also consider an overhead gantry for southbound traffic.	Noted
NSW Department of Environment and Conservation (DEC)	
A response to the consultation letter dated 23 August 2005 was received on the 30 September 2005. The DEC (NPWS) had the following comments to make with regard to the proposed works.	
In addition to the assessment contained in the RTA's *nvironmental Impact Assessment Policy, Guidelines and Procedures 2004*, the DEC responded that the following issues should be considered in assessing the Proposal:	
• Corridor values – providing linkages for the maintenance of biodiversity and minimising potential for edge effects in DEC land	Section 8.4 **Appendix E**
• Erosion and sedimentation	Section 8.2
• Stormwater runoff to DEC land – when adjacent to urban areas	Not applicable to the Proposal
• Management implications and impacts – potential to affect the operation or management of National Park lands.	Not applicable to the Proposal
• Fire – Councils need to undertake an assessment of the fire risk and should ensure that the provisions of the DIPNR and RFS guidelines *Planning for Bushfire Protection: A Guide for Councils, Planners, Fire Authorities, Developers and Home Owners 2001* are implemented within the area proposed for development.	Not applicable to the Proposal
• Boundary encroachments – to ensure that where a proposal shares a common boundary with DEC land, that the subject boundary has been accurately surveyed to ensure there is no encroachment to DEC land as a result of the proposed development	Property acquisition from NPWS Estate would be required for the Proposal. Section 3.2.6 Section 8.9
• Visual impact	Section 8.8

7.2.2 Community Consultation and Involvement

No community consultation has been undertaken due to the small scale of the Proposal. However, the affected community and/or residents would be consulted prior to the commencement of works in accordance with the RTA's *Community Involvement Practice Notes and Resource Manual 1998.*

8 Environmental Assessment

8.1 General

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

The environmental safeguards predominately outline additional site-specific requirements which are not covered by the RTA's *QA Specifications – nvironmental Protection (Management Plan) G35* and *G39* for inclusion into the Contractors Environmental Management Plan (CEMP) and the Project Environmental Management Plan (PEMP). These safeguards would be implemented prior to construction, during construction and post construction. The CEMP and PEMP would be reviewed by the RTA's Regional Environmental Adviser Southern Region prior to the commencement of work. The nearest item of non-Indigenous heritage is located approximately 10km from the Proposal site (refer to Section 7.1), and as such no assessment of the impacts of the Proposal on non-Indigenous heritage is contained in this section.

8.2 Soils and Water Quality

Potential Impacts

Construction

There are no natural drainage lines within the study area. The land slope faces east, and runoff from the Princes Highway travels via unformed table drains and culverts under the Princes Highway into artificial drainage lines along each side of Sussex Inlet Road. These drainage lines eventually discharge into tributaries of Tullarwalla Creek downslope to the east.

Given the location and nature of the proposed works, the potential for soil erosion and sedimentation during construction would be moderate. Excavation and the stripping of topsoil both increase the risk of erosion and sedimentation during construction. Tullarwalla Creek is located approximately 200m east of the study area, and construction of the Proposal is expected to have no impact on water quality provided site specific safeguards outlined below are followed.

Operation

No increased risk of erosion or sedimentation is expected post-construction. The rehabilitation of disturbed areas post-construction would reduce the risk of erosion and sedimentation at the Proposal site. The operation of the Proposal is expected to have no impact on water quality.

Drainage works included in the Proposal (refer to section 3.2.2) would have a positive impact on the environment during operation of the Proposal.

Site Specific Safeguards

- An erosion and sedimentation control plan would be developed and incorporated into the CEMP. The plan would incorporate specifications outlined in the *NSW rosion and Sediment Control Handbook No. 2*, identify areas requiring management controls,

include inspections and checklist sheets and be reviewed by the RTA's Regional Environmental Adviser, Southern Region prior to the commencement of works.

- Temporary stormwater control devices or erosion and sedimentation controls would be implemented at stormwater drains to prevent sediment-laden runoff entering the local stormwater system.
- Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. Sediment would be cleared from behind barriers on a regular basis and all controls would be managed in order to work effectively at all times.
- All stockpiles would be designed, established, operated and decommissioned in accordance with the RTA's *Stockpile Management Procedures 2001*. In addition, all stockpiles would be located 50m away from the high bank of any rivers or drainage lines.
- Stockpiles would not be established on slopes greater than 2:1 (horizontal to vertical).
- Any material transported onto pavement surfaces would be swept and removed at the end of each working day.
- Imported fill required for the Proposal would be sourced from licenced/registered suppliers within the local area.
- The stripping of topsoil and stockpiling activities would not be undertaken during rainfall events.
- Site rehabilitation of disturbed areas would be undertaken progressively as stages are completed.
- Disturbed areas would be restored to their natural shape at the completion of works.
- Should a spill occur during construction, the incident emergency spill plan would be implemented, and the Regional Environmental Adviser Southern Region contacted.
- No fuels, chemicals, and liquids would be stored at the Proposal site or within the compound site.
- The refuelling of plant and maintenance of machinery would be undertaken within impervious bunded areas within the compound site or undertaken off site.
- Vehicle wash downs and/or cement truck washouts would be undertaken within a designated bunded area of an impervious surface or undertaken offsite.
- Excess concrete would be scraped off equipment prior to being washed. All remaining concrete residue would be collected and disposed of to a licenced landfill.
- Wastewater generated from the construction process would be contained onsite, collected via a suction pump or wet industrial vacuum and/or treated in accordance with DEC specifications prior to its disposal. The release of dirty water into any waterways would be prohibited.
- Concrete pumping would be carried out in a controlled manner via a boom pump to minimise overspray.
- Fenced boundaries surrounding stockpile sites would be lined with geotextile fabric.

8.3 Climate

Potential Impacts

Heavy rainfall events could potentially increase the likelihood of erosion and the pollution of stormwater runoff associated with the proposed works.

Site Specific Safeguards

- Works would not be undertaken during periods of high rainfall.
- Sufficient time would be allowed to vacate and clean up the site, prior to the commencement of heavy rainfall.

8.4 Biodiversity

Potential Impacts

A Flora and Fauna Assessment was prepared for the Proposal by ngh environmental (2005), and is included as **Appendix E** to this REF.

Flora

No vegetation types of conservation significance, including populations or ecological communities, are present within the study area. All of the study area has been substantially disturbed by past logging, clearing and the installation of a telecommunications cable.

The proposed works would impact upon a small area of regrowth forest vegetation, a type of which is intermediate between two communities which are common in the Shoalhaven LGA, and are adequately to well represented within reserves. The removal of a limited, disturbed area of this forest type (approximately 0.4ha) would not significantly alter the abundance of this vegetation community on a local or regional scale.

Eight part tests were conducted on the Thick-lipped Spider-orchid (*Caladenia tessellata)* and Leafless Tongue-orchid (*Cryptostylis hunteriana)*, two species with a low potential of occurring within the study area. The Proposal was determined to have no significant impact upon these species.

The noxious Fireweed (*Senecio madagascariensis*) is present in low numbers, scattered along the table drain. No rare or threatened species were identified during the flora and fauna survey.

Not included in the flora and fauna assessment (ngh environmental 2005) was an assessment of the potential for the Proposal to impact upon threatened flora species listed under the EPBC Act. The DEH Protected Matters (EPBC) Database was searched on 3 August 2005 for the Proposal site with a buffer of 5km (refer to **Appendix C**). The following flora species were identified as having the potential to occur within the study area:

Albatross Mallee (*ucalyptus langleyi*)
Austral Toadflax (*Thesium australe*)
Biconvex Paperbark (*Melaleuca biconvexa*)
East Lynne Midge-orchid (*Genoplesium vernale*)
Leafless Tongue-orchid (*Cryptostylis hunteriana*)
Magenta Lilly Pilly (*Syzygium paniculatum*)
Thick-lipped Spider Orchid (*Caladenia tessellata*)

Refer to **Appendix C** of this REF for complete listings, and **Appendix F** for an assessment of the likely impact of the Proposal on each species. No species protected by the EPBC Act are likely to be significantly impacted upon by the Proposal.

Fauna

The Proposal would result in the removal of approximately 0.4ha of potential fauna foraging habitat. Given the abundance of similar and higher value fauna habitat (foraging/nesting) in

the vicinity of the study area, the impact of the removal of this amount of vegetation on the fauna of the study area would be negligible.

The flora and fauna assessment (ngh environmental 2005) identified the following threatened species as potentially occurring within the Proposal site:

Barking Owl (*Ninox connivens*)
Masked Owl (*Tyto novaehollandiae*)
Powerful Owl (*Ninox strenua*)
Gang-gang Cockatoo (*Callocephalon fimbriatum*)
Glossy Black-cockatoo (*Calyptorhynchus lathami*)
Square-tailed Kite (*Lohoictinia isura*)
Regent Honeyeater (*Xanthomyza phrygia*)
Turquoise Parrot (*Neophema pulchella*)
Common Bent-wing Bat (*Miniopterus schreibersii*)
Great Pipistrelle (*Falsistrellus tasmeniensis*)
Greater Broad-nosed Bat (*Scoteanax rueppellii*)
Eastern Freetail-Bat (*Mormopterus* sp.)
Grey-headed Flying-fox (*Pteropus poliocephalus*)
Eastern Pygmy-possum (*Cercartetus nanus*)
Koala (*Phascolarctos cinereus*)
Long-nosed Potoroo (*Potorous tridactylus*)
Southern Brown Bandicoot (*Isoodon obesulus*)
White-footed Dunnart (*Sminthopsis leucopus*)
Yellow-bellied Glider (*Petaurus australis*)
Rosenberg's Monitor (*Varanus rosenbergii*)

Eight part tests were performed on each of the above species and the Proposal was determined to have no significant impact on any listed fauna species (refer to **Appendix E** for full tests).

The Yellow-bellied Glider is listed as Vulnerable under Schedule 2 of the TSC Act, and potential Yellow-bellied Glider feeding marks were identified on trees within the study area, outside of the proposed construction footprint. These feeding marks appeared to be old, and there are no other habitat features critical for this species (such as large hollow bearing trees) present within the study area.

A burrow identified during the flora and fauna assessment outside of the Proposal site could possibly have been excavated by a Rosenberg's Monitor, listed as Vulnerable Schedule 2 of the TSC Act. Alternatively, this burrow may have been excavated by a small mammal or goanna. This burrow is located outside the proposed construction footprint (refer to Section 2.2.6), and the Proposal is not expected to impact upon this burrow or the animal responsible for it.

The Proposal would not have a significant adverse impact upon the east-west connectivity between conservation reserves, currently already compromised by the Princes Highway. The Proposal may cause a reduction in the ability individual fauna to access resources located on the opposite side of the Princes Highway or reduce the connectivity between local family groups, however any such impact would be minor. The Proposal is not expected to result in an increased risk of death to fauna crossing the road at this locality.

Not included in the flora and fauna assessment (ngh environmental 2005) was an assessment of the potential for the Proposal to impact upon threatened fauna species listed under the EPBC Act. The DEH Protected Matters (EPBC) Database was searched on 3 August 2005 for the Proposal site with a buffer of 5km (refer to **Appendix C**). The following fauna species were identified as having the potential to occur within the study area:

Australian Painted Snipe (*Rostratula australis*)
Black-faced Monarch (*Monarcha melanopsis*)
Latham's Snipe (*Gallinago hardwickii*)
Painted Snipe (*Rostratula benghalensis s. lat.*)
Regent Honeyeater (*Xanthomyza phrygia*)
Rufous Fantail (*Rhipidura rufifrons*)
Satin Flycatcher (*Myiagra cyanoleuca*)
Swift Parrot (*Lathamus discolour*)
White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
White-throated Needletail (*Hirundapus caudacutus*)
Australian Grayling (*Prototroctes maraena*)
Giant Burrowing Frog (*Heleioporus australiacus*)
Green and Golden Bell Frog (*Litoria aurea*)
Littlejohn's Tree Frog (*Litoria littlejohni*)
Stuttering Frog (*Mixophyes balbus*)
Brush-tailed Rock-wallaby (*Petrogale penicillata*)
Grey-headed Flying Fox (*Pteropus poliocephalus*)
Large-eared Pied Bat (*Chalinolobus dwyeri*)
Long-nosed Potoroo (*Potorous tridactylus tridactylus*)
Spotted-tail Quoll (*Dasyurus maculatus maculatus*)
Southern Brown Bandicoot (*Isoodon obesulus obesulus*)
Broad-headed Snake (*Hoplocephalus bungaroides*)

In addition, 12 species of avifauna (marine overfly) protected by the EPBC Act were identified as having the potential to occur within the study area. Refer to **Appendix C** of this REF for complete listings, and **Appendix F** for an assessment of the likely impact of the Proposal on each species. No species protected by the EPBC Act are likely to be significantly impacted upon by the Proposal.

Site Specific Safeguards

Flora

- The W2 noxious weed species Fireweed (*Senecio madagascariensis*) identified within the Proposal site would be destroyed and continuously suppressed as required under the *Noxious Weeds Act 1993*.
- Topsoil potentially containing weed propagules would be removed from the Proposal site and disposed of at a licenced landfill facility. Weed infested or contaminated topsoil would not be reused for the proposed works or for revegetation works and would not be stockpiled adjacent to any areas of native vegetation.
- The area of vegetation to be removed would be restricted to those areas specified in this REF. These areas would be clearly marked onsite, and on site plans prior to the commencement of works. Should additional clearing be required, the RTA's Regional Environmental Adviser, Southern Region would be contacted and consulted to determine the need for further environmental impact assessment.
- All vegetation to be retained would be clearly highlighted on site and on site plans and would be protected with fencing. Protective fencing would be erected beyond the drip-line of trees and erected prior to the commencement of works. All staff would be informed and inducted of the limits of vegetation clearing and the areas of vegetation to be retained.
- All trimming of mature native trees would be undertaken by a qualified arborist.
- Vehicles and machinery would be parked in cleared areas and not under the drip-line of retained vegetation or trees. Retained vegetation or trees would not be smothered by stockpiles, sediment, or by the storage of materials and equipment.

- The construction compound, stockpile site and the storage of materials would be established within existing cleared areas.

Fauna

- The burrow located during the flora and fauna survey, located approximately 150m north of the Sussex Inlet Road intersection and close to the western boundary of the construction footprint should be protected from disturbance. It is a few metres from the Geodetic Survey marker, which is well-marked with paint and flagging tape. This burrow would be clearly marked prior to commencement of works.
- Any fauna species found inhibiting within areas to be disturbed would be removed by licensed persons under the NPW Act 1974.
- Trees containing hollows would be retained and protected.

8.5 Indigenous Heritage

Potential Impacts

There are no records of Aboriginal objects and places within the Proposal site (the nearest record is approximately 1km north of the Proposal site), and no Native Title Claims on the site. The RTA's Aboriginal Programs Consultant (APC) Southern Region was consulted on any potential indigenous heritage issues associated with the Proposal. The APC consulted Jerringa Local Aboriginal Land Council (LALC) on the Proposal, and the LALC have no objection or concerns with the Proposal. Refer to **Appendix D** of this REF for correspondence received.

Site Specific Safeguards

- All personnel working on site would receive training in their responsibilities under the *National Parks and Wildlife Act 1974*.
- Should Indigenous heritage items be uncovered during works, all works in the vicinity of the find would cease and the RTA's Aboriginal Programs Consultant, Regional Environmental Adviser Southern Region, DEC representative and relevant LALC representative would be contacted. Works would not re-commence until appropriate clearance has been received.

8.6 Noise and Vibration

Potential Impacts

Construction Noise

The nearest sensitive noise receptor is located approximately 500m southwest of the intersection of Sussex Inlet Road and the Princes Highway – a farmhouse. The Proposal has the potential to increase existing background noise levels during construction owing to construction plant and general construction activities. Construction noise may exceed the current EPA Noise Criteria. However, given that the location of the proposed works would already be subject to noise from trucks and other vehicles on the Princes Highway, the relatively short duration of works and the distance of the nearest sensitive noise receptor, it is not expected that this increase would cause any adverse comment.

Operational Noise

The Proposal would not increase traffic on the Princes Highway, and no increase in noise levels is expected during operation.

Site Specific Safeguards

- Should works be required outside standard working hours, the procedures contained in the RTA's *nvironmental Noise Management Manual 2001* "*Practice Notes vii – Roadworks Outside of Normal Working Hours*" would be followed.
- Best management practices would be adopted that are consistent with the *RTA's nvironmental Noise Management Manual 2001*.

8.7 Air Quality

Potential Impacts

Construction

There is the potential for a short-term deterioration of local air quality as a result of dust generation from construction activities, and construction vehicle emissions. Given that diesel-fuelled vehicles (trucks, 4WDs, *etc.*) are already common in this area, and the small nature of the proposed works, the additional impact on air quality from the construction vehicles is considered to be minor.

Operation

No impact on the air quality of the study area is expected during the operation of the Proposal.

Site Specific Safeguards

- Any stockpiles and general areas with the capacity to cause dust would be dampened to suppress dust emissions.
- Any materials transported in trucks would be appropriately covered to reduce dust generation.
- Construction activities that generate high dust levels would be avoided during high wind periods.

8.8 Visual Amenity / Landscape

Potential Impacts

Construction

There is likely to be a moderate short-term decrease in visual amenity during the construction period due to the presence of construction plant and machinery and the removal of vegetation at the Proposal site.

Operation

The removal of approximately 0.4ha of roadside vegetation would have a minor impact on the visual amenity of the study area. The revegetation of the Proposal site at the completion of works would minimise this impact.

Site Specific Safeguards

- The construction site would be kept tidy and rubbish free.

8.9 Socio-economic Considerations

Potential Impacts

Construction

A Traffic Management Plan would be prepared for the Proposal to provide for two-way traffic flow on the Princes Highway, and also for turning movements into and out of Sussex Inlet Road, during construction. At times during the construction stage, traffic may be restricted to one lane under Stop/Go traffic control. However, given the short period of any restriction and the prior notice to any potentially affected members of the community, any inconvenience would be minor.

Operation

Operation of the Proposal would result in improved road safety at the intersection and reduced delays and improved travel times for traffic on the Princes Highway near this intersection. The Proposal would result in the loss of no more than 0.7ha from NPWS Estate. This property acquisition would be undertaken prior to commencement of construction of the Proposal, and would be by negotiation between the RTA and NPWS.

Site Specific Safeguards

- All property acquisitions would be negotiated in accordance with the RTA's Land Acquisition Policy, and compensation in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Property acquisitions and/or leasing arrangements would be resolved between the RTA and property owners prior to the commencement of works.
- Consultation would be undertaken with potentially affected residences prior to the commencement of works and would be undertaken in accordance with the RTA's *Community Involvement Practice Notes and Resource Manual, 1988*. In addition, consultation would include but not limited to door knocks, newsletters or letter box drops providing information on the proposed works, working hours adhered to and a contact name and number should any complaints wish to be registered.
- A Traffic Control Plan would be prepared in accordance with the RTA's *Traffic Control at Work Sites Manual 2003*, and approved by the RTA prior to implementation. The Traffic Control Plan would include the notification of any traffic alterations or closures.

8.10 Waste Minimisation and Management

Potential Impacts

Waste products from the Proposal are likely to be generated during excavation, stripping of topsoil, clearing and grubbing, asphalting and linemarking. These products are likely to include spoil, excess asphalt, excess pavement materials, excess paint, fuels, and vegetative material.

Site Specific Safeguards

- A Waste Management Plan would be prepared in accordance with RTA's QA Specifications and in accordance with RTA's *Waste Minimisation & Management Guidelines 1998* and the principles of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act).
- Trees to be removed would be assessed for their value as millable timber.
- Leaf material and small branches of native vegetation would be chipped and used as mulch in revegetation works.
- There would be no burning of waste.
- All noxious weeds and exotic plant species removed would be bagged and disposed of at a licenced landfill facility.
- All construction materials, surplus soils and wastes generated from the Proposal would be stockpiled and stored at the compound site prior to reuse, recycling or disposal.
- All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.
- Wastes would not be stored for long periods during construction of the Proposal. Empty drums of fuels, oils or chemicals and fluids would not be stored on site during construction.

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

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

8.11 Summary of Beneficial Effects

The Proposal has the following beneficial effects:

- Improved road safety at the intersection of the Princes Highway and Sussex Inlet Road, Wandandian.
- Reduced travel times along this section of the Princes Highway.
- Improved drainage.

8.12 Summary of Adverse Effects

The Proposal would result in some adverse effects that would include:

- The removal of approximately 0.4ha of roadside vegetation that may potentially provide fauna habitat.
- Short-term alteration of traffic conditions at the intersection of Princes Highway and Sussex Inlet Road, Wandandian.
- The relocation of telecommunications and street lighting utilities.
- Increased risk of erosion during construction activities.
- Short term negative impact on the visual amenity of the Proposal site.
- Property acquisition would result in the loss of no more than 0.7ha of land from NPWS Estate.

9 Implementation Stage

9.1 Summary of Proposed Environmental Safeguards

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

The CEMP and PEMP (if required) would be developed in accordance with the specifications set out in the RTA's *nvironmental Protection (Management Plan) – QA Specification G35* and *G39*.

Table 9.1: Site Specific Environmental Safeguards.

Impact	Environmental Safeguards
Soils and Water Quality	• An erosion and sedimentation control plan would be developed and incorporated into the CEMP. The plan would incorporate specifications outlined in the *NSW rosion and Sediment Control Handbook No. 2*, identify areas requiring management controls, include inspections and checklist sheets and be reviewed by the RTA's Regional Environmental Adviser, Southern Region prior to the commencement of works. • Temporary stormwater control devices or erosion and sedimentation controls would be implemented at stormwater drains to prevent sediment-laden runoff entering the local stormwater system. • Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. Sediment would be cleared from behind barriers on a regular basis and all controls would be managed in order to work effectively at all times. • All stockpiles would be designed, established, operated and decommissioned in accordance with the RTA's *Stockpile Management Procedures 2001*. In addition, all stockpiles would be located 50m away from the high bank of any rivers or drainage lines. • Stockpiles would not be established on slopes greater than 2:1 (horizontal to vertical). • Any material transported onto pavement surfaces would be swept and removed at the end of each working day. • Imported fill required for the Proposal would be sourced from licenced/registered suppliers within the local area. • The stripping of topsoil and stockpiling activities would not be undertaken during rainfall events. • Site rehabilitation of disturbed areas would be undertaken progressively as stages are completed. • Disturbed areas would be restored to their natural shape at the

Impact	Environmental Safeguards
	completion of works. • Should a spill occur during construction, the incident emergency spill plan would be implemented, and the Regional Environmental Adviser Southern Region contacted. • No fuels, chemicals, and liquids would be stored at the Proposal site or within the compound site. • The refuelling of plant and maintenance of machinery would be undertaken within impervious bunded areas within the compound site or undertaken off site. • Vehicle wash downs and/or cement truck washouts would be undertaken within a designated bunded area of an impervious surface or undertaken offsite. • Excess concrete would be scraped off equipment prior to being washed. All remaining concrete residue would be collected and disposed of to a licenced landfill. • Wastewater generated from the construction process would be contained onsite, collected via a suction pump or wet industrial vacuum and/or treated in accordance with DEC specifications prior to its disposal. The release of dirty water into any waterways would be prohibited. • Concrete pumping would be carried out in a controlled manner via a boom pump to minimise overspray. • Fenced boundaries surrounding stockpile sites would be lined with geotextile fabric.
Climate	• Works would not be undertaken during periods of high rainfall. • Sufficient time would be allowed to vacate and clean up the site, prior to the commencement of heavy rainfall.
Biodiversity	• The W2 noxious weed species Fireweed (*Senecio madagascariensis*) identified within the Proposal site would be destroyed and continuously suppressed as required under the *Noxious Weeds Act 1993*. • Topsoil potentially containing weed propagules would be removed from the Proposal site and disposed of at a licenced landfill facility. Weed infested or contaminated topsoil would not be reused for the proposed works or for revegetation works and would not be stockpiled adjacent to any areas of native vegetation. • The area of vegetation to be removed would be restricted to those areas specified in this REF. These areas would be clearly marked onsite, and on site plans prior to the commencement of works. Should additional clearing be required, the RTA's Regional Environmental Adviser, Southern Region would be contacted and consulted to determine the need for further environmental impact assessment. • All vegetation to be retained would be clearly highlighted on site and on site plans and would be protected with fencing. Protective fencing would be erected beyond the drip-line of trees

Impact	Environmental Safeguards
	and erected prior to the commencement of works. All staff would be informed and inducted of the limits of vegetation clearing and the areas of vegetation to be retained. • All trimming of mature native trees would be undertaken by a qualified arborist. • Vehicles and machinery would be parked in cleared areas and not under the drip-line of retained vegetation or trees. Retained vegetation or trees would not be smothered by stockpiles, sediment, or by the storage of materials and equipment. • The construction compound, stockpile site and the storage of materials would be established within existing cleared areas. • The burrow located during the flora and fauna survey, located approximately 150m north of the Sussex Inlet Road intersection and close to the western boundary of the construction footprint should be protected from disturbance. It is a few metres from the Geodetic Survey marker, which is well-marked with paint and flagging tape. This burrow would be clearly marked prior to commencement of works. • Any fauna species found inhibiting within areas to be disturbed would be removed by licensed persons under the *National Parks and Wildlife Act 1974*. • Trees containing hollows would be retained and protected.
Indigenous Heritage	• All personnel working on site would receive training in their responsibilities under the *National Parks and Wildlife Act 1974*. • Should Indigenous heritage items be uncovered during works, all works in the vicinity of the find would cease and the RTA's Aboriginal Programs Consultant, Regional Environmental Adviser Southern Region, DEC representative and relevant LALC representative would be contacted. Works would not re-commence until appropriate clearance has been received.
Noise and Vibration	• Should works be required outside standard working hours, the procedures contained in the *RTA's nvironmental Noise Management Manual 2001* "Practice Notes vii – Roadworks Outside of Normal Working Hours" would be followed. • Best management practices would be adopted that are consistent with the *RTA's nvironmental Noise Management Manual 2001*.
Air Quality	• Any stockpiles and general areas with the capacity to cause dust would be dampened to suppress dust emissions. • Any materials transported in trucks would be appropriately covered to reduce dust generation. • Construction activities that generate high dust levels would be avoided during high wind periods.
Visual Amenity / Landscape	• The construction site would be kept tidy and rubbish free

Impact	Environmental Safeguards
Socio-Economic Considerations	• All property acquisitions would be negotiated in accordance with the RTA's Land Acquisition Policy, and compensation in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Property acquisitions and/or leasing arrangements would be resolved between the RTA and property owners prior to the commencement of works. • Consultation would be undertaken with potentially affected residences prior to the commencement of works and would be undertaken in accordance with the RTA's *Community Involvement Practice Notes and Resource Manual 1988*. In addition, consultation would include but not limited to door knocks, newsletters or letter box drops providing information on the proposed works, working hours adhered to and a contact name and number should any complaints wish to be registered. • A Traffic Control Plan would be prepared in accordance with the RTA's *Traffic Control at Work Sites Manual 2003*, and approved by the RTA prior to implementation. The Traffic Control Plan would include the notification of any traffic alterations or closures.
Waste Management & Minimisation	• A Waste Management Plan would be prepared in accordance with RTA's QA Specifications and in accordance with RTA's *Waste Minimisation & Management Guidelines 1998* and the principles of the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act). • Trees to be removed would be assessed for their value as millable timber. • Leaf material and small branches of native vegetation would be chipped and used as mulch in revegetation works. • There would be no burning of waste. • All noxious weeds and exotic plant species removed would be bagged and disposed of at a licenced landfill facility. • All construction materials, surplus soils and wastes generated from the Proposal would be stockpiled and stored at the compound site prior to reuse, recycling or disposal. • All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day. • Wastes would not be stored for long periods during construction of the Proposal. Empty drums of fuels, oils or chemicals and fluids would not be stored on site during construction. In addition, the Resource Management Hierarchy principles of the WARR Act would be adopted as follows: ➢ Avoid unnecessary resource consumption as a priority; ➢ Avoidance is followed by resource recovery (including reuse of materials, reprocessing recycling, and energy recovery; and ➢ Disposal is undertaken as a last resort.

9.2 Licences and Approvals

Land acquisition would be undertaken prior to commencement of construction works and would be by negotiation between the RTA and NPWS.

10 Consideration of State and Commonwealth Environmental Factors

10.1 Clause 228(2) Factors (NSW Legislation)

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

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

Clause 228(2) Factors	Impact
a) Any environmental impact on a community?	
The Proposal would have a short-term negative impact on the local community, through the altered traffic arrangements, decreased visual amenity and increased noise at the intersection during construction.	Short term negative
Long term positive impacts on the community would result from improved road safety at the intersection of the Princes Highway and Sussex Inlet Road, Wandandian.	Long term positive
b) Any transformation of a locality?	
Overall, the Proposal would result in improved safety in the vicinity of the intersection, having a long-term positive transformation of the local area.	Long term positive
c) Any environmental impact on the ecosystem of the locality?	
The Proposal is minor in nature and would involve the clearing of approximately 0.4ha of disturbed roadside vegetation. A flora and fauna assessment was prepared for the Proposal and is included as **Appendix E** to this REF. This assessment determined that the Proposal would have no significant impact on any threatened species, populations or ecological communities. Given the abundance of similar vegetation in the area, no adverse impact is expected on any fauna species or the ecosystems of the locality.	Minor negative
d) Any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality?	
The presence of construction plant and machinery during construction would cause a short-term decline in the aesthetic value of the study area.	Short term negative
During operation, the proposed revegetation of the Proposal site would have a long-term positive impact on the aesthetics of the study area.	Long term positive

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 generations? The Proposal would have no effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present generations.	Nil
f) Any impact on habitat of any protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)? The Proposal would involve the clearing of approximately 0.4ha of roadside grasses, weeds, and forest re-growth trees which may be used by native fauna for foraging and nesting. However, any impact on native fauna would be minor, provided the site specific safeguards outlined in Section 9 of this REF are implemented.	Short term negative
g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air? The Proposal is minor in nature and would not involve the endangering of any species.	Nil
h) Any long-term effects on the environment? Long term positive impacts on the community would result from improved safety on the Princes Highway, in the vicinity of its intersection with Sussex Inlet Road, Wandandian.	Long term positive
i) Any degradation of the quality of the environment? The presence of construction plant and equipment during the proposed works, and associated increased risks of erosion and pollution during construction activities would result in the short-term degradation of the environmental quality of the study area. Degradation of the quality of the environment would be minimised with the implementation of site specific safeguards outlines in Section 9 of this REF.	Short term negative
j) Any risk to the safety of the environment? The proposed improvements would result in a long-term improvement to the safety of the study area.	Long term positive
k) Any reduction in the range of beneficial uses of the environment? The Proposal would cause no reduction in the range of beneficial uses of the environment.	Nil
l) Any pollution of the environment? The Proposal would result in an increased potential for pollution of the surrounding environment through increased risk of erosion and sedimentation during construction activities. Site specific safeguards outlined in Section 9 of this REF would minimise risk for pollution of the environment resulting from the Proposal.	Short term negative

m) Any environmental problems associated with the disposal of waste?	
No environmental problems associated with the disposal of wastes are anticipated as a result of the Proposal.	Nil
n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply?	
No increase in demand on any resources which are, or are likely to become, in short supply is expected as a result of the Proposal.	Nil
o) Any cumulative environmental effect with other existing or likely future activities?	
In conjunction with the other road safety improvement projects announced and/or proposed as part of the State Government's *Princes Highway Safety Review*, the Proposal would result in a long term improvement of road safety along the Princes Highway.	Long term positive

10.2 EPBC Act 1999 Factors (Commonwealth Legislation)

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

Table 10.2: Compliance with Commonwealth EPBC Act requirements.

EPBC Act Factors	Impact
a) Any environmental impact on World Heritage property? There are no World Heritage properties within the study area, and none would be impacted upon by the Proposal.	Nil
b) Any environmental impact on National Heritage places? No places of National Heritage are located within the study area, nor are likely to be impacted upon by the Proposal.	Nil
c) Any environmental impact on wetlands of international importance? There are no wetlands of international importance within 5km of the study area, and none would be impacted upon by the Proposal.	Nil
d) Any environmental impact on Commonwealth listed threatened species or ecological communities? The Proposal is minor in nature and not expected to have any impact on any Commonwealth listed threatened species or on any ecological communities.	Nil
e) Any environmental impact on Commonwealth listed migratory species? The Proposal is minor in nature and not expected to have any impact on any Commonwealth listed migratory species.	Nil
f) Does any part of the Proposal involve nuclear action? No part of the Proposal involves a nuclear action.	Nil
g) Any environmental impact on a Commonwealth Marine area? There are no Commonwealth Marine areas within the study area, nor are likely to be impacted upon by the Proposal.	Nil
In addition: Any impact on Commonwealth Land? The Proposal would require the acquisition of no more than 0.7ha of NPWS Estate, which would be undertaken prior to the commencement of construction activities and by negotiation between RTA and NPWS. This land acquisition would have negligible impact upon the NPWS Estate.	Negligible

11 Certification

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

Susan Westcott
Environmental Officer
Date:

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

Paul Vecovski
Project Manager
Date:

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APPENDIX A
SITE VISIT PHOTOS

Photo 1. View northwest from Sussex Inlet Road towards the Princes Highway.

Photo 2. Intersection of Sussex Inlet Road and the Princes Highway.

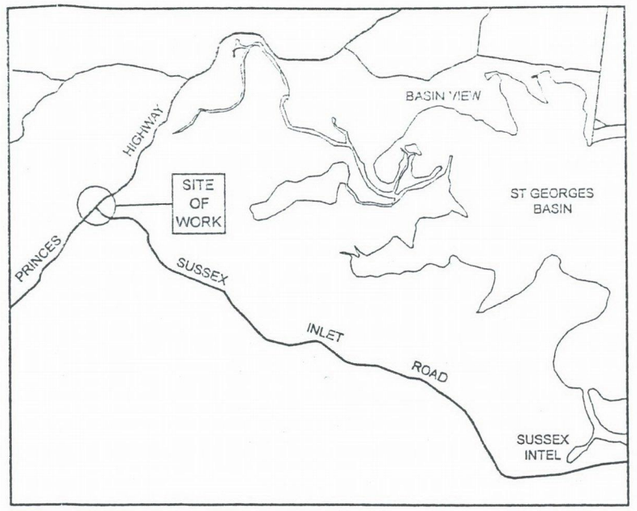
Photo 3. Sign to be relocated.

Photo 4. Roadside vegetation, view southbound.

APPENDIX B
PROPOSAL DETAILS

RTA

SHOALHAVEN CITY COUNCIL



LOCALITY SKETCH
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SH1 PRINCES HIGHWAY

INTERSECTION IMPROVEMENT AT SUSSEX INLET ROAD

PREPARED BY
TECHNOLOGY AND TECHNICAL SERVICES, SOUTHERN
PROJECT DESIGN
WOLLONGONG

DESIGNED	DESIGN REVIEW	RECOMMENDED FOR APPROVAL	CLIENT ACCEPTANCE		FILE No.	DRAWING	PRINTED DATE
NAME S.ELLIS	NAME B.WALTERS	DESIGN MANAGER G.OLSSON TECHNOLOGY AND TECHNICAL SERVICES, SOUTHERN	PROJECT DEVELOPMENT MANAGER P.VECOVSKI		05M97-1	001_Cover.dgn	29/07/2005
SIGNED	SIGNED	SIGNED	SIGNED		REGISTRATION NUMBER		SHEET No.
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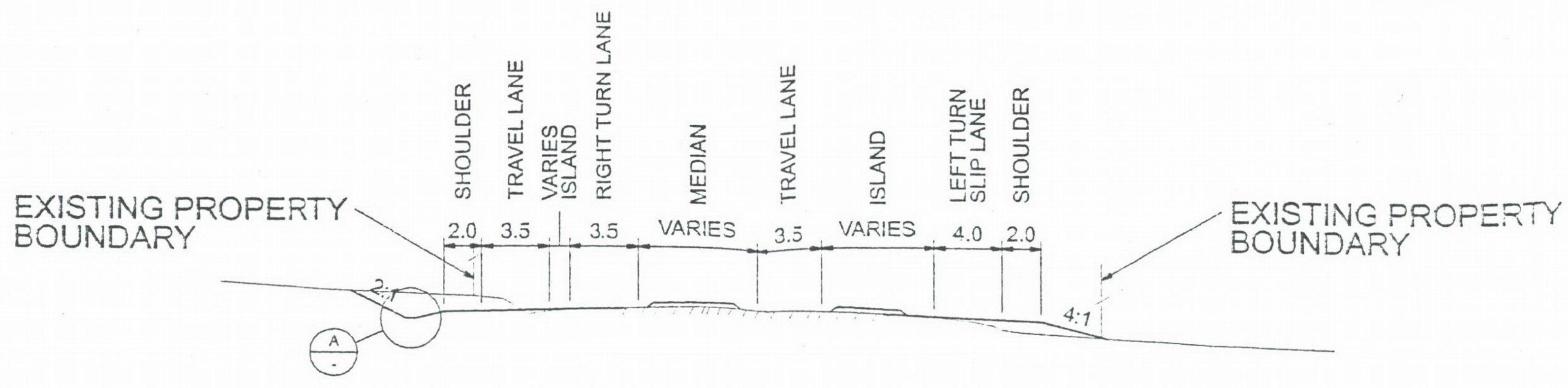

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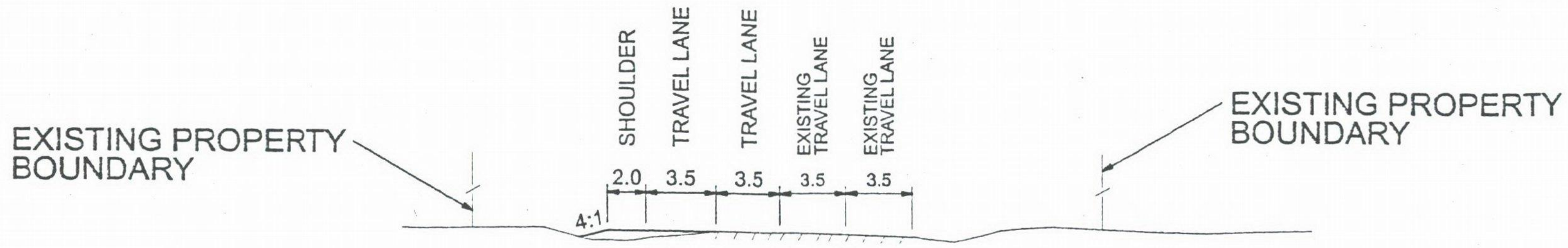

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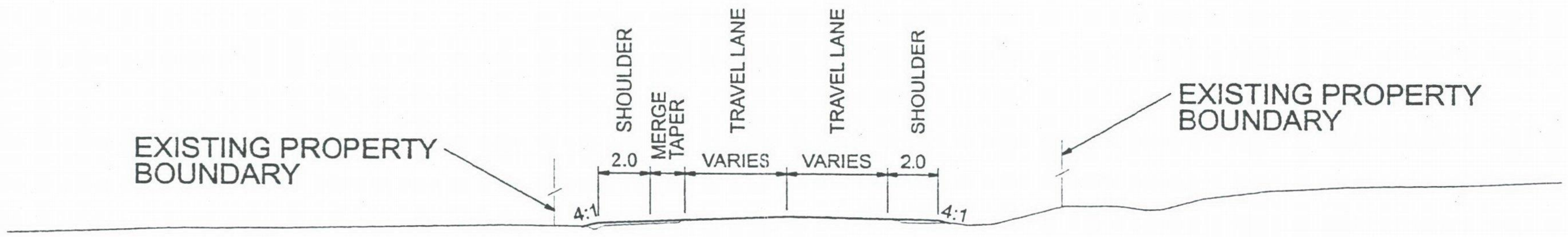

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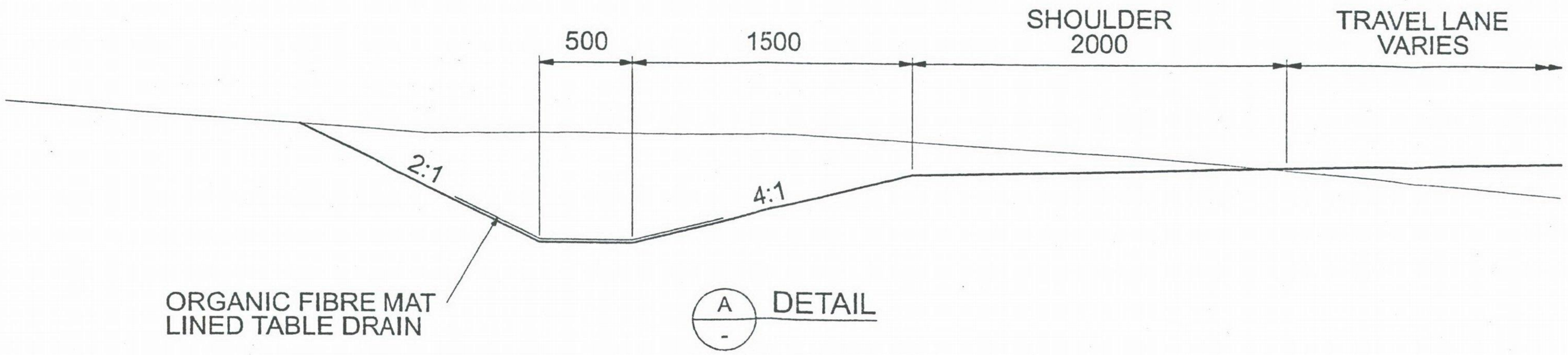

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SH1 PRINCES HIGHWAY
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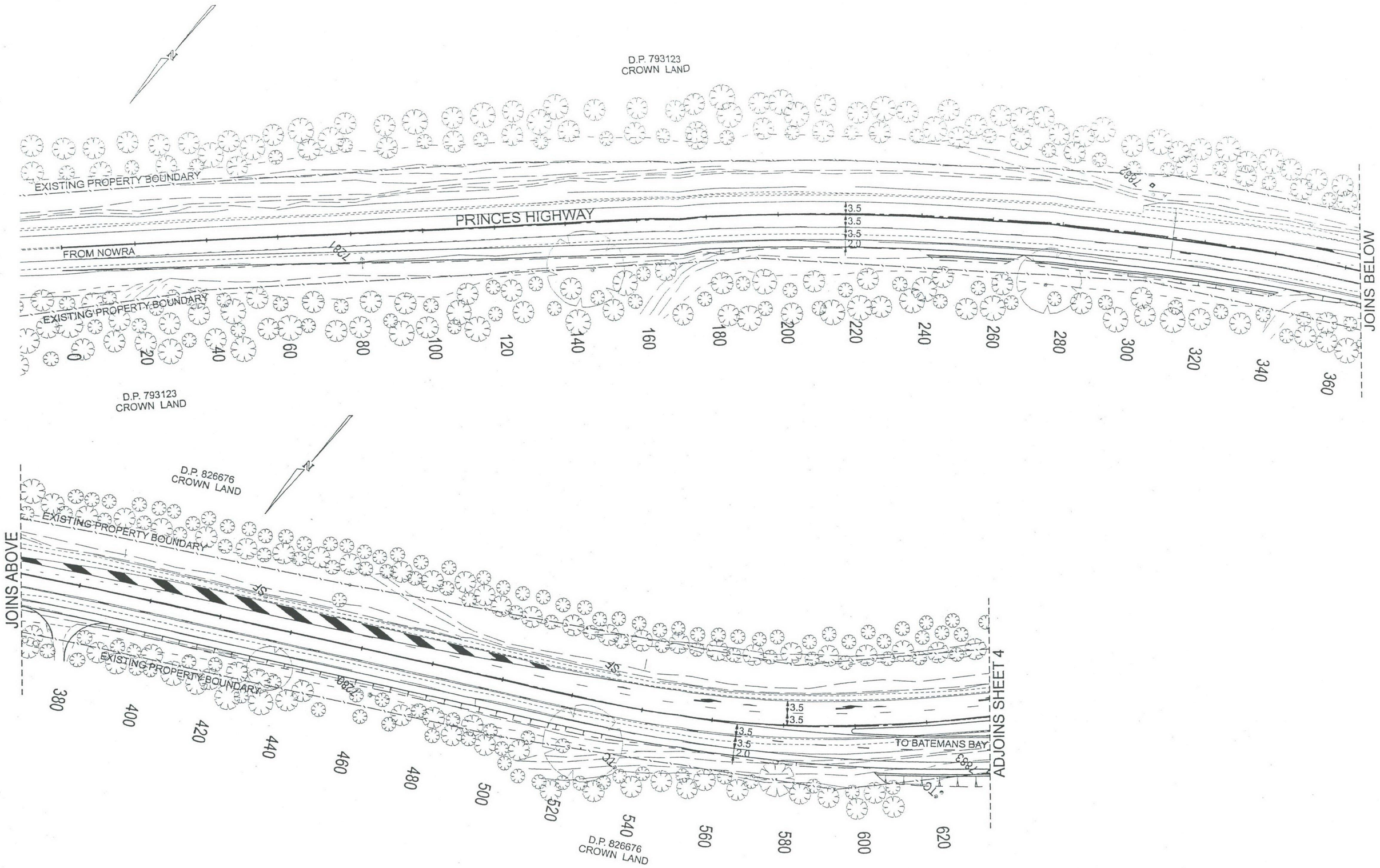

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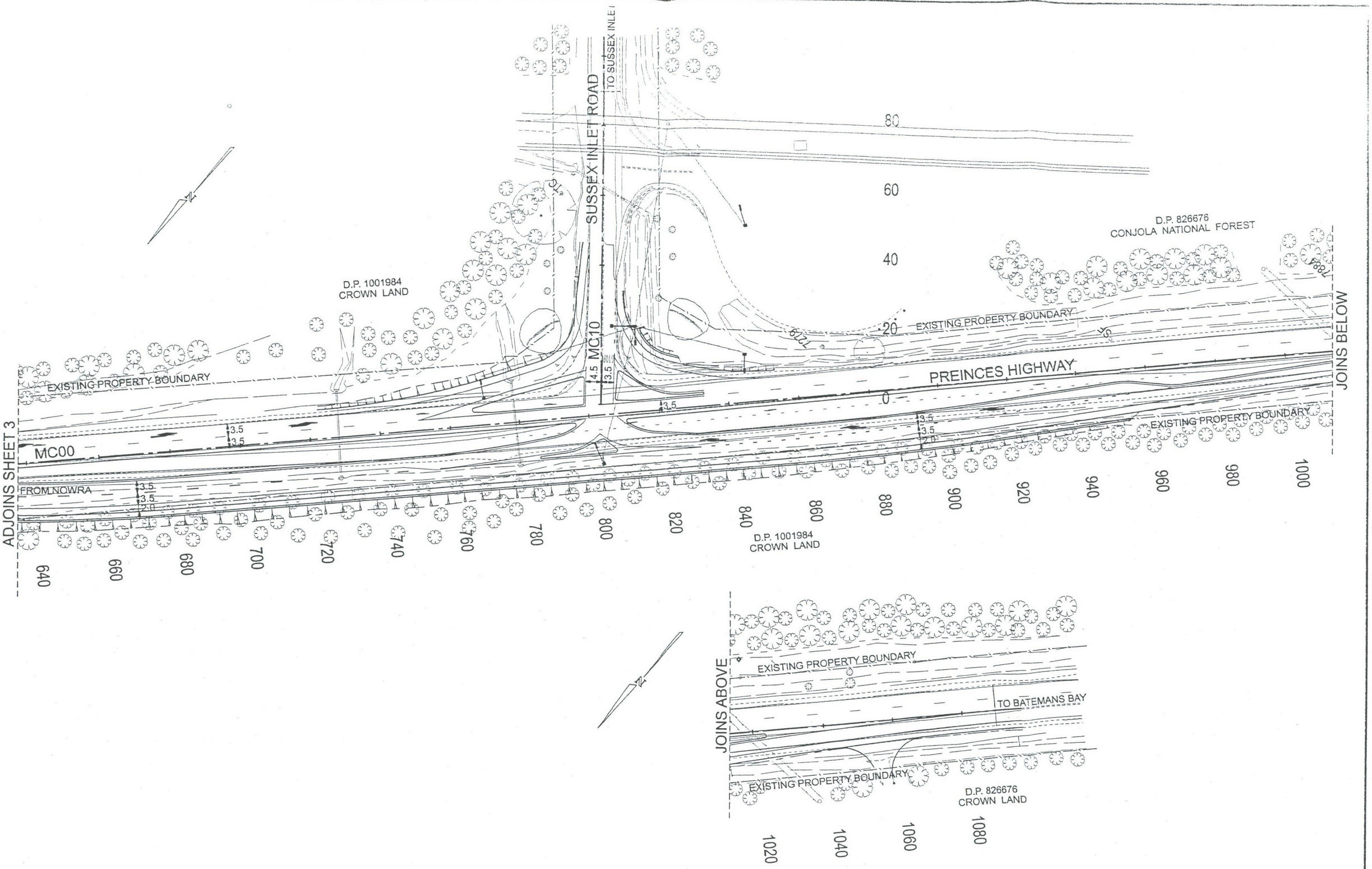

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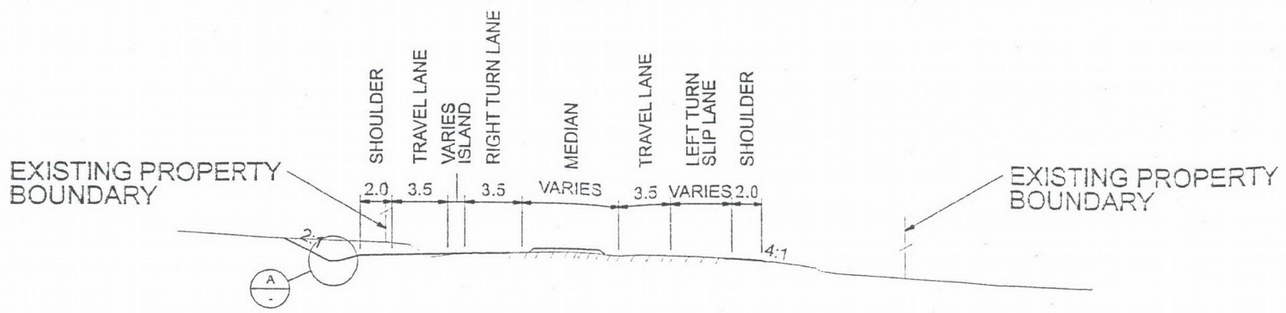

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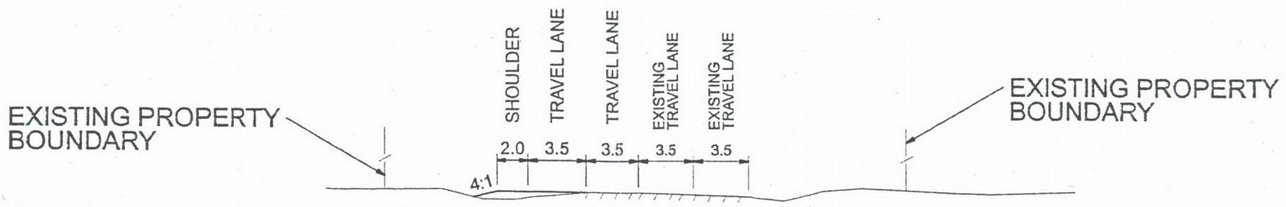

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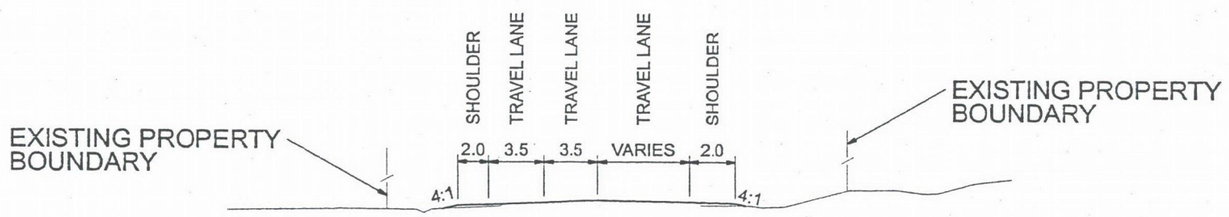

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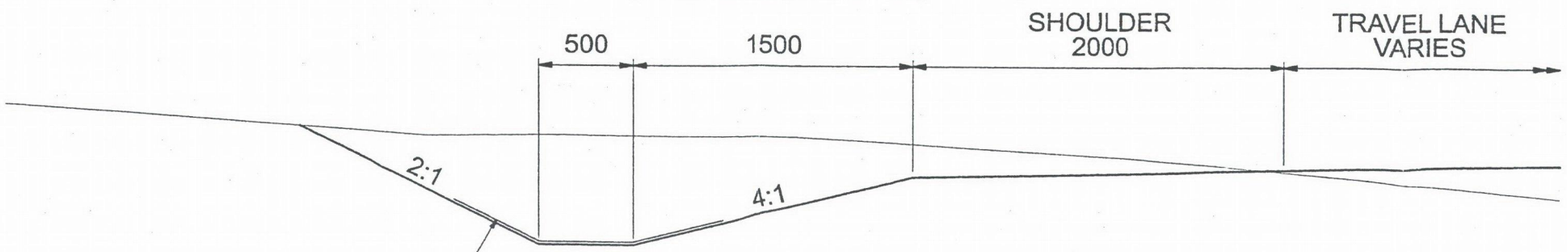

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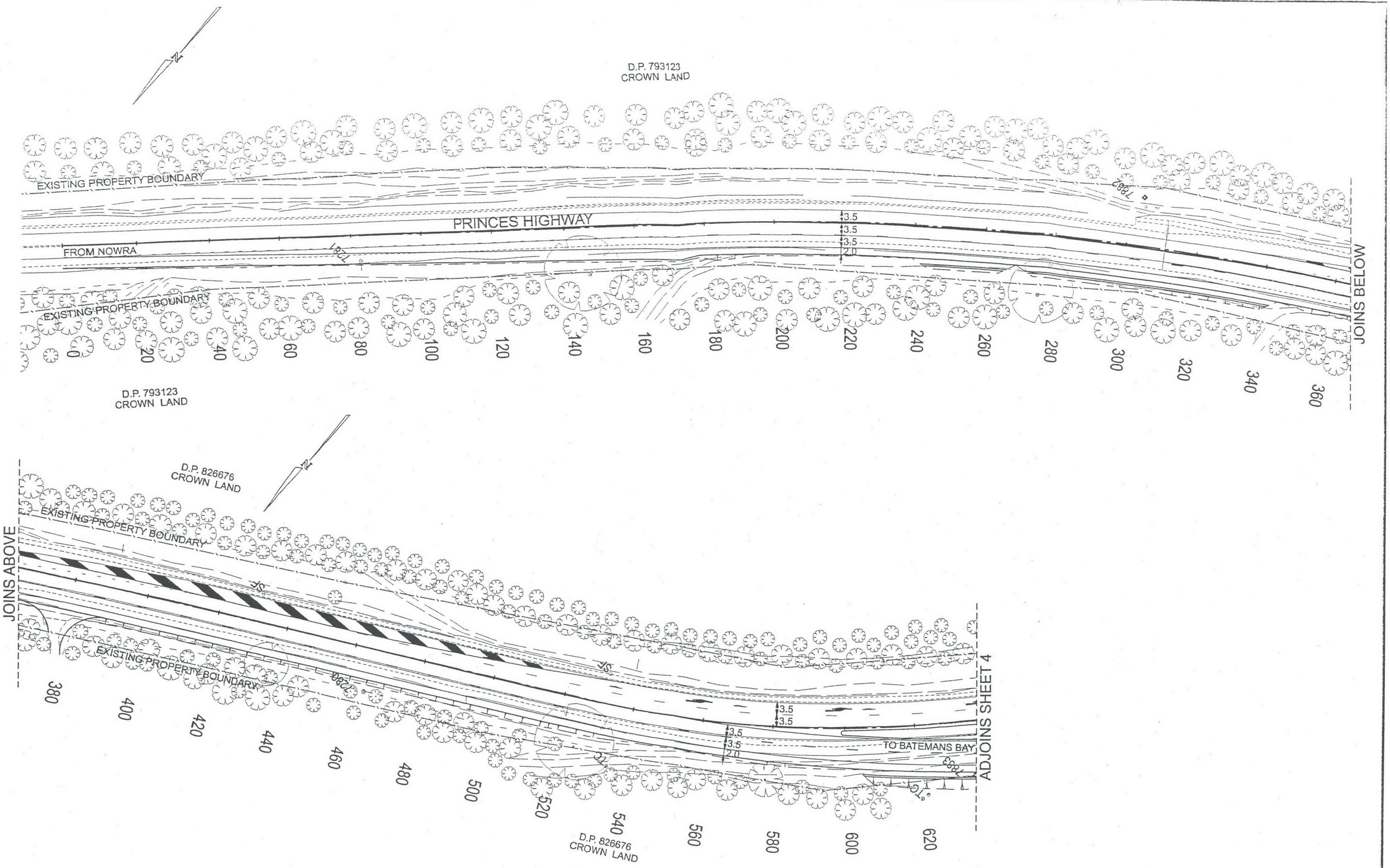

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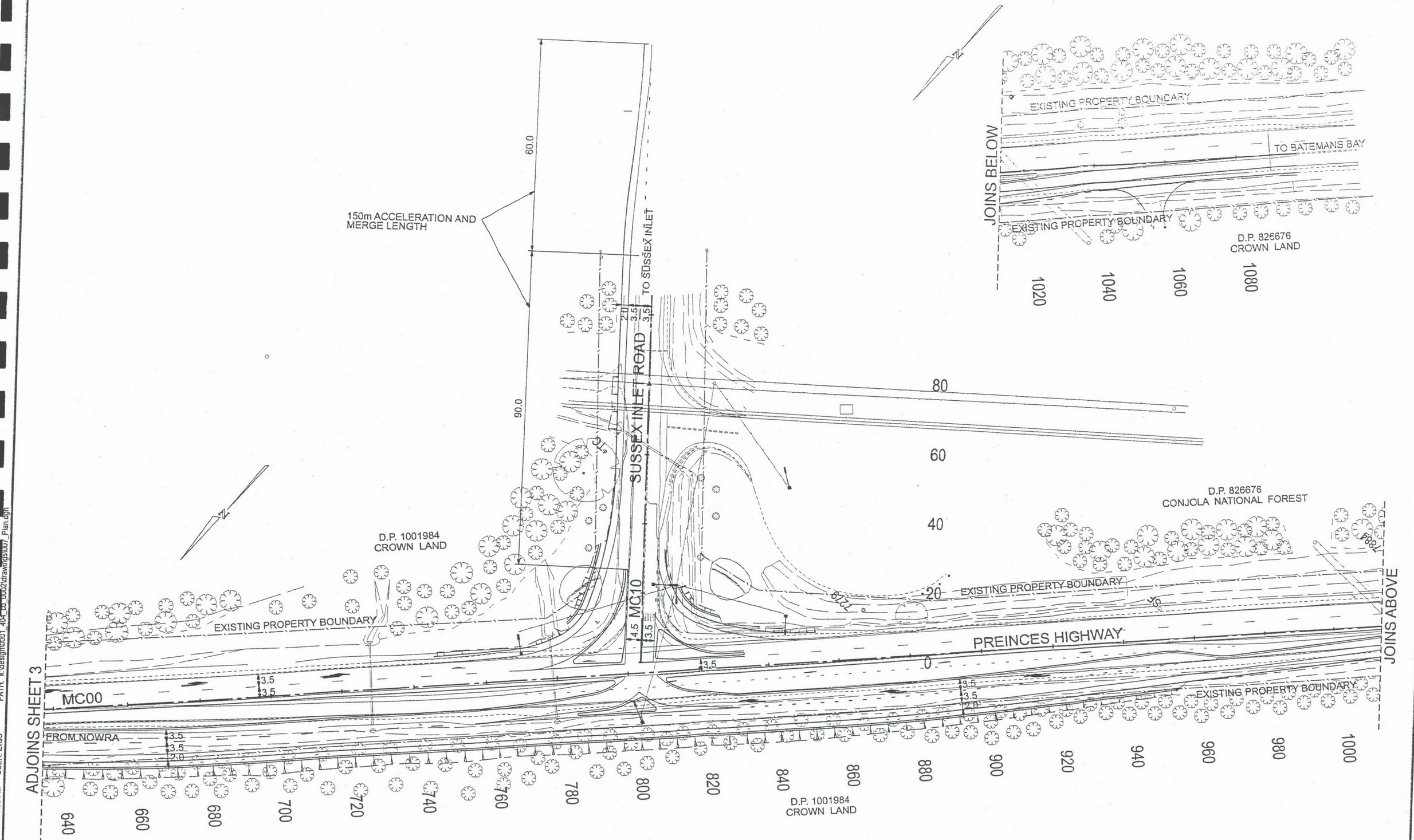

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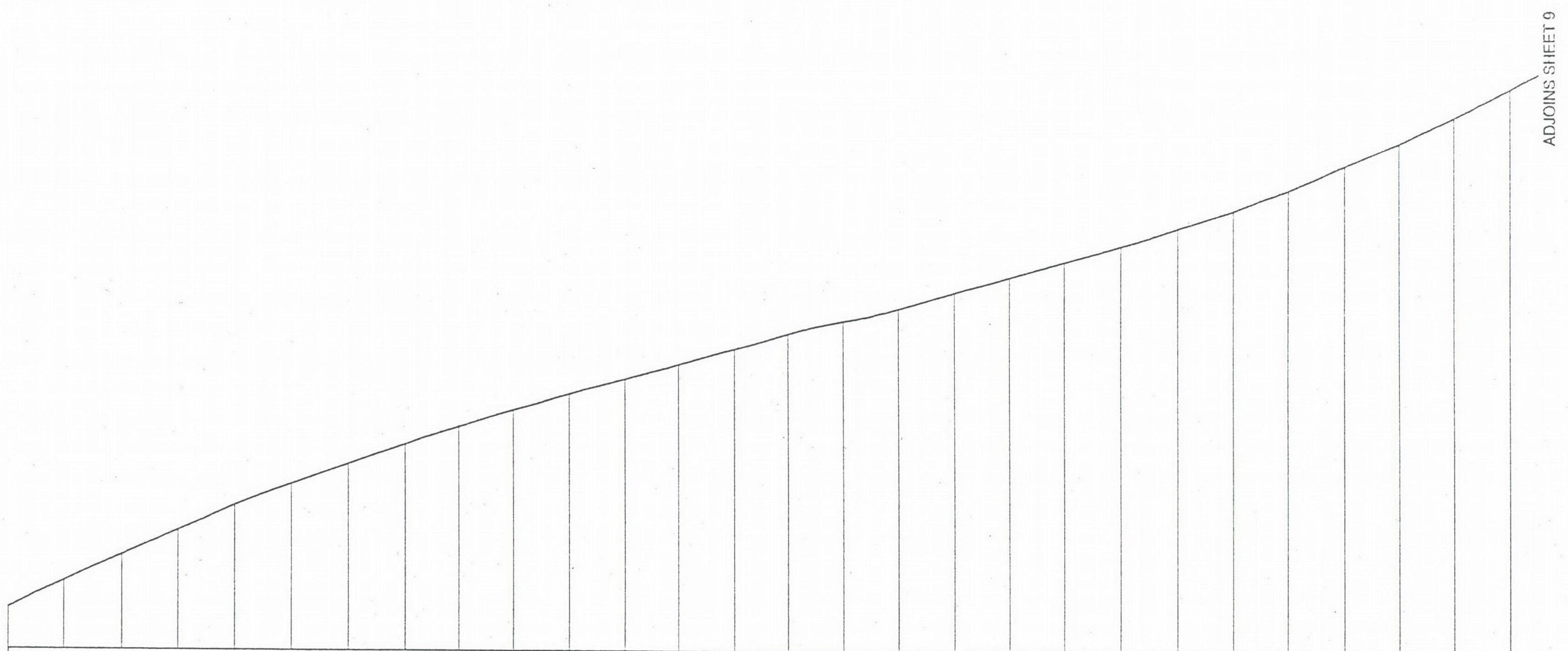

DATUM R.L. 28.0

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HORIZONTAL ALIGN.: STRAIGHT — R -700 — STRAIGHT — R 300

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20.000	30.527	30.527
40.000	31.488	31.488
60.000	32.392	32.392
80.000	33.315	33.315
100.000	34.094	34.094
120.000	34.828	34.828
140.000	35.534	35.534
160.000	36.183	36.183
180.000	36.796	36.796
200.000	37.385	37.385
220.000	37.916	37.916
240.000	38.459	38.459
260.000	39.051	39.051
280.000	39.610	39.610
300.000	40.064	40.064
320.000	40.526	40.526
340.000	41.126	41.126
360.000	41.688	41.688
380.000	42.263	42.263
400.000	42.849	42.849
420.000	43.529	43.529
440.000	44.184	44.184
460.000	44.938	44.938
480.000	45.789	45.789
500.000	46.677	46.677
520.000	47.628	47.628
540.000	48.678	48.678

LONGITUDINAL SECTION - PRINCES HIGHWAY - MC00

No.	Amendment Description	Initials	Date

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

SCALES
VERTICAL SCALE 1:200m (0 2 4 6 8 10)
HORIZONTAL SCALE 1:2000m (0 20 40 60 80 100)

RTA — PREPARED BY TECHNOLOGY AND TECHNICAL SERVICES SOUTHERN PROJECT DESIGN

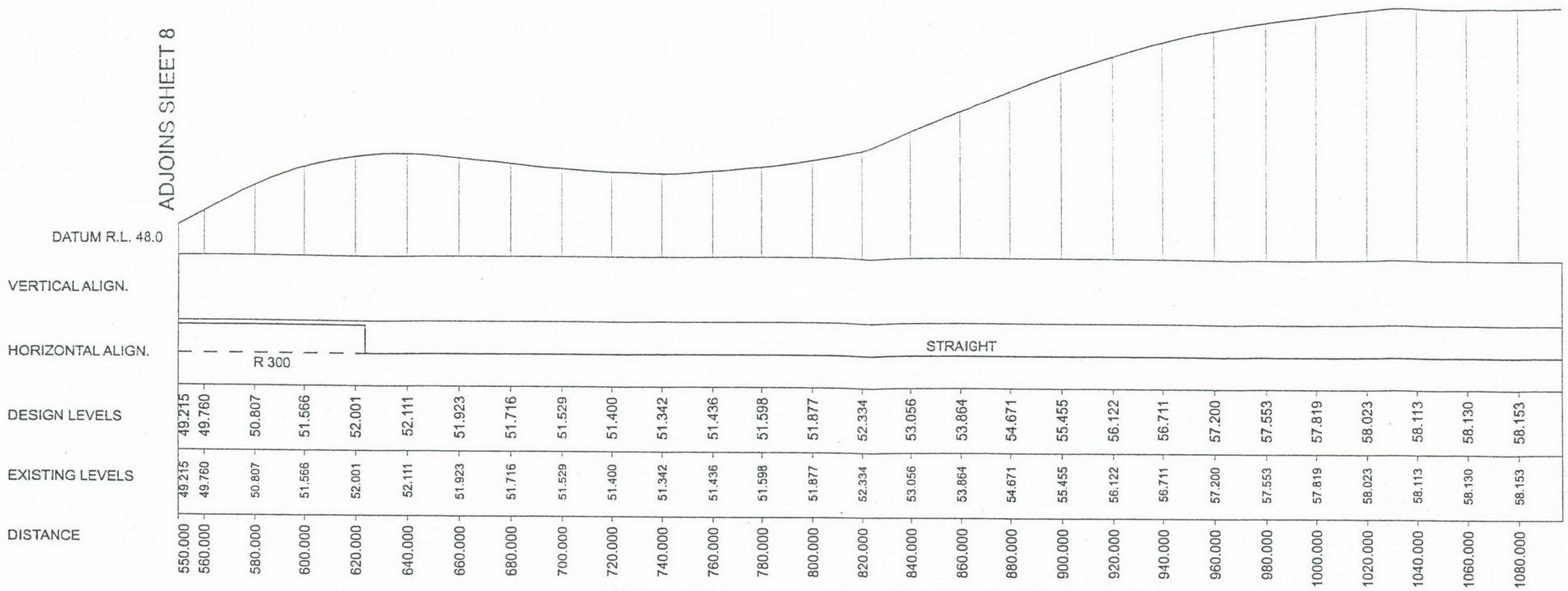
DESIGNED: S.ELLIS
REVIEWED: B.WALTERS

ROADS AND TRAFFIC AUTHORITY OF NSW

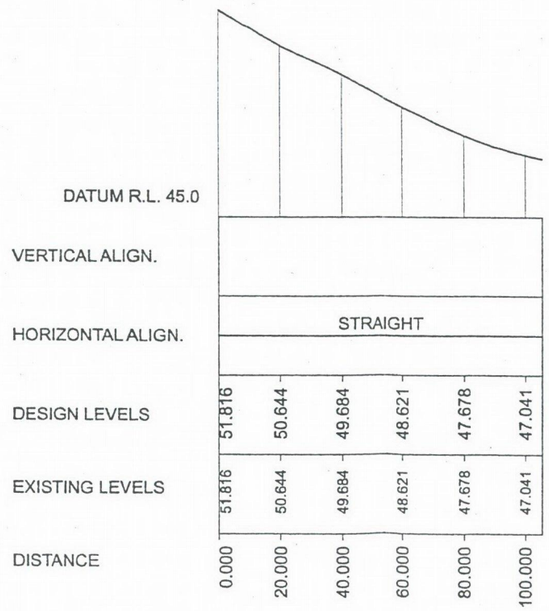
SHOALHAVEN CITY COUNCIL
SH1 PRINCES HIGHWAY
INTERSECTION IMPROVEMENT AT
SUSSEX INLET ROAD
LONGITUDINAL SECTIONS - OPTION 1 & 2

FILE No.	DRAWING	PRINTED DATE	SHEET No.
05M97-1	008_Lsect.	29/07/2005	008

REGISTRATION NUMBER: 0001.404.CD.0002



LONGITUDINAL SECTION - PRINCES HIGHWAY - MC00



LONGITUDINAL SECTION - SUSSEX INLET ROAD - MC10

No.	Amendment Description	Initials	Date

A3 original | This sheet may be prepared using colour and may be incomplete if copied

SCALES
VERTICAL SCALE 1:200m (0 2 4 6 8 10)
HORIZONTAL SCALE 1:2000m (0 20 40 60 80 100)

Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D

RTA PREPARED BY TECHNOLOGY AND TECHNICAL SERVICES SOUTHERN PROJECT DESIGN

DESIGNED. S.ELLIS

REVIEWED. B.WALTERS

ROADS AND TRAFFIC AUTHORITY OF NSW

SHOALHAVEN CITY COUNCIL
SH1 PRINCES HIGHWAY
INTERSECTION IMPROVEMENT AT
SUSSEX INLET ROAD
LONGITUDINAL SECTIONS - OPTION 1 & 2

FILE No.	DRAWING	PRINTED DATE	SHEET No.
05M97-1	009_Lsect.dgn	29/07/2005	009

REGISTRATION NUMBER
0001.404.CD.0002

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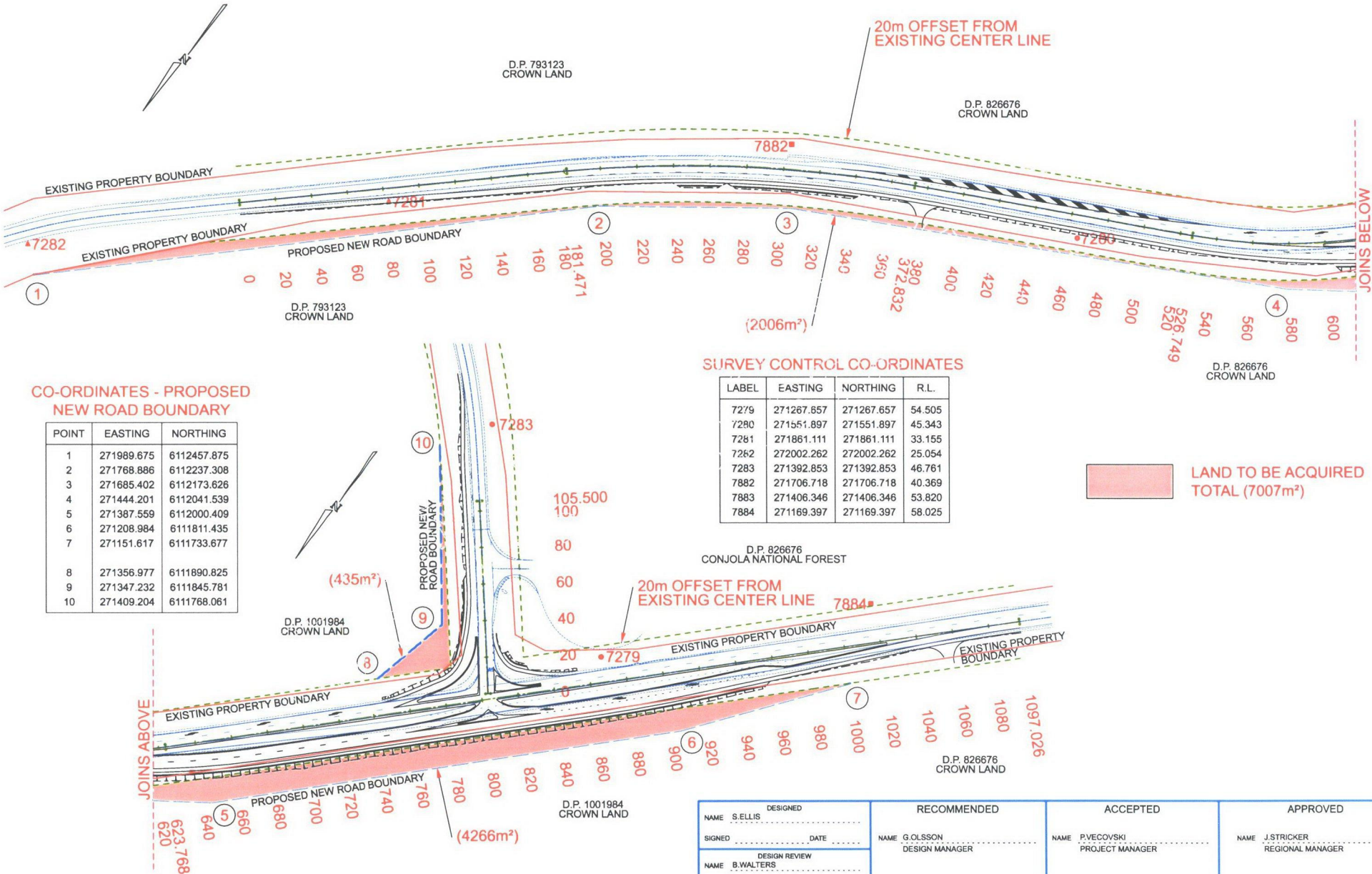
General Sheet



CO-ORDINATES - PROPOSED NEW ROAD BOUNDARY

POINT	EASTING	NORTHING
1	271989.675	6112457.875
2	271768.886	6112237.308
3	271685.402	6112173.626
4	271444.201	6112041.539
5	271387.559	6112000.409
6	271208.984	6111811.435
7	271151.617	6111733.677
8	271356.977	6111890.825
9	271347.232	6111845.781
10	271409.204	6111768.061

SURVEY CONTROL CO-ORDINATES

LABEL	EASTING	NORTHING	R.L.
7279	271267.657	271267.657	54.505
7280	271551.897	271551.897	45.343
7281	271861.111	271861.111	33.155
7282	272002.262	272002.262	25.054
7283	271392.853	271392.853	46.761
7882	271706.718	271706.718	40.369
7883	271406.346	271406.346	53.820
7884	271169.397	271169.397	58.025

	DESIGNED	RECOMMENDED	ACCEPTED	APPROVED
NAME	S.ELLIS	G.OLSSON	P.VECOVSKI	J.STRICKER
		DESIGN MANAGER	PROJECT MANAGER	REGIONAL MANAGER
SIGNED / DATE				

DESIGN REVIEW
NAME B.WALTERS
SIGNED / DATE

No.	Amendment Description	Initials	Date

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

SCALES
0 20 40 60 80 100
SCALE 1:2000m

RTA PREPARED BY TECHNOLOGY AND TECHNICAL SERVICES SOUTHERN PROJECT DESIGN

ROADS AND TRAFFIC AUTHORITY OF NSW

SHOALHAVEN CITY COUNCIL
SH1 PRINCES HIGHWAY
INTERSECTION IMPROVEMENT AT
SUSSEX INLET ROAD
PROPOSED NEW ROAD BOUNDARY

FILE No.	DRAWING	PRINTED DATE	SHEET No.
05M97-1	001_Boundary	02/09/2005	001

REGISTRATION NUMBER
0001.404.SP.2762

PRODUCED 02/09/2005 AT 14:57:51 PM USER: EllisS PATH: k:\design\0001_404_cd_0002\Drawings\001_Boundary.dgn Property Adjustment

Relocation of Telstra Network Plant. (Location) Intersection Sussex Inlet Rd & Princes Hwy

Network Integrity Services (NIS) Details

NIS Ref. No: RW 1778
NIS Contact: Janko Racocaj
Telephone: 0427486922
Date of Issue: 29/08/2005

Customers Details

Name :Adrian Rouse
Postal Address :RTA P.O Box 477
Wollongong NSW 2520
Ph: 0242212479
Fax. 0242273705
Mob: 043161341

Project Brief: Relocate Telstra network due to the re-construction of the intersection.

Scope of Works (SOW) - Refer to the attached sketch plan

1. *Excavate and intercept the existing 20pr cable at Ch 760 and Ch 940.*
2. *Excavate and install a 20pr cable between Ch 760 and Ch 940.*
3. *Cut over between the two chainages and install Elevated Joints.*
4. *Remove and recover all the redundant plant associate with this project.*

Note: Adrian Rouse will supply the final levels, alignments and network cover diagrams within the construction drawing.

Notes:

1. *Customer/Developer and Network Integrity Service Provider (NISP) must obtain and retain on site Telstra Network Plans through "Dial Before You Dig" (Phone No. 1100) prior to commencement of any works.*
2. *All cables are to be identified by the Network Integrity Service Provider (NISP prior to the commencement of work.*
3. *Customer/Developer or Authority to supply all finished levels and alignments prior to the commencement of work.*
4. *After installation all areas to be backfilled and compacted to the formation level by the Network Integrity Service Provider. Final reinstatement of Concrete Paving, Bitumen, Turf areas, etc. should be agreed in between the Customer/Developer and Network Integrity Service Provider.*
5. *Customer/Developer to ensure that the Network Integrity Service Provider to comply with all work OH&S regulations, EPA regulations and Australian Standards before and during construction.*
6. *All Asbestos waste must be bagged and disposed to Telstra OH&S Regulations and Australian Safety Standards.*
7. *All redundant plant shall be recovered and removed by Network Integrity Service Provider.*
8. *Any costs related with interference of other underground utilities are to be borne by the Customer/Developer or Authority.*
9. *No allowance has been made for duct blockage if caused by Customers/Developers or Authorities construction activity.*
10. *Network Integrity Service Provider to complete the necessary code of compliances (NNACS)*

RW 1778– (Location Intersection Sussex Inlet Rd & Princes Hwy)
(date29/08/2005

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11. Network Integrity Service Provider to deliver all recovered cables to RRT 38 Williamson St Ingleburn, Contact: Paul Proctor 0407 004 769
12. The Network Integrity Service Provider shall liaise with Cable Protection (CPAS) to maintain the integrity of the air filled cables. Contact: John Norton (02) 8732 0169
13. The Industry Specialist shall confirm the presence of CATV network with NIS field staff and get an approval from John Dempsey – Broadband HFC, Ph: (03) 9634 4776.
14. Customer/Developer and the Network Integrity Service Provider shall identify the other telecommunication carriers and advise them/NIS of the impact on their network
15. Industry Specialist shall only invoice to the customer/developer after an approved completion certificate has been issued by NIS, Telstra
16. Customer/developer shall only make payment to the Industry Specialist upon receipt of the completion certificate issued by NIS, Telstra

Approved by:

Name: Ray Munt

Signature: R. Munt

Position: Project Manager

Date: 31/8/05

For Network Integrity Services

Approved by:

Name: ____________________

Signature: ____________________

Position: ____________________

Date: ___/___/___

For Customer/Developer/Authority

APPENDIX C
DATABASE SEARCH RESULTS

Department of
Environment and Conservation (NSW)

Your reference : Princes Hwy, Wandandian
Our reference : AHIMS #13620

RTA - Environment Technology/Parramatta
Po Box 3035
Parramatta NSW 2150

Tuesday, 09 August 2005

Attention: Susan Westacott

Dear Sir or Madam:

Re: AHIMS Search for the following area at Princes Highway near Wandandian;Z:56;E: 265000-280000;N: 6105000-62100000

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Conservation (DEC) at the above location.

A search of the DEC Aboriginal Heritage Information Management System (AHIMS) has shown that *76* Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

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

The following qualifications apply to an AHIMS search:

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

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

- It is registered on AHIMS;
- It is known to the Aboriginal community; or

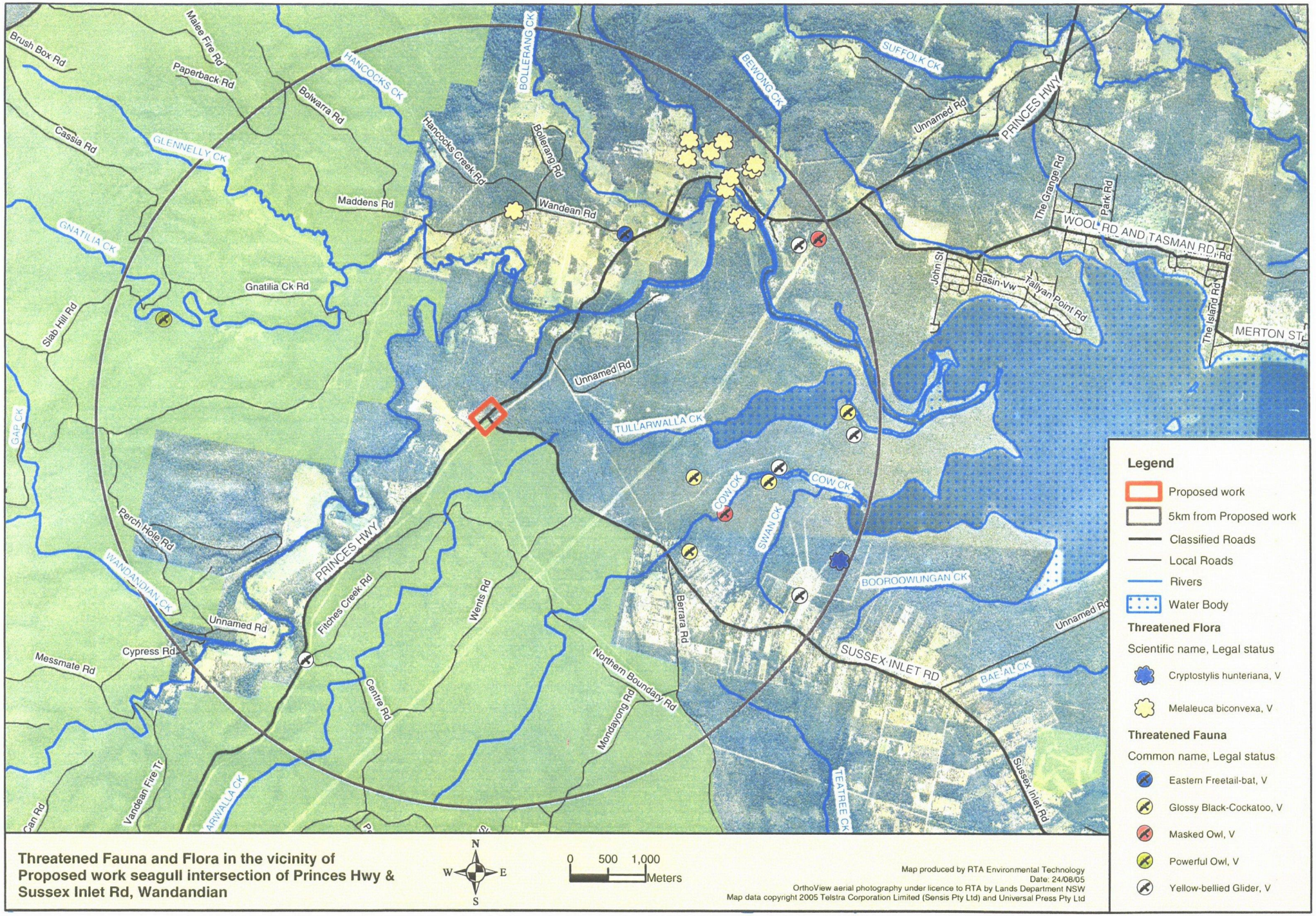
PO Box 1967 Hurstville NSW 2220
43 Bridge Street Hurstville NSW 2220
Telephone (02) 9585 6345
Facsimile (02) 9585 6094
ABN 30 841 387 271
ahims@environment.nsw.gov.au
www.environment.nsw.gov.au

- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DEC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

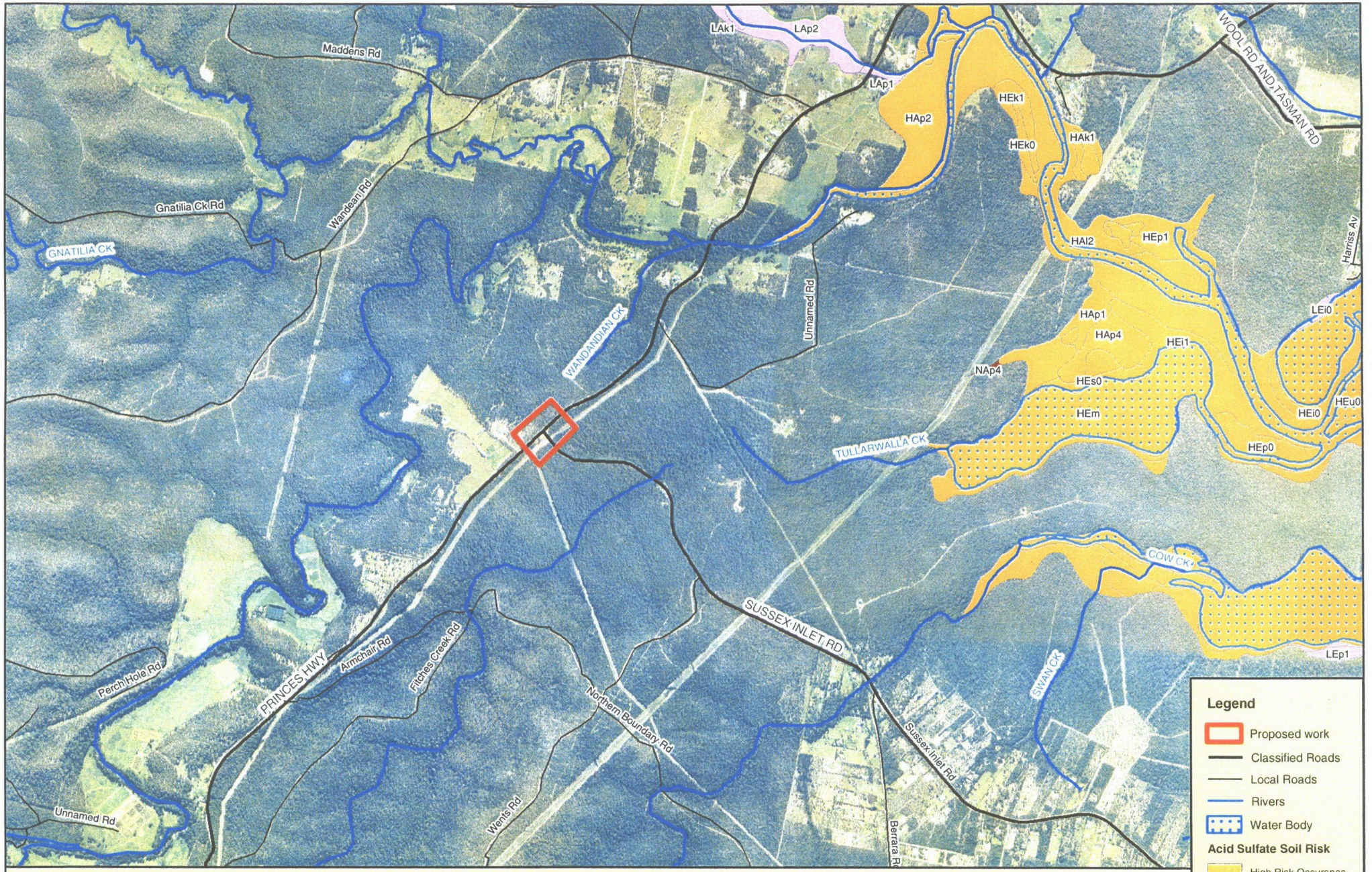
Yours Sincerely

Gordon, David
Administrator
Information Systems Section
Cultural Heritage Division
Phone: 02 9585 6513
Fax: 02 9585 6094



Threatened Fauna and Flora in the vicinity of Proposed work seagull intersection of Princes Hwy & Sussex Inlet Rd, Wandandian

Map produced by RTA Environmental Technology
Date: 24/08/05
OrthoView aerial photography under licence to RTA by Lands Department NSW



Acid Sulfate Soil Risk Map surrounding of Proposed work seagull intersection of Princes Hwy & Sussex Inlet Rd, Wandandian

Map produced by RTA Environmental Technology
Date: 24/08/05
OrthoView aerial photography under licence to RTA by Lands Department NSW

Click on the BACK button of your browser to return to the search.

Statutory Listed Items

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

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

Section 1. Items listed under the NSW Heritage Act.

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

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	Listed Under Heritage Act
Berry Courthouse	58 Victoria Street	Berry	Shoalhaven	Yes
Berry Railway Station group	Illawarra railway	Berry	Shoalhaven	Yes
Berry Railway Station group movable relics	Illawarra railway	Berry	Shoalhaven	Yes
Bomaderry Railway Station and yard group	Illawarra railway	Bomaderry	Shoalhaven	Yes
David Berry Hospital - Original Buildings & Gate House	Beach Road	Berry	Shoalhaven	Yes
Graham Lodge	Pleasant Way	Nowra	Shoalhaven	Yes
Lady Denman (M.V.)	Dent Street	Huskisson	Shoalhaven	Yes
Meroogal	35 West Street	Nowra	Shoalhaven	Yes

There were **8** records in this section matching your search criteria.

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

Item Name (sort)	Address (sort)	Suburb (sort)	LGA (sort)	Information Source (sort)
Aboriginal heritage, Culburra Urban Area		Culburra	Shoalhaven	GAZ
Angelwood incl. Original garden, excl. mod.	Yean Street	Burradoo	Shoalhaven	GAZ

Additions				
ANZ Bank (Former)	Queen Street	Berry	Shoalhaven	GAZ
Applegarth	Wilford's Road	Milton	Shoalhaven	GAZ
Bank and Post Office Group incl. fmr ANZ Bank & CBC Bank	Queen Street	Berry	Shoalhaven	GAZ
Barrengarry House		Barrengarry	Shoalhaven	GAZ
Barrengarry Public School and Principal's Residence		Barrengarry	Shoalhaven	GAZ
Berry Estate Cottage	Pulman Street	Berry	Shoalhaven	GAZ
Berry Railway Station Group		Berry	Shoalhaven	SGOV
Bomaderry Railway Station And Yard Group		Bomaderry	Shoalhaven	SGOV
Bundanon and surrounding landscape	Shoalhaven River	Nowra	Shoalhaven	GAZ
CBC Bank	Queen Street	Berry	Shoalhaven	GAZ
Church of the Good Shepherd Anglican & rectory		Kangaroo Valley	Shoalhaven	GAZ
Coolangatta Estate	Shoalhaven Heads Road	Coolangatta	Shoalhaven	GAZ
Cottage	19 Pulman Street	Berry	Shoalhaven	GAZ
Courthouse	Princes Highway	Milton	Shoalhaven	GAZ
Courthouse (former)	Shoalhaven Road	Kangaroo Valley	Shoalhaven	GAZ
Creek Hospital	Pulman Street	Berry	Shoalhaven	GAZ
Danes Bank Cottage	Evans Lane	Milton	Shoalhaven	GAZ
David Berry Hospital		Berry	Shoalhaven	GAZ
Garrad House	PRINCES HIGHWAY	MILTON	Shoalhaven	SGOV
Gate House	SEE DAVID BERRY HOSPITAL ACT NO.53 1906	WAVERTON	Shoalhaven	SGOV
Hampden Bridge		Kangaroo Valley	Shoalhaven	GAZ
Hampton Villa	Berry Street	Nowra	Shoalhaven	GAZ
Inverness - two storey house	Southern Road	Terara	Shoalhaven	GAZ
James Wilson Store (former)	97 Queen Street	Berry	Shoalhaven	GAZ
Kendall Dale	Princes Highway	Milton	Shoalhaven	GAZ
Kirmington	Princes Highway (west of)	Milton	Shoalhaven	GAZ
Main Building	SEE DAVID BERRY HOSPITAL ACT NO.53 1906	WAVERTON	Shoalhaven	SGOV

Mechanics Institute and School of Arts	Berry Street	Nowra	Shoalhaven	GAZ
Meroogal House, Servant's wing and stables	35 West Street	Nowra	Shoalhaven	GAZ
Methodist Church (former)	Croobyar Road	Milton	Shoalhaven	GAZ
Minto House	102 PRINCES HIGHWAY	MILTON	Shoalhaven	SGOV
Mount Airlie	Woodstock Road	Milton	Shoalhaven	GAZ
National Australia Bank	Princes Highway	Milton	Shoalhaven	GAZ
Old Nowra Road Bridge - across Shoalhaven River	Princes Highway	Nowra	Shoalhaven	GAZ
Pickering's Old Store Group incl. Pickering's Old Store Residence	Princes Highway	Milton	Shoalhaven	GAZ
Plunket Street Conservation Area	Plunket Street	Nowra	Shoalhaven	GAZ
Point Perpendicular Lighthouse Group		Point Perpendicular	Shoalhaven	GAZ
Principal's Residence	Greenwell Point Road	Pyree	Shoalhaven	GAZ
Principal's Residence		Cambewarra	Shoalhaven	GAZ
Public School	Victoria Street	Berry	Shoalhaven	GAZ
Public School		Terara	Shoalhaven	GAZ
Public School		Kangaroo Valley	Shoalhaven	GAZ
Pulman Street Group		Berry	Shoalhaven	GAZ
Rectory		Kangaroo Valley	Shoalhaven	GAZ
Residence	Pulman Street	Berry	Shoalhaven	GAZ
SHOALHAVEN DISTRICT MEMORIAL HOSPITAL	SHOALHAVEN STREET	NOWRA	Shoalhaven	SGOV
St Andrew's Presbyterian Church		Nowra	Shoalhaven	GAZ
St Lukes Anglican Church	Princes Street	Berry	Shoalhaven	GAZ
St Lukes Anglican Rectory	Princes Street	Berry	Shoalhaven	GAZ
Tapalla Point Rock Platforms		Huskisson	Shoalhaven	GAZ
Terara House		Terara	Shoalhaven	GAZ
Town Hall		Milton	Shoalhaven	GAZ
Ulladulla Lighthouse	Warden Head	Ulladulla	Shoalhaven	GAZ
Uniting Church		Milton	Shoalhaven	GAZ
Whoppidally	Princes Highway	Milton	Shoalhaven	GAZ
Wilson Memorial Drinking Fountain	Alexandra Street	Berry	Shoalhaven	GAZ

Wintersloe	45 Links Road	Bowral	Shoalhaven	GAZ
Wogamia House	Yalwal Road (via)	Wogamia	Shoalhaven	GAZ

There were **60** records in this section matching your search criteria.

There was a total of **68** records matching your search criteria.

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

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

Australian Heritage Database

Search Results

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

105 results found.

Anglican Church of the Good Shepherd 143 Moss Vale Rd	Kangaroo Valley, NSW	(Registered) Register of the National Estate
Badgerys Lookout View	Tallong, NSW	(Indicative Place) Register of the National Estate
Barren Grounds Nature Reserve Jamberoo Mountain Rd	Jamberoo, NSW	(Registered) Register of the National Estate
Beecroft Peninsula Currarong Rd	Currarong, NSW	(Listed place) Commonwealth Heritage List
Beecroft Peninsula (Commonwealth) Currarong Rd	Currarong, NSW	(Registered) Register of the National Estate
Beecroft Peninsula / Lake Wollumboola Currarong Rd	Currarong, NSW	(Registered) Register of the National Estate
Belowla Island Nature Res	Kioloa, NSW	(Registered) Register of the National Estate
Benandarah Area Princes Hwy	Benandarah, NSW	(Registered) Register of the National Estate
Berry Bank and Post Office Group Queen St	Berry, NSW	(Registered) Register of the National Estate
Berry Courthouse 58 Victoria St	Berry, NSW	(Registered) Register of the National Estate
Berry District Princes Hwy	Berry, NSW	(Indicative Place) Register of the National Estate
Berry Local History Museum 135 Queen St	Berry, NSW	(Registered) Register of the National Estate
Berry Post Office Queen St	Berry, NSW	(Registered) Register of the National Estate
Berry Soldiers Memorial & Memorial Avenue Alexandra St	Berry, NSW	(Indicative Place) Register of the National Estate
Birrell & Davis Dam & Quarries	Nerriga, NSW	(Indicative Place) Register of the National Estate
Black Ash Nature Reserve Berry Mountain Rd	Berry, NSW	(Registered) Register of the

Bomaderry Creek Gorge West Cambewarra Rd	Bomaderry, NSW	National Estate (Registered)
Bomaderry Creek Zieria Baeuerlenii Site West Cambewarra Rd	Bomaderry, NSW	Register of the National Estate (Registered)
Bomaderry Creek Zieria Baeuerlenii Site 2 West Cambewarra Rd	Bomaderry, NSW	Register of the National Estate (Registered)
Bomaderry Public School (1893 building) 5 Birrilley St	Bomaderry, NSW	Register of the National Estate (Indicative Place)
Boolgatta Farm Group Princes Hwy	Yatteyyattah via Milton, NSW	Register of the National Estate (Indicative Place)
Brush Island Nature Reserve	Bawley Point, NSW	Register of the National Estate (Registered)
Budawang National Park Budawang Rd	Monga, NSW	Register of the National Estate (Registered)
Bundanon Commonwealth Land Area Illaroo Rd	Nowra, NSW	Register of the National Estate (Indicative Place)
Bundanon Including Landscape Illaroo Rd	Nowra, NSW	Register of the National Estate (Registered)
Bundanon Including Landscape Illaroo Rd	Nowra, NSW	Register of the National Estate (Indicative Place)
Cambewarra Mountain Area Cambewarra Rd	Cambewarra, NSW	Commonwealth Heritage List (Registered)
Church of the Good Shepherd Rectory (former) Rectory Park Way	Kangaroo Valley, NSW	Register of the National Estate (Registered)
Clyde River Kings Hwy	Batemans Bay, NSW	Register of the National Estate (Indicative Place)
Coolangatta Estate Bolong Rd	Shoalhaven Heads, NSW	Register of the National Estate (Registered)
Coolangatta Estate Billiards Room (former) Bolong Rd	Shoalhaven Heads, NSW	Register of the National Estate (Registered)
Coolangatta Estate Blacksmiths Shop (former) Bolong Rd	Shoalhaven Heads, NSW	Register of the National Estate (Registered)
Coolangatta Estate Coach House (former) Bolong Rd	Shoalhaven Heads, NSW	Register of the National Estate (Registered)
Coolangatta Estate Coach House (former) Bolong Rd	Shoalhaven Heads, NSW	Register of the National Estate (Registered)
Coolangatta Estate Community Hall (former) Bolong Rd	Shoalhaven Heads, NSW	Register of the National Estate (Registered)

Coolangatta Estate Convict Cottage (former) Bolong Rd	Shoalhaven Heads, NSW	National Estate (Registered) Register of the National Estate
Coolangatta Estate Office (former) Bolong Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Coolangatta Estate Stables & Coachmans Residence (former) Bolong Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Coolangatta Estate The Cottage Bolong Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Coolangatta Estate Tinsmiths Shop & Residence (former) Bolong Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Coomonderry Swamp Nature Reserve Proposal Gerroa Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Crocodile Head Area Lighthouse Rd	Currarong, NSW	(Within Listed Place) Commonwealth Heritage List
Cudmirrah Nature Reserve (1980 boundary)	Berrara, NSW	(Registered) Register of the National Estate
Cudmirrah Ornithological Area Berrara Rd	Berrara, NSW	(Indicative Place) Register of the National Estate
Currarong Rockshelters Area Currarong Rd	Currarong, NSW	(Within Listed Place) Commonwealth Heritage List
Devils Glen Nature Reserve Berry Mountain Rd	Berry, NSW	(Registered) Register of the National Estate
Ettrema / Bundundah Wilderness	Nerriga, NSW	(Indicative Place) Register of the National Estate
Fitzroy Falls Geological Area Moss Vale Kangaroo Valley Rd	Fitzroy Falls, NSW	(Indicative Place) Register of the National Estate
Gurumbi Nature Reserve Jervis Bay Rd	Erowal Bay, NSW	(Registered) Register of the National Estate
Hampden Bridge Moss Vale Rd	Kangaroo Valley, NSW	(Registered) Register of the National Estate
Indigenous Place	Bawley Point, NSW	(Registered) Register of the National Estate
Indigenous Place	Burrill Lake, NSW	(Registered) Register of the National Estate
Indigenous Place	Currarong, NSW	(Registered) Register of the National Estate

Indigenous Place	Currarong, NSW	(Registered) Register of the National Estate
Indigenous Place	Durras North, NSW	(Registered) Register of the National Estate
Indigenous Place	Kangaroo Valley, NSW	(Indicative Place) Register of the National Estate
Indigenous Place	Kioloa, NSW	(Registered) Register of the National Estate
Indigenous Place	Nowra, NSW	(Registered) Register of the National Estate
Indigenous Place	Orient Point, NSW	(Indicative Place) Register of the National Estate
Indigenous Place	Pebbly Beach via Durras North, NSW	(Registered) Register of the National Estate
Indigenous Place	Sassafras via Nerriga, NSW	(Registered) Register of the National Estate
Indigenous Place	Termeil, NSW	(Indicative Place) Register of the National Estate
Indigenous Place	Wandandian, NSW	(Registered) Register of the National Estate
Jervis Bay and Surrounds	Jervis Bay, NSW	(Registered) Register of the National Estate
Kangaroo Valley Kangaroo Valley Rd	Kangaroo Valley, NSW	(Indicative Place) Register of the National Estate
Kangaroo Valley Pioneer Settlement Moss Vale Rd	Kangaroo Valley, NSW	(Rejected Place) Register of the National Estate
Kangaroo Valley Police Station & Courthouse (former) Moss Vale Rd	Kangaroo Valley, NSW	(Registered) Register of the National Estate
Kangaroo Valley Soldiers Memorial Moss Vale Rd	Kangaroo Valley, NSW	(Indicative Place) Register of the National Estate
Kangaroo and Lower Shoalhaven Rivers Moss Vale Rd	Kangaroo Valley, NSW	(Rejected Place) Register of the National Estate
Kirmington Princes Hwy	Yatteyattah via Milton, NSW	(Registered) Register of the National Estate
Meroogal 35 West St	Nowra, NSW	(Registered) Register of the National Estate
Mill Bank House and associated buildings Millbank Rd	Terara, NSW	(Indicative Place) Register of the National Estate

Milton Courthouse 64 Princes Hwy	Milton, NSW	(Registered) Register of the National Estate
Morton National Park (1980 boundary)	Bundanoon, NSW	(Registered) Register of the National Estate
Murramarang Area Princes Hwy	Benandarah, NSW	(Registered) Register of the National Estate
Murramarang National Park (1980 boundary) Durras Rd	Durras, NSW	(Registered) Register of the National Estate
Narrawallee Inlet Matron Porter Dr	Narrawallee via Mollymook, NSW	(Registered) Register of the National Estate
Narrawallee Inlet and Nature Reserve Lake Conjola Entrance Rd	Lake Conjola, NSW	(Registered) Register of the National Estate
Narrawilly Princes Hwy	Milton, NSW	(Indicative Place) Register of the National Estate
National Bank Queen St	Berry, NSW	(Registered) Register of the National Estate
Nowra Post Office (former) 72 Junction St	Nowra, NSW	(Registered) Register of the National Estate
Nowra Road Bridge Princes Hwy	Nowra, NSW	(Registered) Register of the National Estate
Nowra Soldiers Memorial Junction St	Nowra, NSW	(Indicative Place) Register of the National Estate
Nowra South African War Memorial Junction St	Nowra, NSW	(Indicative Place) Register of the National Estate
Parma Farm and outbuildings Parma Rd	Falls Creek, NSW	(Indicative Place) Register of the National Estate
Penguin Head Geological Site Penguin Head Rd	Culburra, NSW	(Indicative Place) Register of the National Estate
Pigeon House Mountain and Surrounding Area Pigeon House Rd	Milton, NSW	(Registered) Register of the National Estate
Plantation Point Rock Platform Plantation Point Pde	Vincentia, NSW	(Registered) Register of the National Estate
Plunket Street Precinct Plunket St	Nowra, NSW	(Registered) Register of the National Estate
Point Perpendicular Lightstation Lighthouse Rd	Currarong, NSW	(Registered) Register of the National Estate
Point Perpendicular Lightstation Lighthouse Rd	Currarong, NSW	(Listed place) Commonwealth Heritage List

Public School 140 Moss Vale Rd	Kangaroo Valley, NSW	(Registered) Register of the National Estate
Red Rocks Nature Reserve Nugents Creek Rd	Kangaroo Valley, NSW	(Registered) Register of the National Estate
Remains of Original Coolangatta Estate Homestead Bolong Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Rock Platform Pacific Cr	Ulladulla, NSW	(Rejected Place) Register of the National Estate
Rodway Nature Reserve Wattamolla Rd	Berry, NSW	(Registered) Register of the National Estate
School of Arts (former) 71 Princes Hwy	Milton, NSW	(Registered) Register of the National Estate
Seven Mile Beach National Park Gerroa Rd	Shoalhaven Heads, NSW	(Registered) Register of the National Estate
Shoalhaven Historical Society Museum Plunket St	Nowra, NSW	(Registered) Register of the National Estate
Snapper Point Nursery Beds	Kioloa, NSW	(Registered) Register of the National Estate
Swan Lake / Cudmirrah Area Sussex Inlet Rd	Sussex Inlet, NSW	(Indicative Place) Register of the National Estate
Tapalla Point Rock Platforms Nowra St	Huskisson, NSW	(Registered) Register of the National Estate
Union Church Jervis St	Greenwell Point, NSW	(Indicative Place) Register of the National Estate
Warden Head Geological Site Deering St	Ulladulla, NSW	(Registered) Register of the National Estate
Warden Head Lighthouse Deering St	Ulladulla, NSW	(Registered) Register of the National Estate

Report Produced: Wed Aug 3 13:03:01 2005

Australian Heritage Database

Place Details

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

Send Feedback

Swan Lake / Cudmirrah Area, Sussex Inlet Rd, Sussex Inlet, NSW

Photographs: None
List: Register of the National Estate
Class: Natural
Legal Status: Indicative Place
Place ID: 18945
Place File No: 1/11/102/0072
Nominator's Statement of Significance:
Uncommon bangalay and blackbutt forest on holocene dunes, which is a habitat to several uncommon faunal species.
Official Values: Not Available
Description:
Low lying, sand dune and sedimentary rock area that contains three coastal lakes. Lakes contain seagrass beds while terrestial areas support open eucalypt forest and woodland.
History: Not Available
Condition and Integrity:
Good.
Location:
About 3800ha, 3km south-west of Sussex Inlet.
Bibliography:

Benson J., Andrew D. and Campbell D. (1986). Cudmirrah Sand Dunes - Reoprt on Flora and Fauna. NPWS, Unpublished.
Bucher, D and Saenger, P (1989) An Inventory of Australian Estuaries and Enclosed Marine Waters, Vol 2. Australian Recreational and Sport Fishing Confederation.

NSW National Parks and Wildlife Service. (1977). Cudmirrah Nature Reserve Additions. NPWS Unpublished.
NSw National Parks and Wildlife Service (1985). Proposed Additions to Cudmirrah Nature Reserve. NPWS Unpublished.

Report Produced: Wed Aug 3 13:03:30 2005

Management overview
Site auditor scheme
Guidelines under the CLM Act
Record of EPA notices
Engaging a consultant
Frequently asked questions
More information about land

Search results

Your search for: LGA: Shoalhaven City Council

Matched 1 notice relating to 1 site.

Search again | Refine search

Suburb	Address	Site Name	Notices related to this site
Nowra	Lamonds Lane	Nowra Gasworks	1 current

Page 1 of 1

Print-friendly version

3 August 2005

NSW DEPARTMENT OF PRIMARY INDUSTRIES | AGRICULTURE

Noxious weed declarations in NSW

Shoalhaven

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

Common name	Scientific name	Category	
African boxthorn	*Lycium ferocissimum*	W2	details
African love grass	*Eragrostis curvula*	W2	details
Alligator weed	*Alternanthera philoxeroides*	W1	details
Bathurst Noogoora Californian Cockle burrs	*Xanthium spp.*	W2	details
Bitou bush Boneseed	*Chrysanthemoides monilifera*	W2	details
Black knapweed	*Centaurea nigra*	W1	details
Blackberry	*Rubus fruticosus (agg. spp.)*	W2	details
Broomrape	*Orobanche spp.*	W1	details
Cabomba	*Cabomba spp.*	W4g	details
Crofton weed	*Ageratina adenophora*	W2	details
Dodder	*Cuscuta campestris*	W2	details
Fireweed	*Senecio madagascariensis*	W2/W3	details
Giant Parramatta grass	*Sporobolus fertilis syn. Sporobolus indicus var. major*	W2	details
Gorse	*Ulex europaeus*	W2	details
Green cestrum	*Cestrum parqui*	W2	details
Harrisia cactus	*Harrisia spp.*	W4f	details
Hawkweed	*Hieracium spp.*	W1	details
Horsetail	*Equisetum spp.*	W1	details
Karroo thorn	*Acacia karroo*	W1	details
Kochia	*Kochia scoparia*	W1	details
Lagarosiphon	*Lagarosiphon major*	W1	details
Mexican feather grass	*Nassella tenuissima syn Stipa tenuissima*	W1	details
Miconia	*Miconia spp.*	W1	details
Mistflower	*Ageratina riparia*	W2	details
Nodding thistle	*Carduus nutans*	W2	details
Pampas grass	*Cortaderia spp.*	W2	details
Parthenium weed	*Parthenium hysterophorus*	W1	details
Prickly pears	*Opuntia spp.*	W4f	details
Privet - broadleaf	*Ligustrum lucidum*	W4b	details

Privet - narrowleaf	*Ligustrum sinense*	W4b	details
Rhus tree	*Toxicodendron succedaneum*	W2	details
Salvinia	*Salvinia molesta*	W1	details
Scotch English broom	*Cytisus scoparius*	W2	details
Senegal tea plant	*Gymnocoronis spilanthoides*	W1	details
Serrated tussock	*Nassella trichotoma*	W2	details
Siam weed	*Chromolaena odorata*	W1	details
Spotted knapweed	*Centaurea maculosa*	W1	details
St John's wort	*Hypericum perforatum*	W2	details
Water hyacinth	*Eichhornia crassipes*	W2	details
Water lettuce	*Pistia stratiotes*	W1	details
Willows	*Salix spp.*	W4g	details

Return to start page

What is the weather usually like?

- Climate Averages for Australian Sites -

Averages for JERVIS BAY (POINT PERPENDICULAR LIGHTHOU

Make sure you understand what the Climate Averages are all about before you make use of the following information. A comma separated text file of these averages is also available for download which can be graphed in software such as a spreadsheet

068034 JERVIS BAY (POINT PERPENDICULAR LIGHTHOUCommenced: 1899 Last record: 2004
Latitude:-35.0936 S Longitude: 150.8048 E Elevation: 85.0 m State: NSW

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	No. Yrs	%age comp
Mean Daily Max Temp (deg C)	23.8	23.9	23.0	20.7	18.2	15.9	15.1	16.1	17.9	19.8	21.2	22.9	19.9	94.7	97
Mean no. Days, Max >= 40.0 deg C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.4	96
Mean no. Days, Max >= 35.0 deg C	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	1.0	45.4	96
Mean no. Days, Max >= 30.0 deg C	1.7	1.3	0.6	0.1	0.0	0.0	0.0	0.0	0.1	0.5	1.1	1.6	7.1	45.4	96
Highest Max Temp (deg C)	40.6	39.7	36.7	31.2	27.2	23.0	24.5	27.9	32.8	32.6	38.3	39.1	40.6	45.8	96
Mean Daily Min Temp (deg C)	17.5	18.0	17.1	14.9	12.4	10.4	9.2	9.6	11.2	12.9	14.5	16.3	13.6	94.9	97
Mean no. Days, Min =< 2.0 deg C	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.3	45.6	96
Mean no. Days, Min =< 0.0 deg C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	45.6	96

Lowest Min Temp (deg C)														
9.5	8.0	10.0	6.0	5.0	-0.5	1.5	-3.2	1.7	5.0	2.7	7.2	-3.2	45.8	96
Mean 9am Air Temp (deg C)														
20.6	20.8	19.8	17.5	14.8	12.5	11.4	12.3	14.4	16.5	18.0	19.7	16.5	97.1	100
Mean 9am Wet-bulb Temp (deg C)														
17.9	18.2	17.3	14.8	12.4	10.3	9.2	9.7	11.5	13.4	15.1	16.8	13.9	96.4	99
Mean 9am Dew Point Temp (deg C)														
16.2	16.7	15.5	12.9	10.2	8.1	6.5	6.9	8.5	10.6	12.8	14.7	11.7	46.4	98
Mean 9am Relative Humidity (%)														
75	77	77	74	75	75	73	70	69	69	72	73	73	96.4	99
Mean 9am Wind Speed (km/hr)														
14.2	14.0	13.5	15.0	16.8	18.9	17.7	17.1	16.2	15.2	15.6	15.0	15.8	45.5	96
Mean 3pm Air Temp (deg C)														
22.3	22.6	21.7	19.6	17.2	15.0	14.3	15.1	16.6	18.1	19.5	21.2	18.6	95.1	100
Mean 3pm Wet-bulb Temp (deg C)														
18.8	19.3	18.3	16.0	13.8	11.8	10.8	11.3	12.8	14.4	16.0	17.7	15.1	94.4	99
Mean 3pm Dew Point Temp (deg C)														
16.8	17.2	16.0	13.3	10.7	8.4	6.8	7.3	9.1	11.3	13.3	15.4	12.2	46.4	98
Mean 3pm Relative Humidity (%)														
71	72	71	67	67	66	62	61	64	66	68	70	67	94.4	99
Mean 3pm Wind Speed (km/hr)														
20.5	19.2	18.3	17.9	17.9	19.0	19.4	20.5	21.3	21.2	22.5	22.0	20.0	45.4	95
Mean Rainfall (mm)														
97.1	98.5	122.4	131.8	133.4	128.8	107.2	90.2	78.9	85.3	84.3	83.1	1241.1	104.8	100
Median (Decile 5) Rainfall (mm)														
79.7	65.6	98.8	88.7	106.8	105.2	79.5	56.1	70.8	66.2	69.7	72.9	1161.9	103	
Decile 9 Rainfall (mm)														
192.2	218.9	229.2	314.6	286.9	302.9	219.2	213.4	154.8	169.6	156.8	176.0	1859.7	103	
Decile 1 Rainfall (mm)														
24.3	19.2	25.7	32.1	32.3	28.2	27.2	15.3	18.9	18.1	24.2	16.1	819.5	103	
Mean no. of Raindays														
11.7	11.4	12.7	11.9	12.2	11.6	10.6	10.1	10.3	11.2	11.3	11.3	136.4	104.7	100
Highest Monthly Rainfall (mm)														
378.6	426.7	572.3	566.0	515.9	422.6	483.8	436.9	329.2	539.8	667.1	260.6		104.8	100
Lowest Monthly Rainfall (mm)														
3.8	2.0	10.6	0.8	2.0	5.4	0.6	1.4	2.6	2.4	3.8	0.0		104.8	100
Highest Recorded Daily Rain (mm)														
198.6	151.6	316.7	206.2	146.8	129.5	154.9	163.0	132.6	158.0	175.5	104.1	316.7	104.7	100

Mean no. of Clear Days

6.9	5.8	6.8	8.4	8.4	8.4	10.6	11.7	9.3	7.6	6.1	6.7	96.8	47.3	100

Mean no. of Cloudy Days

13.6	12.5	12.1	10.8	11.5	11.2	9.2	8.5	8.9	11.7	12.1	12.5	134.5	47.3	100

Last modified 16 August 2004

Australian Government
Department of the Environment and Heritage

Protected Matters Search Tool

You are here: DEH Home > EPBC Act > Search

3 August 2005 12:35

EPBC Act Protected Matters Report

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

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

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

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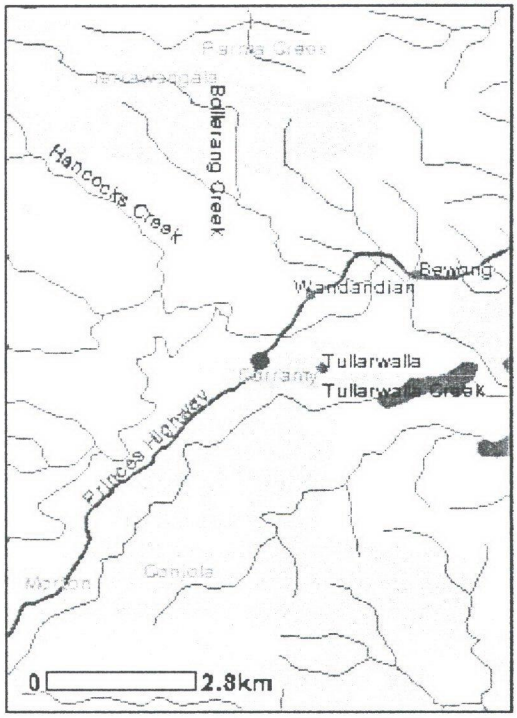
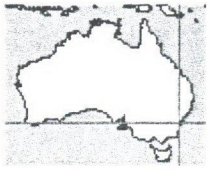


Search Type: Point

Buffer: 5 km

Coordinates: -35.1026,150.49961



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	22
Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species,

whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	12
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

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

State and Territory Reserves:	3
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Lathamus discolor Swift Parrot	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Xanthomyza phrygia Regent Honeyeater	Endangered	Species or species habitat likely to occur within area
Fishes		
Prototroctes maraena * Australian Grayling	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Heleioporus australiacus * Giant Burrowing Frog	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea * Green and Golden Bell Frog	Vulnerable	Species or species habitat likely to occur within area
Litoria littlejohni * Littlejohn's Tree Frog, Heath Frog	Vulnerable	Species or species habitat likely to occur within area
Mixophyes balbus * Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable	Species or species habitat likely to occur within area

Mammals

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

Reptiles

Hoplocephalus bungaroides * Broad-headed Snake	Vulnerable	Species or species habitat likely to occur within area

Plants

Caladenia tessellata Thick-lipped Spider-orchid, Daddy Long-legs	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid	Vulnerable	Species or species habitat may occur within area
Eucalyptus langleyi Albatross Mallee	Vulnerable	Species or species habitat likely to occur within area
Genoplesium vernale * East Lynne Midge-orchid	Vulnerable	Species or species habitat may occur within area
Melaleuca biconvexa Biconvex Paperbark	Vulnerable	Species or species habitat likely to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Pocket-less Brush Cherry, Scrub Cherry, Creek Lilly Pilly, Brush Cherry	Vulnerable	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax	Vulnerable	Species or species habitat likely to occur within area

Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons	Migratory	Breeding may occur within area

Rufous Fantail		
Xanthomyza phrygia Regent Honeyeater	Migratory	Species or species habitat likely to occur within area

Migratory Wetland Species

Birds

Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

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

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

Extra Information

State and Territory Reserves [Dataset Information]

Conjola National Park, NSW

Cudmirrah National Park, NSW

Jerrawangala National Park, NSW

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

Southern RFA, New South Wales

Caveat

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

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

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

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

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

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

The following species and ecological communities have not been mapped and do not appear in

reports produced from this database:

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

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

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

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

Acknowledgments

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

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

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

Last updated:

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

APPENDIX D
CORRESPONDENCE

Shoalhaven City Council

City Administrative Centre
Bridge Road, Nowra NSW Australia 2541
Phone: (02) 4429 3111 • Fax: (02) 4422 1816 • DX 5323 Nowra
Address all correspondence to
The General Manager, PO Box 42, Nowra NSW Australia 2541

COUNCIL REFERENCE: D05/86766 DF
CONTACT PERSON: David Farrow
YOUR REF: WBS Ref: S/663/8/R/OREF06318

4th October, 2005

Roads and Traffic Authority
Level 5 Pod D
99 Phillip St
Paramatta NSW 2124

Attention: Susan Westcott

Dear Sir/Madam

Proposed Princes Highway & Sussex Inlet Road Intersection Upgrade

I refer to your letter dated 23rd August seeking comment on the proposed Princes Highway and Sussex Inlet Intersection Upgrade.

Council supports the implementation of this project.

The plans indicate that the landscaping and entry signs will be affected by the road works and the signs will need to be relocated and the landscaping reinstated. Council landscape architect staff will contact the RTA project officer direct to finalise design and other requirements for the landscape relocation.

During discussion with Council Officers the option of an overhead gantry for southbound traffic was suggested. This would clearly identify the left turn lane from the through lane and give advance warning of the intersection. RTA staff indicated that the suggestion would be considered.

If you need further information about this matter, please contact David Farrow, Acting Manager Traffic & Transport Unit on (02) 4429 3312. Please quote Council's reference D05/86766.

Yours faithfully

Paul Collins
Acting Director City Services

16TH December 2005.

To – STEVEN KNIGHT
C/- GPO BOX 200
CANBERRA 2601
ACT.

RE: SITE WORK SUSSEX INLET.

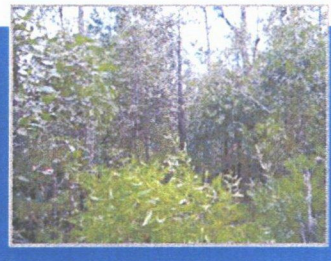
I Craig Wellington, attended Sussex Inlet Site Work on the 16th December 2005, for the Road Traffic Authority.
During this timeframe I observed the land;
Thus far nothing had been sighted i.e. Aboriginal Artifacts.

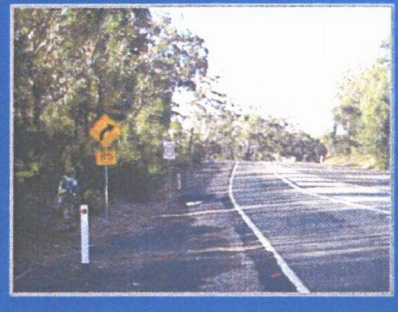
Yours truly,

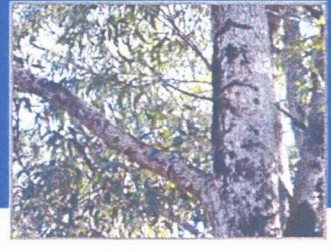
Craig Wellington
CRAIG WELLINGTON

APPENDIX E
SPECIALIST ECOLOGY REPORT

Proposed Intersection Upgrade, Princes Highway and Sussex Inlet Road Wandandian







Ecological Assessment: Flora and Fauna Survey

prepared by
ngh environmental

October 2005

nghenvironmental

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Document Verification

ngh environmental

planning • assessment • ems • auditing

Job title: Proposed Intersection Upgrade, Princes Highway and Sussex Inlet Road Wandandian

Document Title	Flora and Fauna Assessment
File Name	RTA/ RTA Sussex Inlet Final_2.doc

Revision	Date	Prepared by		Checked by		Approved by	
Draft		name	Jackie Miles (Botanist).	name	Nick Graham-Higgs	name	Nick Graham Higgs
Final	11/10/05	Name	Nick Graham-Higgs	name	Kate Gillespie		Nick Graham Higgs
Final V2	17/10/05	Name	Nick Graham-Higgs	name			Nick Graham Higgs

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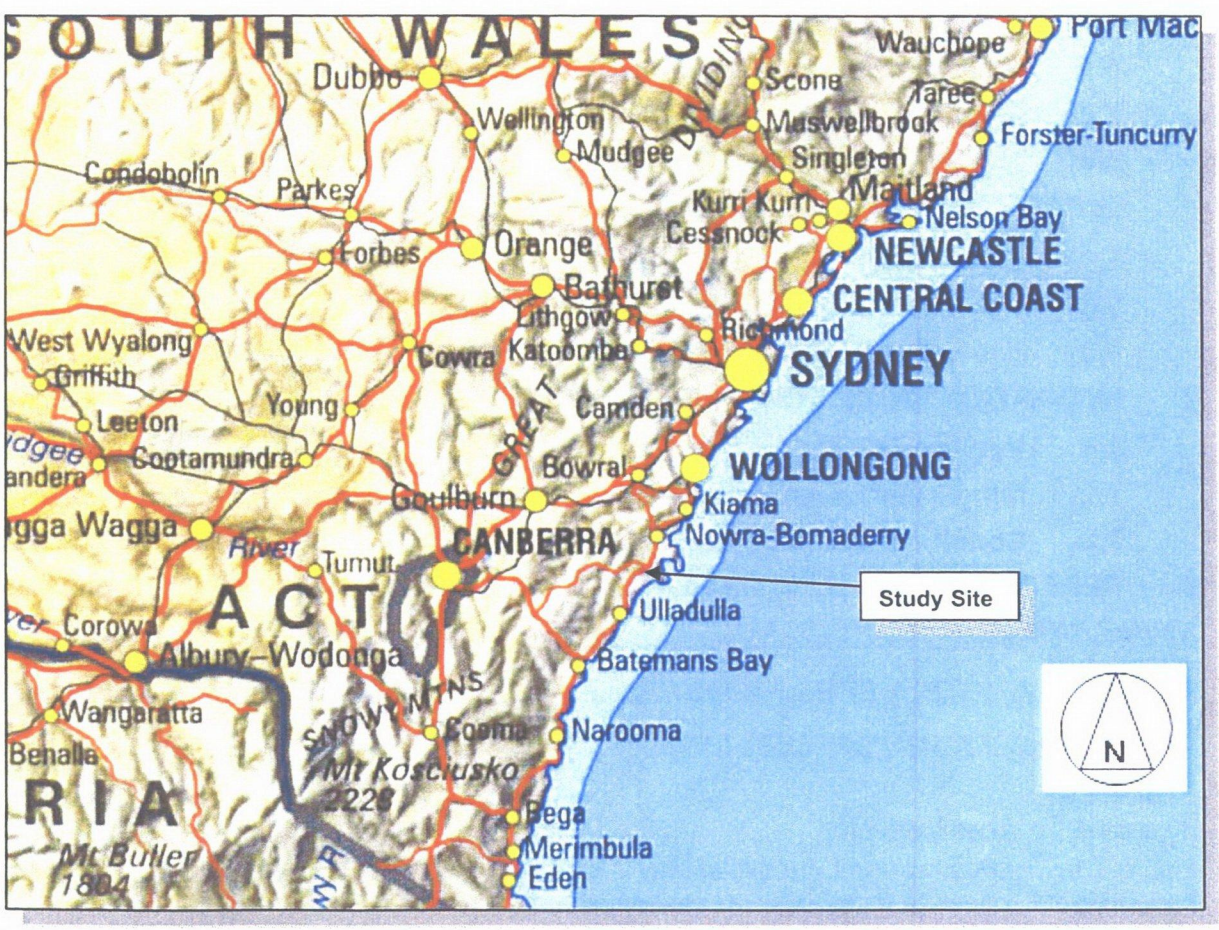
FIGURES

1. INTRODUCTION

This Ecological Assessment was commissioned by the NSW Roads and Traffic Authority (RTA). It assesses the impacts likely to be associated with the proposed upgrading of the intersection of Sussex Inlet Road with the SHI Princes Highway approximately 3km south of Wandandian. The site is within the Shoalhaven Local Government Area (LGA) and is close to Conjola National Park and the contiguous Corramy State Conservation Area. The study site consists of a strip of land (approximately 800m x 15m) adjacent to the western side of the Princes Highway which has been previously disturbed by the presence of the road and a telecommunications cable and a recent (2001) fire. The objective of this assessment is to identify the biodiversity values of the site and determine the likelihood and level of impact on flora and fauna that may arise during and following site development. This report aims to assist the RTA in completing a Review of Environmental Factors (REF). The study will enable the RTA to determine:

- the effects of the proposal on terrestrial flora and fauna species, populations, ecological communities and their habitats with regard to NSW and Commonwealth legislation,
- whether a Species Impact Statement (SIS) is required (in accordance with the *Environmental Planning and Assessment Act 1979* with respect to the *Threatened Species Conservation Act 1995*), and
- whether the proposal requires a referral under the *Environment Protection and Biodiversity Conservation Act 1999.*

Figure 1.1 Location Map, Southern NSW.



2. RELEVANT LEGISLATION

2.1 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* introduces a set of eight factors which must be considered by decision makers regarding the effect of a proposed development or activity on threatened species, populations, ecological communities, or their habitats. These factors form part of the threatened species assessment process under the Envi*ronmental Planning and Assessment Act 1979* and are collectively referred to as the 'Eight-part Test'.

Consent and determining authorities have a statutory obligation to consider whether a proposal is likely to significantly affect threatened species, populations or ecological communities, or their habitats by applying the 'Eight-part Test. If the determination is made that there is likely to be a significant effect then:

i) A species impact statement (SIS) must be prepared and the concurrence of the Director-General of National Parks and Wildlife Service, or the consultation of the Minister for the Environment is required; and or

ii) The proposal may be modified such that a significant effect on threatened species, populations or ecological communities, or their habitats is unlikely. This may require the original application to be withdrawn and the modified proposal to be submitted for re-assessment.

This report recommends several mitigation measures (Section 7) based on the Eight-part Test conducted in Section 6, in order that the proposal will avoid a significant impact on species listed as threatened under the Act.

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

State Environmental Planning Policy No. 44 - Koala Habitat Protection, commenced in February 1995. The aim of the policy is to ensure that;

i) For any development application (DA) to which the policy applies, consent is not issued without investigation of the presence of core koala habitat.

"Core koala habitat" is defined as "an area of land with a resident population of koalas, evidence of attributes such as breeding females (that is, females with young), and recent sightings of and historical records of koala population".

ii) That any identification of core koala habitat will require that a plan of management must accompany any DA relating to such areas, before council consider the granting of consent.

iii) That in respect of rezoning, other than to environmental protection, involves an area of potential or core koala habitat then the Director of Planning may require that a local environmental study be prepared.

The policy affects the DA process by requiring land to be assessed for potential koala habitat, that is land containing at least 15% of the "total number of trees in the upper or lower strata" of the tree types listed in Schedule 2 of the policy. If land is potential koala habitat further investigation to determine if core koala habitat is present is required. If investigations reveal that core habitat is not present no further provisions of the policy apply. If core habitat is present a plan of management for the site must be prepared prior to development taking place.

In Section 5 of this report, the potential for the site to be core habitat for koalas was evaluated. In this district they are generally seen only in large areas of continuous forest. They utilise a diverse range of eucalypt trees typically present on high nutrient soils (Klippel 1992). On the NSW south coast, *Eucalyptus viminalis* and *E. tereticornis* are regarded as the primary feed species with numerous species, none present on this site, recorded as secondary feed species (Phillips 2000). The site does not provide primary or secondary feed species for this species. The soils are not high nutrient and it is considered unlikely that this species would utilise the site and highly unlikely that the site represents core habitat.

2.3 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* introduces a new assessment and approvals system for actions that have a significant impact on matters of national environmental significance. Approval of the Environment Minister is required if an action is likely to have a significant impact on a matters including:

i) World Heritage Properties,

ii) Wetlands of International Importance,

iii) Commonwealth Listed Threatened Species and Ecological Communities,

iv) Commonwealth Listed Migratory Species,

v) Nuclear action,

vi) Commonwealth Marine areas, or

vii) Commonwealth land.

This Flora and Fauna Assessment has considered whether the proposed development has potential to impact any of these matters.

2.4 Native Vegetation Conservation Act 1997

The proposed works would involve clearing of native vegetation for purposes of road widening.

The *Native Vegetation Conservation Act 1997* (NVC Act) Act currently provides for the protection of native vegetation through incentives and regulation, and provides for regional native vegetation management planning. The Department of Infrastructure, Planning and Natural Resources (DIPNR) is the consent authority under Part 4 of the *EP&A Act*, for the clearing of native vegetation.

2.5 Native Vegetation Act 2003

The draft regulations for the *Native Vegetation Act 2003* were put on public exhibition in November 2004. Once submissions have been incorporated and approved by the Minister, the *Native Vegetation Act 2003* will replace the *Native Vegetation Conservation Act 1997*. Clearing under the Native Vegetation Act 2003 would require development consent from Catchment Management Authorities. Property Vegetation Plans (PVP) would be the vehicle for this process which aims to improve or maintain environmental outcomes.

The objects of this Act are:

a) to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and

b) to prevent broad scale clearing unless it improves or maintains environmental outcomes, and

c) to protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and

d) to improve the condition of existing native vegetation, particularly where it has high conservation value, and

e) to encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

2.6 Principles of Ecologically Sustainable Development

An aim of the Shoalhaven LEP 1985 (amended July 2005) is to ensure that development has regard to the principles of ecologically sustainable development.

The "principles of ecologically sustainable development" are listed below;

a) the precautionary principle - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

b) inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

c) conservation of biological diversity and ecological integrity - namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration; and

d) improved valuation, pricing and incentive mechanisms - namely, that environmental factors should be included in the valuation of assets and services.

This report has incorporated these principles in its approach to evaluating the impacts of the proposed activities.

3 THE PROPOSAL

3.1 Description of the study area

The proposed road widening involves creating a dedicated lane for vehicles turning north out of Sussex Inlet Road onto the Princes Highway, with an extended north-bound merging lane extending to 1km to the north of the intersection and a separate slip lane for traffic entering Sussex Inlet Road (refer to Photograph 1 and 2). The study area is located approximately 3km south of Wandandian. The site appears to be located on Wandrawandian siltstone or Tertiary sediments on near-flat terrain at an elevation of around 60m (NSW Department of Mines Survey 1966).

The survey assessed an area from 200m south to 600m north of the intersection and to about 25m west of the road, with the smaller target area being assessed in greatest detail.

The study area is located on road reserve and private property, with Conjola National Park being close by on the eastern side of the highway and south of Sussex Inlet Road and Corramy State Conservation Area both west and east of the highway and north of Sussex Inlet Road. Morton National Park and Yerriyong State Forest are also close by on the western side of the highway. All of the site has been substantially disturbed by past clearing (although it has largely regrown) and more recent laying of telecommunications cable through the regrowth forest. About half of the 15m width affected by the proposal consists of gravel verge carrying very little vegetation. The remainder carries regrowth forest, with the western edge of the impact zone on the telecommunications cable route which carries similar but sparser vegetation to the remainder of the site.

Most trees on the site are relatively young and have limited value for fauna species. Regeneration of the vegetation has been affected by the wildfire of 2001-02, with some smaller trees and many shrubs having lost their above-ground parts and resprouting from the base.

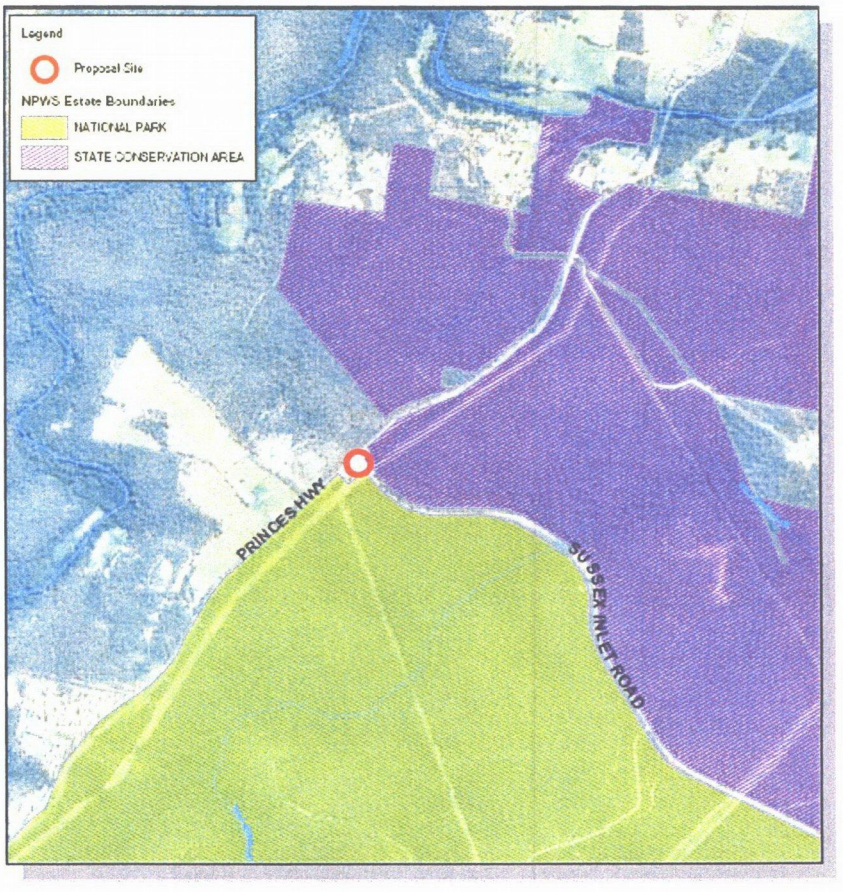


Figure 3.1. Location of proposed road widening, Sussex Inlet Road.

Photograph 1. Sussex Inlet Road Intersection with the Princes Highway (looking South).

Photograph 2. Western side of the Princes Highway, north of the intersection with Sussex Road.

3.2 Proposed Development

The proposal would involve removal of vegetation and cut and fill work. A construction compound/stock pile site would likely be established on disturbed ground on a powerline easement which appears to have already been used as a gravel dump south of the carpark on the south-eastern side of the road junction. The proposed activities would improve driver safety at this intersection.

For plans of the proposed works refer to Figures 3.2 and 3.3. The disturbance zone would be approximately 1km in length and extend up to 15m from the existing bitumen on the Princes Highway western verge at its widest point 200m either side of the intersection, tapering down to the north as the extra lane merges.

The proposed works would involve compacting and sealing a total area of at most 1.5ha of which about one third is already cleared. Adjoining disturbed areas would be revegetated to stabilise the soil and prevent weed infestations.

3.3 Approach of this assessment

In compiling this assessment the following approach was adopted:

i) Field Work. A site assessment was carried out on the 2nd September, 2005. The field assessment identified vegetation and habitat types onsite, and focused survey efforts on the core 400m by 15m area to obtain a comprehensive flora and fauna species lists for this site. Less detailed survey was conducted on an additional 400m to the north.

ii) Research. Research involved sourcing information available on the threatened species, populations, and communities that may be present onsite. This included a search of the threatened flora and fauna records from the Department of Environment and Conservation, Parks and Wildlife Division (DEC PWD) Wildlife Atlas.

iii) Report Compilation. Following the completion of the field assessment and research, communities were described separately for flora and fauna. The potential impacts of the proposal upon threatened flora and fauna were evaluated. This report concludes with recommendations for minimising environmental impacts, with a focus on threatened species.

Figure 3.2 Plan 1 of proposed intersection upgrade, Sussex Inlet Road and the Princes Highway.

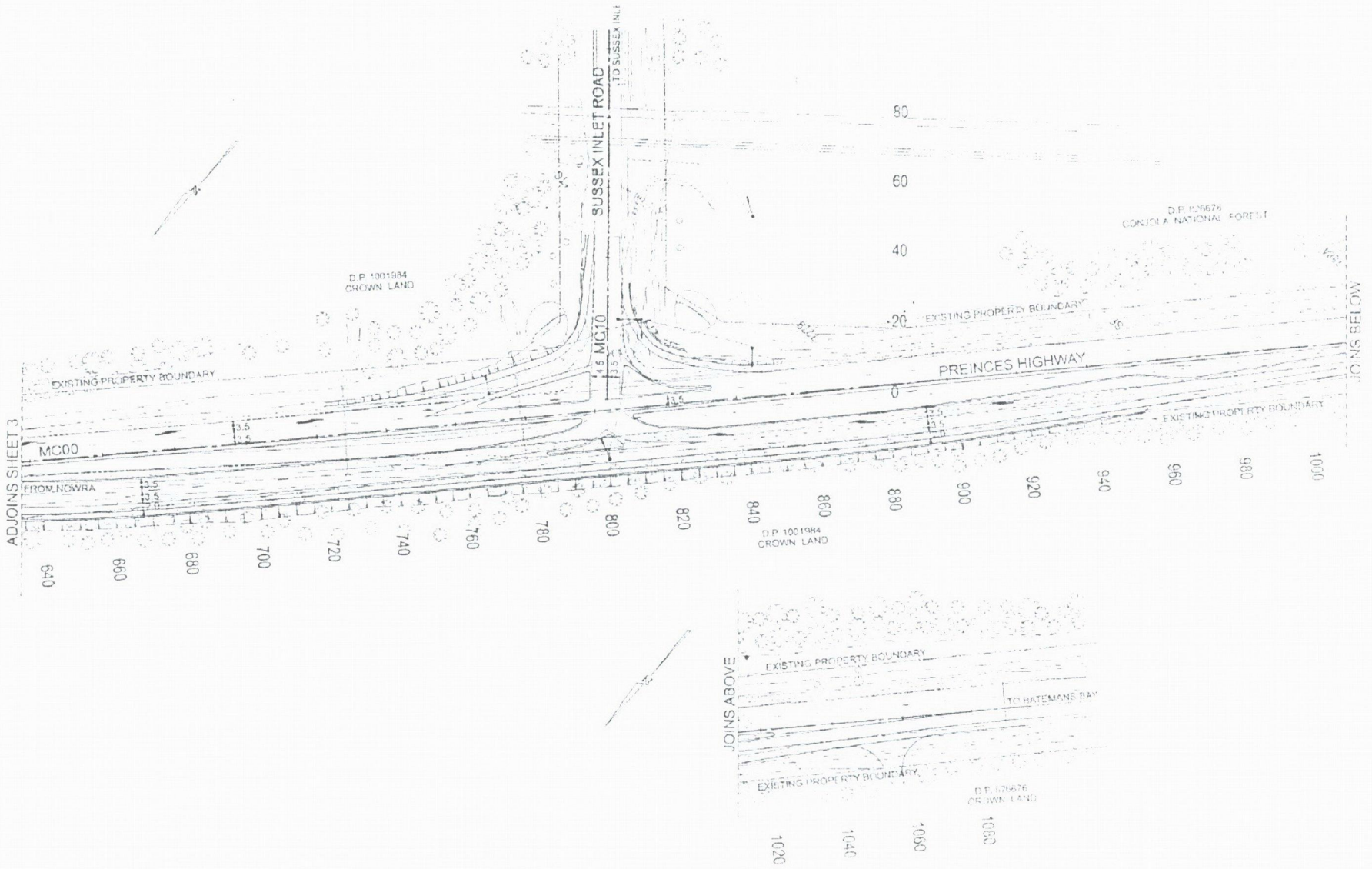
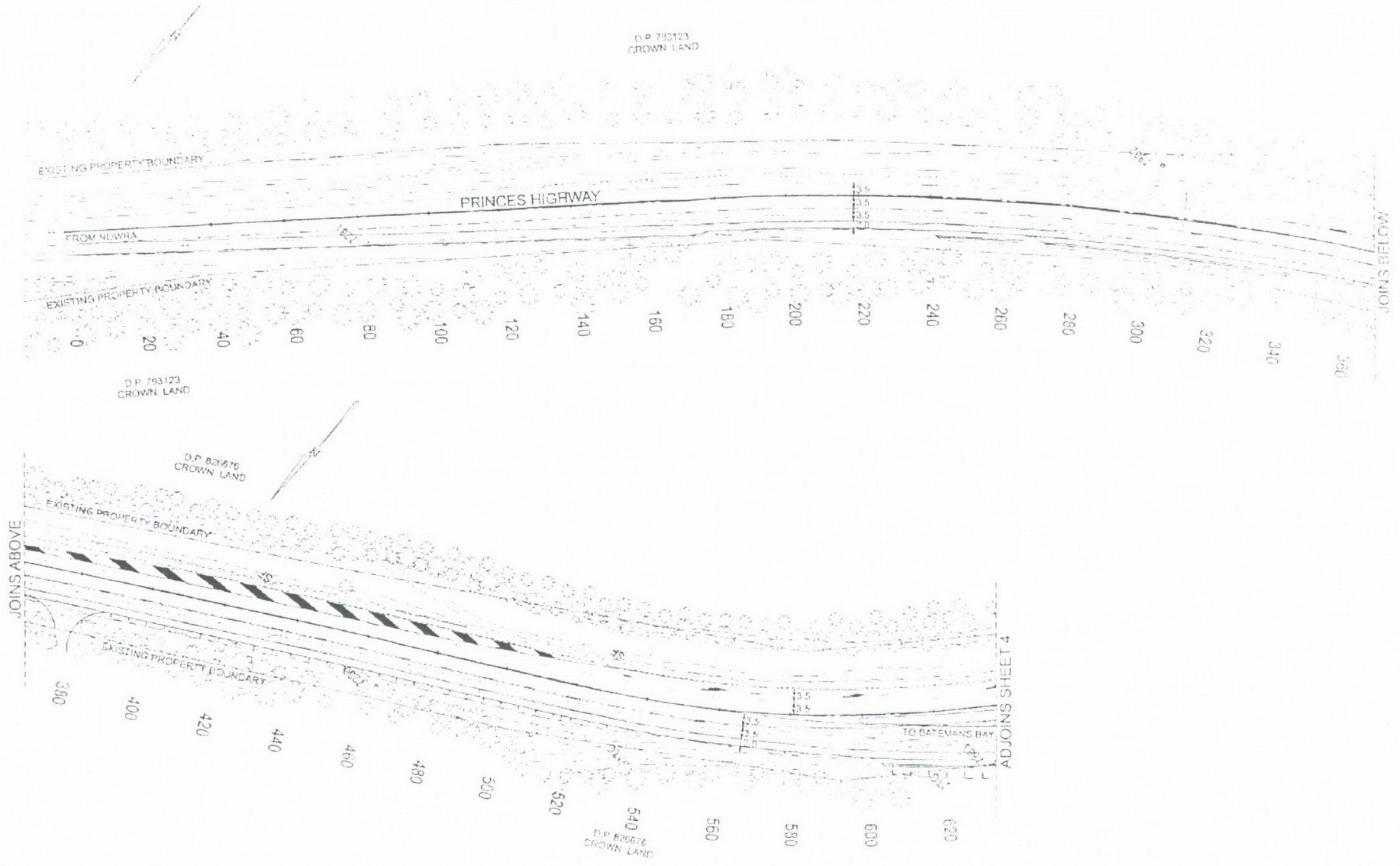


Figure 3.3 Plan 2 of proposed intersection upgrade, Sussex Inlet Road and the Princes Highway.



4 FLORA

4.1 Methods

The vegetation on the site was surveyed on 2nd September 2005 by Jackie Miles. A species list was compiled for the site, with a few additional species recorded in the extended area to the north. A full list of species recorded on the site is presented in **Appendix A.** Two 800m transects were walked, one along the disturbed verge of the highway and one at about the 15m limit of the impact zone. Given the timing of the survey in early spring it is likely that a few species have been overlooked, particularly geophytes such as orchids and lilies, many of which are visible only during a short flowering period, and grasses which usually flower in summer.

The approach of the botanical assessment followed the method known as the 'random meander' documented by Cropper (1993). Species occurrence and abundance was documented for each vegetation community. Site structural attributes were recorded for vegetation communities present. Vegetation communities were classified using the Forest Ecosystem classification developed as part of the Comprehensive Regional Assessment for the Southern Regional Forest Agreement (NPWS 2000).

4.2 Results

The core 400m of the site carries regrowth forest with a moderate cover of young red bloodwood (*Corymbia gummifera*) and thin-leaved stringybark (*Eucalyptus eugenioides*). Small trees include occasional turpentine (*Syncarpia glomulifera*) and black sheoak (*Allocasuarina littoralis*). There is a diverse shrub layer 1-3m high. Dominant shrub species are *Lambertia formosa, Daviesia mimosoides, Leptospermum trinervium, Bossiaea obcordata, Hakea laevipes, Acacia myrtifolia* and *Banksia spinulosa*, with many other species present at lower density. The groundcover is patchy includes subshrubs *Mirbelia rubiifolia, Pultenaea linophylla, P retusa* and *Rhytidosporum procumbens*, grasses *Entolasia stricta, Austrostipa ?pubescens* and occasionally *Themeda triandra*, graminoids *Lepidosperma* spp, *Caustis flexuosa* and *Lomandra* spp, and occasional forbs of which the only common species is *Xanthosia tridentata*.

The additional 400m surveyed at the northern part of the site includes more blackbutt (*E. pilularis*) and scribbly gum (*E. sclerophylla*) (the latter not present at all on the core area), with the additional shrub species *Daviesia ulicifolia* patchily common and *Leptospermum polygalifolium* abundant in the table drain in places. It is otherwise similar to the core area in species composition and structure.

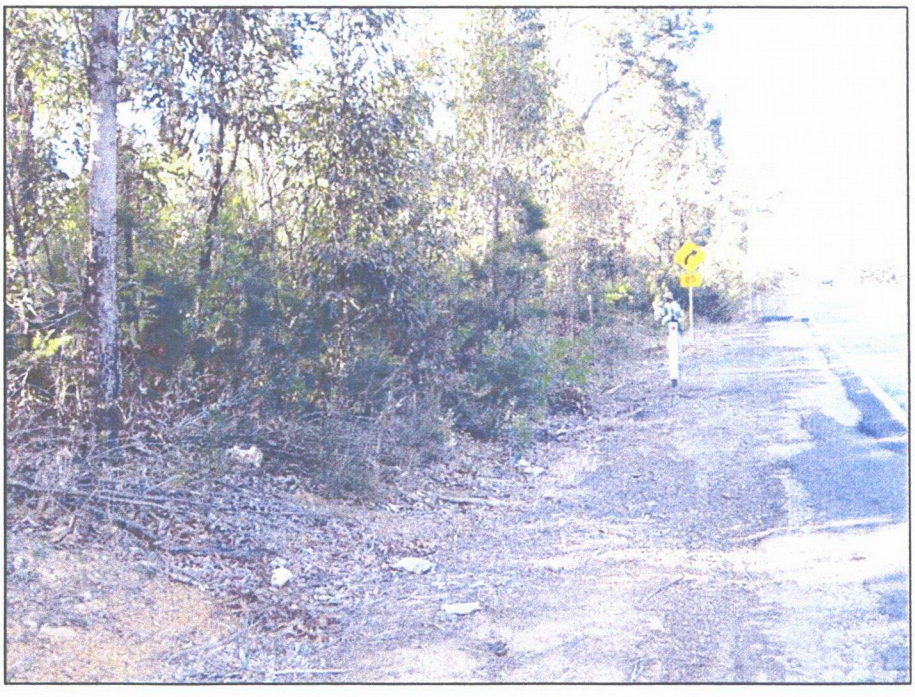
This vegetation is intermediate in species composition between two common and relatively widespread communities described by Tindall *et al* (2005) as occurring in the Shoalhaven LGA. They are (refer to Photographs 3 and 4) :

- Shoalhaven Sandstone Forest (DSF148), often dominated by scribbly gum and red bloodwood, with a heathy shrub and sedge understorey, on sandy loam soils derived from Hawkesbury or Nowra sandstones;
- Currambene Lowlands Forest (DSF85) typically dominated by red bloodwood but potentially including blackbutt, thin-leaved stringybark and scribbly gum, with a more open and less heathy shrub layer and prominent grassy groundcover, found on sandstone or shale-derived soils on coastal lowlands below about 100m elevation between Berry and Cudmirrah.

The vegetation is reasonably uniform in composition throughout the core 400m of the site. Towards the northern end, the canopy is more dominated by scribbly gum, though the understorey is tending more towards the grassy forest type in this area. The vegetation east of the highway, on more low-lying land, tends more towards the grassy forest type (DSF85).

The site is largely free of introduced plant species, at least within the forested parts. The more disturbed road verges carry a few more exotic species but in low numbers generally. The most common weed species are **Hypochaeris radicata* and **Richardia* species. One weed species which is declared noxious in Shoalhaven LGA is present on the disturbed verges, fireweed (**Senecio madagascariensis*). It is scattered in low numbers along the table drain, with occasional plants penetrating into the edge of the forest.

Photograph 3. Thick regrowth vegetation located at the intersection.



Photograph 4. Disturbed vegetation found along the road verge and impact zone north of the intersection.

Plant species of regional conservation significance

No plant species which are listed on Schedules 1 or 2 of the *Threatened Species Conservation Act 1995* were found on the site. However, the timing of the survey in September was a little early for detecting the presence of some orchids, most of which are only identifiable when flowering for a short period each year.

A search of the NSW DEC Wildlife Atlas database for the Jervis Bay and Ulladulla 1:100,000 map sheets produced 20 threatened plant species which have been recorded in the region, most of which have habitat requirements which are not met on this site. Table 4.1 below outlines what is known of the habitat requirements of eleven of these species, excluding the species which have been recorded only from the western part of the Ulladulla map sheet, which is at considerably higher elevation than the study site (*Callitris oblonga, Budawangia gnidoides, Eucalytpus sturgissiana, Leptospermum thompsonii, Plinthanthesis rodwayi, Grevillea renwickiana, Pultenaea baeuerlenii, Baloskion longipes, Boronia deanei*).

Table 4.1 Threatened Flora recorded from the Jervis Bay and Ulladulla 1:100,000 map sheets for which potential habitat could occur on the site or in nearby less disturbed vegetation.

Species	Category*	Habitat required
Eucalyptus langleyi, mallee tree (Myrtaceae)	V	Grows in skeletal soils on rock platforms in sandstone heath vegetation of Morton National Park. No suitable habitat is present on the site and the species was not recorded.
Melaleuca biconvexa, small tree (Myrtaceae)	V	Grows in wet soils along drainage lines in flat topography west from Jervis Bay and St Georges Basin. No suitable habitat is present on the site and the species was not recorded. The species occurs on the highway just north of Wandandian, about 3km from the site.
Syzygium paniculatum, tree (Myrtaceae)	V	Grows in littoral rainforest adjacent to Jervis Bay and St Georges Basin. No suitable habitat is present on the site and the species was not recorded.
Prostanthera densa, shrub (Lamiaceae)	V	Grows in eucalypt forest and shrubland, on coastal headlands and near-coastal ranges from Nelson Bay to the Beecroft Peninsula (Harden 1992). A reasonably close record is known from Currarong Road near Callala Bay on the northern side of Jervis Bay some 24km from the study site It is a moderately conspicuous species growing up to 0.5-2m in height and should have been detectable if present on the site. It was not seen.
Cryptostylis hunteriana, leafless tongue-orchid (Orchidaceae)	V	Grows in sandy soils in coastal situations. Descriptions of its preferred habitat include "swamp-heath on sandy soils" (Weston 1993), "Favours swamp fringes in Victoria, while in New South Wales it occupies habitats ranging from scrubby swamp fringes to steep bare hillsides in tall eucalypt forest" (Bishop 1996) and "open woodland with a heath understorey" on dry sandy soil for the NSW Central Coast (Bell, 2001). There are 25 records from the area between Nowra and Ulladulla (Clark *et al* 2004), though the plant usually occurs in small populations. Typical vegetation is somewhat heathier than that occurring on the study site, but there is unlikely that it could occur there. The survey timing was not appropriate for its detection as the flowering period is Dec-Feb (Bishop 2000).
Caladenia tessellata, Thick-lip spider Orchid (Orchidaceae)	E	There is an old (1931) record from the eastern edge of Jervis Bay and a more recent (1998) record from south of Ulladulla for this species. It is said to favour low open forest with a heathy or sometimes grassy understorey (Bishop 2000). The site therefore does represent potential habitat. It flowers in Sept-Nov, so the survey timing could have been a little early for its detection.

Species	Category*	Habitat required
Prasophyllum affine, terrestrial orchid (Orchidaceae)	E	This species has been recently (2000, 2003) recorded between Jervis Bay and St Georges Basin. It favours coastal heathland (Bishop 2000). Although the forest on the site has a heathy understorey, with a similar species composition to coastal heathland, it is not heath, and is unlikely to represent suitable habitat. The flowering period is Nov-Dec (Bishop 2000), so this species would not have been detected if present.
Wilsonia backhousei, forb (Convolvulaceae)	V	Grows in saltmarsh or on rocks around the edges of coastal lakes and estuaries. No suitable habitat is present.
Thesium australe, Australian toadflax, a forb (Santalaceae)	V	Grows as a partial root parasite on grasses, particularly *Themeda triandra*, in grassland and grassy woodland, with an old (1911) record from a headland in Ulladulla. Despite the presence of *Themeda* near the northern end of the site no suitable habitat is present, as the site is forested.
Galium australe, tangled bedstraw, a forb (Rubiaceae)	E	This species has been recorded from several sites in the region, generally in grassy forest. The site requirements of this species in NSW are poorly known, since it is known from very small populations in a handful of sites, in various types of dry forest, and one coastal headland grassland (J Miles, pers. obs.). In Victoria, where it is more common, it occurs in a range of vegetation types but is usually near-coastal (Jeanes, 1999). This is a very inconspicuous species which is easily overlooked, but the probability of its occurrence on the site is very low. It has not been recorded growing in heathy forest types, which constitute the bulk of the site.
Irenepharsus trypherus, a forb (Brassicaceae)	E	"Grows in gullies on the coast and escarpment between Wollongong and the Shoalhaven River" (Harden 2000). The site is well south of the Shoalhaven River and is probably drier than would be suitable for this species.

V= listed as Vulnerable in NSW in Schedule 2 of the *Threatened Species Conservation Act*
E = listed as Endangered in NSW in Schedule 1 of the *Threatened Species Conservation Act*

This assessment has identified that there is some potential for the shrub *Prostanthera densa*, the small forb *Galium australe* and the orchids *Cryptostylis hunteriana* and *Caladenia tessellata* to occur on the site.

The shrub *Prostanthera densa* was not recorded, but there is a slight possibility that it could have been overlooked if it occurred in pockets of dense post-fire shrub regeneration or it may occur beyond the limits of the area surveyed (to 600m north of the intersection). However, the probability of this is quite low. The vegetation is more heathy than the site on which we have previously seen this species (J Miles, pers. obs.). The same is true of *Galium australe*, which tends to occur in more grassy forest.

The habitat preferences of the Leafless Tongue Orchid (*Cryptostylis hunteriana*) in the Shoalhaven region where it has been found in a relatively large number of locations (25) seem similar to those from the NSW Central Coast, reported by Bell (2001), that is, dry heathy woodland. All the occurrences of this species on the NSW Central Coast recorded by Bell (2001) had been burnt in the past 1.5 to 5 years, as has the study site. Clark *et al* (2004) do not discuss fire history of sites where the Leafless Tongue Orchid has been located in the Shoalhaven region, but did find correlations with climate variables, soils and vegetation types. The site is within the bioclimatic habitat envelope, geological formation and soil landscape types in which Leafless Tongue Orchid has been found to occur in Shoalhaven LGA and the vegetation communities mapped in the areas where it occurs include Northern Coastal Hinterland Heath Shrub Dry Forest (Forest Ecosystem 139 of Thomas, Gellie and Harrison, 2000) and Jervis Bay Lowlands Shrub/Grass Dry Forest (FE5). These communities are equivalent to those found on the site, Shoalhaven Sandstone Forest and Currambene Lowlands Forest, respectively. Further, Clark *et al* found a number of plant species which showed a high correlation with the presence of Leafless Tongue Orchid.

Species growing on the study site which have a high correlation with the orchid's presence include the shrubs *Pimelea linifolia, Lambertia formosa, Isopogon anemonifolius* and *Kunzea capitata*, and the groundcover species *Xanthosia tridentata* and *Lomandra obliqua*. However these are all common and widespread species in the region, so may be expected to occur on many sites where the orchid is not present. The species *Dianella caerulea, Lepidosperma laterale* and the shrub *Persoonia linearis*, which also occur on the site, are negatively correlated with the presence of Leafless Tongue Orchid (Clark *et al* 2004).

Although the habitat is potentially suitable on the site, the species has a very patchy occurrence within its area of distribution, and tends to occur in very small numbers on any one site. The probability of its occurrence is therefore quite low. The nearest known record is north of Sussex Inlet Road, about half way between the Princes Highway and Sussex Inlet, some 5km from the study site.

Searches for this species would need to be conducted between December and February, when it is in flower (although it has been recorded flowering in November on the Central Coast). Dates on which it has been recorded in the Shoalhaven LGA range from 22 November to 12 February with one outlying record from 5 March (DEC Wildlife Atlas). Having no leaves, it is not apparent when not in flower. However, on the Central Coast it was found not to flower regularly, with some occurrences of the species only being sighted once (Bell 2001). The probability of its occurrence on this site is low and there is no certainty that searches during the flowering period will locate the species even if it is present as dormant tubers.

Less detailed information is available about the habitat preferences of the Thick-lip spider Orchid (*Caladenia tessellata*) but information provided by Bishop (2000) suggests that it has quite a broad habitat tolerance which could be satisfied on the study site. Searches for this species would need to be conducted in the period Sept-Nov, with the two previous records from the region being made in the first two weeks of October.

The two forest types represented on the site are regarded as being relatively common in the region, with the adequacy of reservation in the region varying from well reserved in the case of the more widespread community, to poor to just adequate for the less common of the two communities. Tindall *et al* (2005) provide the following estimates of current and past extent in the Shoalhaven LGA:

- Shoalhaven Sandstone Forest (DSF148): 56,300 hectares extant, being 80-95% of the original pre-european extent of this community. 30,600 hectares in conservation reserves, being 40-55% of the pre-european extent of the community.
- Currambene Lowlands Forest (DSF85): 24,600 hectares extant, being 55-75% of the original pre-european extent of this community. 5,000 hectares in conservation reserves, being 5-20% of the pre-european extent of the community. This community is threatened to some extent by expansion of Nowra and its satellite towns, and by rural residential subdivision in the Jervis Bay hinterland (Tindall *et al* 2005), but is not listed as an Endangered Ecological Community.

5 FAUNA

5.1 Methods

The fauna survey was conducted on the 2nd September 2005. The objectives of the fauna survey were to establish the habitat values of the vegetated area and to determine if any threatened species of fauna were present.

Weather conditions during the field visit were mild to cool with a temperature of approximately 18^0C in the afternoon dropping to 14^0C during the evening surveying work. A gentle breeze freshened to moderate winds after dark and the sky was 80-90% overcast. Due to the low temperatures and overcast conditions reptile and bat activity was not detected.

Fauna survey techniques used during the assessment are:

1. **Diurnal herpetofauna census** of the study area utilising a random meander method.
2. **Diurnal bird censusing,** of the study area utilising a random meander method, completed by an experienced bird observer over a period of about 3 hours, concurrent with other searches.
3. **Recording of bats ultrasonic calls,** from dusk (6pm) for one hour using the anabat system, which was set up close to the lights on the intersection as it was thought that these might attract bats, hunting for insects attracted to the lights. Due probably to the cool windy weather no bats were recorded.
4. **Amphibian surveying** of the study area utilising a random meander method and listening for frog calls after dark. There was a lack of suitable habitat for amphibians on the site but two species were detected calling on the eastern side of the highway nearby.
5. **Foot based spotlighting** was completed, searching for nocturnal, arboreal and scansorial vertebrate fauna a period of 45 minutes from 6.15 to 7pm, within the site and on the eastern side of the highway around the intersection.
6. Potential **habitat trees** (eg. hollow bearing trees and sap/feed trees) on the site were recorded, and
7. **Scat and animal sign searches** (eg. scratch marks, scats, footprints, nests, burrows, evidence of feeding) at the site were completed on-site utilising the random meander method.

Call playback of threatened species of forest owls was not undertaken due to the windy conditions and traffic noise on the site, which would have made it difficult for any owls present in the area to detect the taped calls, and for the surveyors to detect any response they might have made.

The work aimed to identify habitats of fauna species listed as threatened under the *Threatened Species Conservation Act 1995* occurring within, or directly adjacent to the identified study area.

A desktop search of threatened species in the region was conducted. These species were evaluated for their potential to utilise the study site and be affected by the proposal.

5.2 Results

5.2.1 Habitat Types and survey results

The site provides a number of fauna habitat resources. Only one general fauna habitat type was identified at the site. This is detailed below:

Dry Shrub Forest–
This strip of forested vegetation has previously been disturbed from logging/clearing/fire and the laying of telecommunications cable. As a result most of the large mature trees have been removed and there are areas of regrowth predominantly consisting of young eucalypts, wattle and patches of shrubs and grass.

Due to the lack of mature trees, hollow bearing trees were not evident in the core 400m study area (potential impact zone). Therefore there is limited habitat for arboreal or other hollow dependent fauna. A number of hollow bearing trees were identified adjacent to the study area so it is likely that some hollow dependent fauna species utilise the site for foraging. One such species, the Sugar Glider, was detected on the site. These large hollow bearing trees provide potential den, nesting and roosting sites for microchiropteran bats, forest owls and other birds, arboreal mammals and some reptiles such as goannas. A number of stringybark eucalypts were flowering at the time of the survey, providing nectar and insect resources for birds and mammals. A number of trees, principally red bloodwood, were also observed to have what appeared to be signs of sap feeding. A number of 'V' shaped notches were observed in the bark which is typical of Yellow-bellied Glider sap feeding (refer to Photograph 6). Red bloodwood is a favoured sap-feed tree species for the Yellow-bellied Glider. However most of the markings appear to be old and only a few trees showed what looked like recent use. It was thought that a number of trees may also have insect damage which resembles the appearance of sap feeding, though being in the form of straight horizontal lines rather than V shaped notches. Trees which showed potential sign of fauna activity are summarised below in Table 5.1.

Table 5.1 Location of trees with potential Yellow-bellied Glider feeding marks

Tree Number	Location (Zone – 56, old datum AGD66')		Comments
	Eastings	Northings	
1	271053	6111527	Stringybark eucalypt, with potential hollows (low habitat value)
2	271054	6111532	Bloodwood, potential old sap feed tree, horizontal incisions, no longer used.
3	271050	6111537	As above, may be insect damage?
4	271075	6111562	Bloodwood, with old sap feed marks no longer utilised
5	271086	6111572	As above, looks more recent, but again could be insect damage.
6	271117	6111609	Bloodwood with distinct V notches, old, not currently used (refer Photograph 6).
7	271127	6111615	Small hollow bearing tree, fire induced, low habitat value.
8	271150	6111637	Small bloodwood with similar incision marks (old)
9	271156	6111645	Two trees with similar marks as above
10	271209	6111711	Potential hollow bearing tree, very small hollows with little fauna habitat potential.
11	271210	6111736	STAG, 25m from road outside impact zone however has well developed hollows
12	271261	6111771	Hollow bearing tree, in impact zone, fire induced hollow, small hollows not well formed, poor fauna habitat potential.
13	271275	6111790	Hollow bearing blackbutt with orange flagging, just outside impact zone but limbs do hang over. Avoid

Tree Number	Location (Zone – 56, old datum AGD66')		Comments
	Eastings	Northings	
			removal as it has well developed hollows, including in the overhanging limb.
14	271314	6111814	Bloodwood with signs of sap feeding, old, and could be insect damage
15	271531	6111957	Past 200m mark (north), stag with fire damage, large vertical hollows at top, avoid damage.
16	271557	6111967	Past 200m mark (north) Large hollow bearing tree with well developed medium hollow. Lots of activity on trunk (scratch marks). Avoid removal or damage.

There is a variable mixed shrub, bracken and grass/sedge layer providing potential refuge and cover for medium sized terrestrial mammals (eg. swamp wallabies, eastern grey kangaroos, bandicoots and wombats). During the survey a number of bandicoot diggings were located throughout this habitat type on both sides of the Sussex Inlet intersection (refer to Photograph 7). During the night spotlighting session a distinct Long-nosed Bandicoot alarm call was heard coming from the study area. Dense shrub vegetation in and adjacent to the study area provides cover and potential den sites for these solitary and nocturnal marsupials.

Telstra underground cable is present along the western boundary of most of the study area. Therefore earthworks have occurred and terrestrial fauna habitat is somewhat modified over the 2-3m width of this easement.

Photograph 6. Red Bloodwood with signs of yellow bellied glider feeding (distinct 'v' notch present on trunk and branches).

Despite past disturbance (logging/clearing and fire), the regrowth forest provides resources for tree canopy birds. The avian assemblage recorded on and adjacent to the site during the survey period was low in diversity. It includes small tree canopy and trunk specialists (Striated Thornbill, White-throated Treecreeper), nectar feeders (Noisy Friarbird, Red Wattlebird, Eastern Spinebill and Rainbow Lorikeet), the nest predators common to more open habitats (Pied Currawong, Australian Magpie, Laughing Kookaburra), ground and scrub birds (Superb fairy Wren, White-browed Scrub-wren). The short duration of the survey and the fact that it was conducted when few shrub species were in flower possibly reduced the number of species detected. It could be expected that many

more species utilise the site, especially during the migration periods of honeyeaters and other summer migrants.

Photograph 7. Bandicoot diggings in leaf litter and soil (most likely of the Long-nosed Bandicoot)

Photograph 8. Burrow, most likely of a small-medium mammal or possibly a goanna (see Figure 5.1 for approximate location).

Road Reserve – There is no fauna habitat located on the disturbed road verge, which consists largely of soil and gravel, without any grassy verge. However an number of dead European Rabbits, Eastern Grey Kangaroos and Swamp Wallabies were found on the site. They probably feed on the grassy areas located to the east of the highway around the Sussex Inlet Road intersection and the powerline easement just beyond it to the east.

In total, 20 species were identified from the fauna survey (refer to **Appendix B** for species list). This is far from a complete list of the species which could be expected to occur. Assessment of the importance of the site for fauna therefore relies heavily on the presence of habitat attributes and fauna records on the DEC database.

Vegetation descriptions

1 Stringybark eucalypt, with potential hollows (low habitat value)
2 Bloodwood, potential old sap feed tree, horizontal incisions, no longer used.
3 As above, may be insect damage?
4 Bloodwood, with old sap feed marks no longer utilised
5 As above, looks more recent, but again could be insect damage.
6 Bloodwood with distinct V notches, old, not currently used (refer Photograph 6).
7 Small hollow bearing tree, fire induced, low habitat value.
8 Small bloodwood with similar incision marks (old)
9 Two trees with similar marks as above
10 Potential hollow bearing tree, very small hollows with little fauna habitat potential.
11 STAG, 25m from road outside impact zone however has well developed hollows
12 Hollow bearing tree, in impact zone, fire induced hollow, small hollows not well formed, poor fauna habitat potential.
13 Hollow bearing blackbutt with orange flagging, just outside impact zone but limbs do hang over. Avoid removal as it has well developed hollows, including in the overhanging limb
14 Bloodwood with signs of sap feeding, old, and could be insect damage
15 Past 200m mark (north), stag with fire damage, large vertical hollows at top, avoid damage.
16 Past 200m mark (north) Large hollow bearing tree with well developed medium hollow. Lots of activity on trunk (scratch marks). Avoid removal or damage.

Note: Features were located with a GPS and therefore accuratcy is only to within 15m

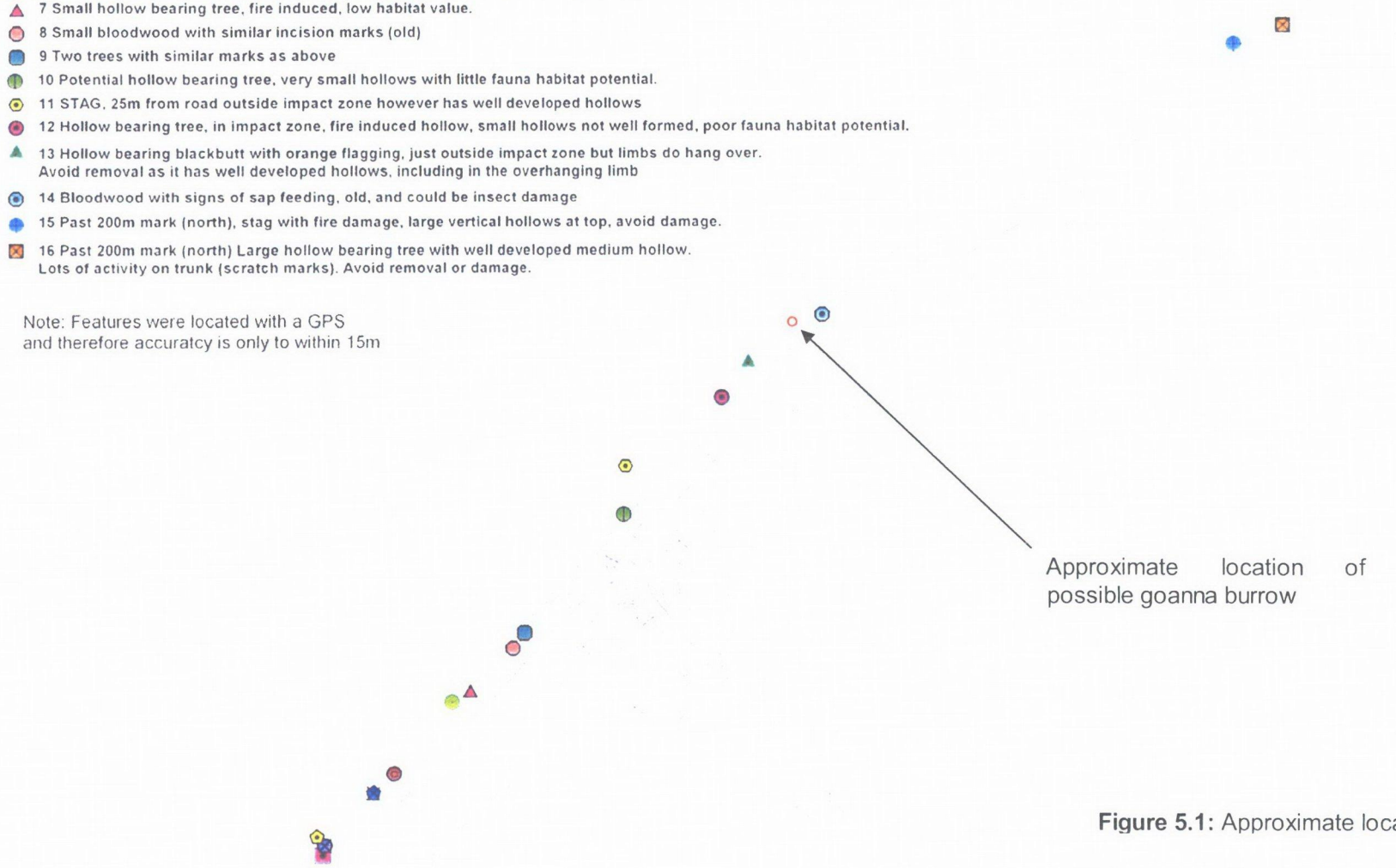


Figure 5.1: Approximate location of habitat features

5.3 Threatened species

One listed threatened species listed as vulnerable under Schedule 2 of the *Threatened Species Conservation Act 1995* was deduced to be utilising the site occasionally from the presence of feeding marks on some trees (Yellow-bellied Glider). An evaluation of threatened species known from the area determined that nineteen other species have potential to be present on the site (refer to Table 5.2). However due to the disturbed nature of the site (past clearing), their frequent occurrence and dependence on the site is unlikely. Of the 39 threatened species recorded from the area (DEC PWS Wildlife Atlas Jervis Bay and Ulladulla 1:100,000 map sheets), habitat for the following species is potentially present on-site:

Barking, Masked and Powerful Owl
Gang-gang Cockatoo
Glossy Black-cockatoo
Square-tailed Kite
Regent Honeyeater
Turquoise Parrot
Common Bent-wing Bat
Great Pipistrelle
Greater Broad-nosed Bat
Eastern Freetail-bat
Grey-headed Flying-fox
Eastern Pygmy-possum
Koala
Long-nosed Potoroo
Southern Brown Bandicoot
White-footed Dunnart
Yellow-bellied Glider
Rosenberg's Monitor

In Table 5.2. below "unlikely" indicates that the species is unlikely to be present because potential habitat is marginal or the site is outside the normal range of the species.

"Low" level of impact indicates that habitat on-site has some potential to support this species but is deficient in some requirement. In most cases no roosting, nesting or den sites are available though foraging habitat may present. An eight part test was completed for these species.

No species were categorised as likely to be affected to a moderate to high level of adverse impact due to site development.

Table 5.2 Threatened Flora recorded from the Jervis Bay and Ulladulla 1:100,000 map sheets (DEC Wildlife Atlas 4/5/05). Marine and strictly littoral species have been excluded. (V TSC Listed as Vulnerable on the *NSW Threatened Species Conservation Act, 1995,* E TSC Listed as Endangered on the *NSW Threatened Species Conservation Act, 1995,* V EPBC Listed as Vulnerable on the *Environmental Protection Biodiversity Conservation Act, 1999,* E EPBC Listed as Endangered on the *Environmental Protection Biodiversity Conservation Act, 1999,* JAMBA listed on the Japan - Australia Migratory Bird Agreement (JAMBA).)

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
AVES			
Barking Owl *Ninox connivens* V TSC	This species preys on mammals, birds and invertebrates, and can take prey as large as rabbits (Schodde & Tidemann 1995). Mated pairs occupy a 30 to 200 hectare territory, depending on habitat quality. It is found in drier forest and woodland and has been recorded persisting around human habitation. Habitat essential for the lifecycle of this species includes forest or woodland habitat, large nesting hollows and an abundance of prey species.	Foraging habitat is present on-site, but the low number of hollow-bearing trees in the vicinity would reduce the number of prey animals available, so the site is unlikely to provide high quality habitat.	Low
Brown Treecreeper *Climacteris picumnus* V TSC	The species occurs in eucalypt woodlands, mallee and drier open forest of eastern Australia (Schodde & Tidemann 1995). Threats include the loss of hollow bearing trees, decrease in the diversity of ground-dwelling invertebrates (Bromham *et al.* 1999) and increased competition with aggressive honeyeater species.	The site is outside the normal distribution of this species, which is generally found in dry woodlands west of the Great Dividing Range.	Unlikely
Diamond Firetail *Stagonopleura guttata* V TSC	This species occupies eucalypt woodlands, forests and mallee where a grassy understorey is present, preferring unfragmented woodlands.	The site is outside the normal distribution of this species, which is generally found in dry woodlands west of the Great Dividing Range.	Unlikely
Eastern Bristlebird *Dasyornis brachypterus* E TSC	This species requires dense heath and tussocky undergrowth (Schodde & Tidemann 1995), but it has been known to inhabit a wide variety of vegetation communities (NPWS 1999b).	This species has its main stronghold in the heath around Jervis Bay and Budderoo National Park/ Barren Grounds Nature Reserve north of Berry. As the site does not carry heath and is not close to heathland, the probability of this species using it is low.	Unlikely

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Gang-gang Cockatoo *Callocephalon fimbriatum* V TSC	Gang gangs inhabit wetter sclerophyll forests and woodlands of the coast and ranges, being seasonally nomadic between higher and lower elevations. They feed on seed of eucalypts and wattles and venture into towns and farmlands to feed on some introduced plants when available. They nest in tree hollows, which may be limiting in younger regrowth forests and farmlands.	Potential foraging habitat is available, but no hollow trees which could provide nest sites.	Low
Glossy Black Cockatoo *Calyptohynchus lathami* V TSC	This is a species of open forests and woodland, dependent mainly on the seeds of *Allocasuarina* trees as a food source (Blakers *et al.* 1984). Large trees with hollows are required for breeding sites (Emison *et al.* 1987).	Potential foraging habitat is available as *Allocasuarina littoralis* occurs on the site, but no hollow trees which could provide nest sites. No sign of this species feeding on cones of *A. littoralis* was found on the site.	Low
Ground Parrot (eastern subsp.) *Pezoporus wallicus wallicus* V TSC	This species is closely associated with heathlands and sedgelands. It is present in swampy areas, dry ridges and is tolerant to burned areas of these habitat types, feeding principally on seed of sedges, which are favoured over shrubs by burning. It is sedentary with local seasonal movements (Pizzey & Knight 2003).	No suitable habitat (heath) present onsite.	Nil
Hooded Robin *Melanodryas cucullata* V TSC	The Hooded Robin favours lightly timbered country (Schodde & Tidemann 1995) west of the Great Dividing Range. This species spends much of its time on the ground in woodland foraging for insects, frequenting places with dead trees and fallen timber (Schodde and Tidemann 1995), nesting in strong bark cusps of trees. Established pairs keep to their territory of 10-20 hectares.	The site does not provide suitable habitat (mature woodland with a grassy understorey and fallen timber) and is outside the normal distribution of this species.	Unlikely

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Latham's Snipe *Gallinago hardwickii* JAMBA	Latham's Snipe nest annually in northern Japan, (Schodde and Tidemann 1995). During August they begin their migration south to Australia. In Australia it generally disperses singly through favoured habitat: wet treeless tussocky grassland, short-grassed marshes, and low brakes along freshwater streams and channels.	No suitable habitat is present on the site.	Nil
Masked Owl *Tyto novaehollandiae* V TSC	This species forages in a range of forest and woodland types but requires large tree hollows for nesting. Forested areas adjacent to areas of dense and sparse ground cover within close proximity are required for foraging (Garnett 1992 & Peake *et al.* 1993). It also occurs in fragmented forest-pastoral land usually near creek lines and in open grassy woodland (Kavanagh 2004). This owl forages on ground-dwelling prey, particularly Bush Rats, introduced Black Rat and House Mouse.	Foraging habitat exists on the site, but roost and nesting habitat is not present. This species also has a large home range and is highly mobile.	Low
Olive Whistler *Pachycephala olivacea* V	In coastal areas, this species strongly favours moist forest and riparian thickets, especially teatree thickets (Blakers *et al.* 1984, Emison *et al.* 1987).	Suitable habitat does not occur on the site.	Nil
Pink Robin *Petroica rodinogaster* V TSC	This species appears to prefer heavily timbered moist forest with a dense understorey (Tanton 1994), though dispersing into drier forest and woodland in winter. It forages within forest feeding on insects and spiders. The pink robin nests in small trees or shrubs creating a compact cup, built of moss, bound with spider webs and covered in lichen (Schodde and Tidemann 1995).	No suitable heavily forested habitat is present onsite due to previous logging and fire disturbance.	Nil

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Powerful Owl *Ninox strenua* V TSC	This species is dependent on large territories in coastal and mountain eucalypt forest (Blakers *et al.* 1984). Territories are usually centred around gullies, with roost and nest site located centrally (Fleay 1968). Large tree hollows are required in which to nest (Emison *et al.* 1987). Abundant arboreal mammals (which form about 80% of the diet of this species) are a requirement of this species (Blakers *et al.* 1984).	Due to the lack of prey available on-site it is unlikely that this species frequents the site. This species also has a large home range and is highly mobile.	Low
Regent Honeyeater *Xanthomyza phrygia* E TSC	The Regent Honeyeater is mostly an inhabitant of inland NSW and Victoria, although coming to the coast in the Hunter Valley and Sydney region. It is migratory, following the flowering and fruiting of food resources such as mistletoe and flowering eucalypts in dry open forests, woodland and riparian forest.	The site is outside the usual range of this species, but could provide occasional resources when the bloodwoods and eucalypts and in flower.	Low
Sooty Owl *Tyto tenebricosa* V TSC	Pairs of this species establish large permanent territories in rainforest and wet eucalypt forest (Blakers *et al.* 1984). Within these forests they prey mostly on a variety of small to medium terrestrial and arboreal mammals (Blakers *et al.* 1984). The Sooty Owl may also nest in dry sclerophyll forest, adjacent to moister forests, if trees with suitable hollows are present.	The site does not provide potential roost or nesting habitat and lack of arboreal and terrestrial prey makes it unlikely that this species frequents the site.	Unlikely
Square-tailed Kite *Lopoitinia isura* V TSC	This species' preferred habitat is open eucalypt forest and woodland (Schodde & Tidemann 1995) where it preys on passerine birds taken in the forest canopy (Klippel 1992) and builds large stick nests tall trees. Resident pairs have territories of greater than 100 km². The species is believed to be nomadic (Slater *et al.* 1986).	Potential foraging resources are present onsite but no evidence of nesting was observed during the survey. Due to the disturbed nature of the site and the shortage of prey species, it is unlikely that this species frequents the site.	Low
Striated Fieldwren *Calamanthus fuliginosus* V TSC	Inhabiting swamp-fringes, low shrubs and tussocks, this species can be found in saltmarsh, coastal heath and vegetated dune areas. It typically has a domed nest of grass or plant stems, on or near the ground in tussocks, hedges or scrub (Pizzey & Knight, 2003).	No suitable habitat present on the site.	Nil

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Superb Fruit-dove *Ptilinopus superbus* V TSC	This species utilises rainforests and fringing scrub, mangroves, wooded stream margins, lantana thickets and may visit isolated food trees of suitable species such as figs. Its range is the east coast from Cape York (Q) south to about Moruya, although it is only an occasional visitor in the southern part of this range. It feeds on soft fruits and constructs a flimsy stick nest in the tree canopy.	No suitable habitat present on the site.	Nil
Turquoise Parrot *Neophema pulchella* V TSC	The Turquoise Parrot feeds on grass and herb seeds and nests in holes in trees or stumps. It normally lives on the edges of eucalypt woodland where it has access to grassy areas. It tends to prefer sheltered valleys amongst rocky hills (Klippel, 1992).	Marginal foraging habitat is available onsite. No hollow bearing trees are present on the site so no nesting resources are available.	Low
MAMMALIA			
Brush-tailed Rock Wallaby *Petrogale penicillata* E TSC	Inhabits cliffs and rock piles with numerous crevices and ledges, in which it shelters, emerging at night to feed on grasses, shrubs and herbs.	No suitable habitat is present.	Nil
Common or Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis* V TSC	This species is a common although vulnerable species that is likely to be widely distributed throughout the region. It roosts and raises its young in caves and mine tunnels (Strahan 1995). The species appears to forage above the forest canopy in a diverse range of forest types (Strahan 1995).	Potential foraging habitat is present on-site for this species. No roosting habitat is available.	Low

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Eastern Cave Bat *Vespadelus troughtoni* V TSC	Mostly in drier open forest and woodland along the inland slopes and coastal plains from Cape York (Q) to about Kempsey, NSW. Roosts in caves and mineshafts. The area is outside the normal known range of this species though as bat distributions in general are poorly known this does not preclude it occurring in the area. However, it is said to be similar in appearance to the Large Forest Bat, *V. darlingtoni*, which does occur on the south coast, so the record may be incorrect.	Potential foraging habitat is present on-site for this species. No roosting habitat is available.	Unlikely
Eastern Freetail-bat *Mormopterus norfolkensis* V TSC	Little is known of the habitat requirements of this species. It is found in a range of habitats including dry and wet sclerophyll forest (Hall & Richards 1979) and roosts in tree hollows.	Due to the lack of hollow bearing trees it is unlikely that this species roosts on-site, though foraging habitat may be present for this species.	Low
Eastern Pygmy-possum *Cercartetus nanus* V TSC	Feeding largely on nectar, and insects, the species is found from rainforest through sclerophyll forest to tree heath. *Banksias* and myrtaceous shrubs and trees are favoured as food sources (Turner & Ward from Strahan 1995). Its small size allows it to nest in very small spaces during the day, and hollows in trees are favoured (Turner & Ward from Strahan 1995).	Potential foraging habitat is present onsite. There is an abundance of nectar producing species in the understorey such as *Banksia spinulosa* and *Lambertia formosa*, and the dominant canopy species red bloodwood is a prolifically flowering species. A couple of small tree hollows were observed on site and more hollows are available nearby.	Low, due to the availability of abundant similar habitat adjacent to the site.
Great or Eastern False Pipistrelle *Falsistrellus tasmaniensis* V TSC	Little is known of the habitat requirements of this species. It is found in a range of habitats including dry and wet sclerophyll forest but appears to prefer wet sclerophyll forest (Hall & Richards 1979). This species roosts in tree hollows (Phillips & Inwards 1985).	Due to the lack of hollow bearing trees it is unlikely that this species roosts on-site, though foraging habitat may be present for this species.	Low

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Greater Broad-nosed Bat *Scoteanex rueppellii* V TSC	This species is recorded from a range of habitats, from woodland to rainforest (Hall & Richards 1979). It is known to roost in tree hollows (Richards 1983) but has also been found in roof spaces. Its diet includes slow-flying insects. It may prefer riparian areas adjacent cleared areas in which to forage.	Due to the lack of hollow bearing trees it is unlikely that this species roosts onsite, though foraging habitat may be present.	Low
Grey-headed Flying-fox *Pteropus poliocephalus* V TSC V EPBC	This species roosts in large camps, generally in wetter vegetation such as rainforest or swamp forest. Groups fly out at night to feed on fruit, nectar and blossom, particularly of *Eucalyptus, Melaleuca* and *Banksia*. This species shows fidelity to roosting areas but may feed in orchards. It appears to be showing an increasing tendency to roost around human habitation, possibly driven by the impacts of drought and vegetation clearing on its natural food sources.	The site may represent foraging habitat when the canopy tree species are flowering.	Low
Koala *Phascolarctos cinereus* V TSC	This species utilises a wide range of forest and woodland types. They are solitary with distinct home ranges (Strahan 1995) and feed on the foliage of a range of eucalypt trees (Klippel 1992).	None of the tree species on site have been identified as primary feed trees for koalas. None of the bloodwoods or scribbly gums or blackbutt feature in any of the regional surveys of koala food trees as even secondary feed species, although stringybarks, including *E. eugenioides* have been recorded as secondary feed species. There are no recent koala records from the Jervis Bay hinterland (C. Allen, DEC, pers. comm.).	Low, due to the presence of abundant similar habitat nearby and the lack of recent records in the vicinity.
Large-footed Mouse-eared Bat *Myotis adversus* V TSC	This species forages on the surface of water bodies such as rivers, lakes and swamps and roosts in caves, mine, tunnels and old buildings (Hall & Richards 1979).	The site does not contain potential roost or foraging habitat for this species.	Nil

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Long-nosed Potoroo *Potorous tridactylus* V TSC	This species occurs in coastal heath, dry and wet sclerophyll forest and requires thick contiguous undergrowth. Individuals are generally concentrated where soil is light and sandy (Johnston 1983)	The site could represent habitat for this species although the soil appeared more clay than sandy. Conical diggings were evident on the site but appeared to be those of bandicoot species.	Low, due to the presence of abundant similar habitat nearby.
Parma Wallaby *Macropus parma* V TSC	Records of this species in the Shoalhaven district are likely to be historical only, since the species is now restricted to the north coast and ranges of NSW (Menkhorst & Knight 2001) where it inhabits wet forests, sheltering in dense cover during the day and emerging at night to feed in grassy clearings.	The site is outside the current range of this species.	Unlikely
Southern Brown Bandicoot (eastern) *Issodon obesulus obesulus* E TSC	Scrubby habitat with low ground cover occasionally burnt out is preferred by this species (Braithwaite 1983). A preference for thick undergrowth can also provide protection from predators such as foxes (Lobert & Lee 1990).	Habitat for this species occurs on the site and the presence of small conical shaped diggings suggests that a species of bandicoot frequents the site for foraging. These are likely to belong to the more common Long-nosed Bandicoot which was heard on the site.	Low, due to the presence of abundant similar habitat nearby.
Spotted-tail Quoll *Dasyurus maculatus* V TSC	Sclerophyll forest, rainforest in mountainous country, and coastal habitats can be utilised by this species (Le Souef & Burrell 1926). Habitat attributes which are likely to be critical to the life cycle for the Spotted-tail Quoll are large areas of undisturbed habitat which provide a variety of key food and other resources such as large hollow logs or small caves at ground level for den sites. Quolls appear to be most abundant in areas with few roads and where foxes are either absent or kept in check by dingoes (Resource and Conservation Assessment Council, 1996).	Due to the disturbed nature of the site, lack of potential den sites and limited food resources it is unlikely that potential habitat is present on-site for this species.	Unlikely.

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
White-footed Dunnart *Sminthopsis leucopus* V TSC	Research on this species in a recently logged area near Bega suggests that preferred habitat is treeless ridges and mid slopes with sparse ground cover of less than 51% (Lunney *et al.* 1989). The study suggested that it seeks initial seral stages of forest regenerating from gross disturbance" (Lunney *et al.* 1989). It constructs a bark nest beneath fallen timber or dense litter (Menkhorst and Knight 2001). It has also been recorded in coastal dune scrub adjacent to disturbed forest (pers. obs. Kate Gillespie).	The disturbed forest in this site appears to represent optimal potential for this species.	Low, due to the presence of abundant similar habitat nearby.
Yellow-bellied Glider *Petaurus australis* V TSC	This species is restricted to tall mature eucalypt forest (Russell 1983), where it uses tree hollows for shelter and feeds on a range of plant and insect exudates (including pollen, nectar, sap, manna and honeydew) and arthropods, the latter collected mostly under exfoliating bark. The animals chew into the bark of selected trees to stimulate a flow of sap, which is lapped from the wound. The undersides of branches and trunks of trees are typically tapped in this way and quite small trees may be used. Only a small proportion of the trees within the territory of a family group will be tapped for sap, but those individual trees may be very heavily scarred by this activity. The species may prefer forest of high species diversity in order to ensure a regular supply of the various plant exudates it requires. Eucalypts that provide hollows, sap flow and flower in winter are preferred by this species. These include red bloodwood, which is also a favoured sap feed species.	Some evidence of Yellow-bellied Glider activity was recorded on-site, in the form of sap-feeding scars on many of the red bloodwoods, although little of it appeared to be current. Large hollow bearing trees (for den sites) are critical to the lifecycle of this species, and were not present on-site, although some good-sized hollows are present in trees along the western edge of the site.	Low, due to the presence of abundant similar habitat nearby, and the fact that very little of the sap feed scars appeared current.
AMPHIBIA			
Giant Burrowing Frog *Heleioporus australiacus* V TSC	This species can be found in a range of forest types on the coast and adjacent ranges including riparian and moist forests dry sclerophyll and woodlands (Gillespie 1990). Breeds summer and autumn, apparently in burrows in creek banks, favouring deep loam soils.	This species does not appear to inhabit areas that have been exposed to clearing and is therefore not likely to be present within the study area.	Unlikely

Species and Status*	Ecology	Presence of Habitat	Potential impact rating
Green and Golden Bell frog *Litoria aurea* E TSC	This species occurs in or near water or very wet areas. It is present in forests, woodlands and shrublands, in open or disturbed areas (Hero *et al.* 1991). Breeding takes place in permanent lakes, swamps and dams with still water (Hero *et al.* 1991).	No suitable habitat is present on-site.	Nil
Littlejohn's Tree Frog *Litoria littlejohni* V TSC	Littlejohn's Tree Frog is distributed along the eastern slopes of the Great Dividing Range from near Wyong, south to Buchan in north-eastern Victoria (NPWS Website). It appears restricted to sandstone woodland and heath communities at mid to high altitude (280-1000m) on the slopes of the Great Dividing Range (Barker *et al* 1995). It forages both in the tree canopy and on the ground, and it has been observed sheltering under rocks on high exposed ridges during summer. It is not known from coastal habitats. It appears to breed in flowing rocky streams or in dams with emergent vegetation (Barker *et al* 1995).	The site is outside the normal distribution of this species and does not include any water.	Nil
REPTILIA			
Broad-headed Snake *Hoplocephalus bungaroides* E TSC	This species of small nocturnal snake is restricted to sandstone areas, where it shelters under slabs and in crevices, emerging to feed on frogs and lizards. It is threatened largely by habitat destruction for housing and collection of bush rock.	Potential habitat is not present on-site.	Nil
Rosenberg's Monitor *Varanus rosenbergi* V TSC	This species inhabits a range of forests, woodland and coastal heath on sandy soils, sheltering in burrows which it excavates, or in hollow logs and rock crevices (Cogger 1992). It is an active predator, feeding on insects, frogs, reptiles, birds, mammals and carrion. It lays its eggs in active termite mounds (Vincent & Wilson 1999).	Potential habitat is present and a freshly dug burrow which could have been excavated by this species is present near the northern end of the 400m core site, on the western edge of the site. It could also have been excavated by a Common Wombat, scat of which was found in a single location on the site (not near the burrow) but the size of the burrow seemed small for a Wombat.	Low, due to the presence of abundant similar habitat nearby, though care may need to be taken to ensure that the occupant of the burrow is not killed during the works.

6 IMPACT ASSESSMENT

Impacts on Flora

No vegetation types of any conservation significance, including populations or ecological communities are present on the study site. All of the site has been substantially disturbed by past logging, clearing and the installation of a telecommunications cable.

The proposed works would affect only a small area of regrowth forest vegetation, of a type which is intermediate between two communities which are common in the Shoalhaven LGA and are adequately to well represented within reserves. The removal of a limited, disturbed area of this forest type (approximately 0.4 ha) would not significantly alter the abundance of this vegetation community on a local or regional scale.

Vegetation removal can leave soil vulnerable to erosion and reduce soil stability. Sealing this area to create an extra merging lane on the highway would increase the total area impervious to water infiltration and therefore increase water runoff, which can exacerbate erosion at the point of discharge. If required these areas would require appropriate treatment to ensure erosion does not occur. The proposed works would take place within areas already substantially modified as part of the highway verge and from past clearing and logging and cable-laying. As such, the underlying soils have already been subject to disturbance, at least in part.

Construction should aim to avoid the removal of any mature eucalypts containing hollows which are located adjacent to the western edge of the site, including those with limbs which overhang the site if these limbs are hollow-bearing. However due to the abundance of similar forested vegetation adjacent to the site the removal of a small number of trees which are not hollow-bearing is unlikely to have a significant impact on the biodiversity of the local area.

Impacts on Fauna

Impacts on fauna would occur as a result of:

(i) Habitat removal, primarily foraging resources in the form of tree canopies and shrubby understorey;

(ii) Habitat degradation due to soil erosion and potential damage to remaining vegetation caused by tree felling and the movement of large machinery onsite; and

(iii) The increased width of the cleared road easement that may impede the movement of some fauna between foraging and nesting/denning/roosting resources or between local populations in the area.

The works would result in the increased width of the Princes Highway around the Sussex Inlet Road intersection, with a maximum increase up to 15m over a 400m strip, tapering down to the north up to 1km beyond the intersection. The works would widen an existing sealed area (Princes Highway) through regrowth forest habitat. The increased open area may reduce the ability of individuals to access resources located on the opposite side of the highway or reduce the connectivity between local family groups. The latter case would act to reduce the genetic diversity of the local population and potentially lead isolated groups towards inbreeding depression.

However, the level of this impact is likely to be only minor, given that the highway is lined by forest on both sides, both north and south of the study area. There should be no significant adverse impact upon the east-west connectivity between conservation reserves, currently already compromised by the Princes Highway.

It is not anticipated that there would be an increase in traffic levels or vehicle speed. Therefore it is considered unlikely that it would result in an increased risk of death to fauna crossing the road at this locality.

While the proposal may remove some habitat of fauna that utilise the site, impacts would be limited to an area modified by road construction, past logging and clearing and cable laying. Impact amelioration would be achieved following the regeneration of the site along disturbed areas.

It is not anticipated that any hollow bearing trees would be removed.

The works should not provide improved conditions to introduced species. Nor is it anticipated that the works would result in improved access for predation by the European Red Fox to forest areas that surround the site.

6.1 Eight Part Test

The following Eight-part test, which has been completed in accordance with section 5A of the *Environmental Planning and Assessment Act 1979*, assesses the impact of site development on 20 species listed as threatened by the *Threatened Species Conservation Act 1995*. Table 5.2 identified that the following fauna species are more likely to occur at the site and therefore have low potential impact rating: Masked Owl, Powerful Owl, Barking Owl, Square-tailed Kite, Gang-gang Cockatoo, Glossy Black-cockatoo, Turquoise Parrot, Regent Honeyeater, Common Bent-wing Bat, Eastern Freetail-bat, Great or Eastern False Pipistrelle, Greater Broad-nosed Bat, Grey-headed Flying-fox, Eastern Pygmy-possum, Koala, Southern Brown Bandicoot, Long-nosed Potoroo, White-footed Dunnart, Yellow-bellied Glider and Rosenberg's Monitor. Section 4 also identified that the sites provides potential habitat for the orchids *Caladenia tessellata* and *Cryptostylis hunteriana,* which are also included in the eight part test.

This assessment should be read in conjunction with the evaluation carried out in Table 5.2, which considers the ecology of the species, likelihood of occurrence on-site and anticipated impacts from site development, and has categorised the above mentioned species as having potential to be affected at only a low level of impact. Because the level of impact is considered likely to be low, the eight part test has been performed on groups of like species, rather than individually for every species which could be affected by the proposal.

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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

Masked, Powerful and Barking Owls, Square-tailed Kite

The three forest owls are nocturnal predators of arboreal or terrestrial mammals, and occasionally of birds. Pair occupy permanent large territories and nest in tree hollows, roosting by day in densely foliaged trees. No trees with large hollows were identified within the impact zone, nor are there any densely foliaged small trees likely to be used for daytime roosts. Trees or stags with larger hollows occur adjacent to the site. This includes trees identified as 13,15 and 16 in Table 5.1, which occur just outside of the proposed impact zone. These would be protected from impact.

The Square-tailed Kite is a diurnal predator of passerine birds which it captures by hunting above the tree canopy. It builds a large stick nest in the tree canopy. No nests are present on the study site. This species also has a large territory, and may be partially migratory. It could forage in the study area.

While the abundance of forest in the local area ensures that it provides potential habitat to viable populations of these four species, it is considered unlikely that development would impact on the life cycle of this species to a level that would place them at a risk of extinction (at a local level) because of the small amount of forest habitat that occurs in the impact zone (0.4ha or less) and as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area.

Gang-gang Cockatoo, Glossy Black-cockatoo, Turquoise Parrot

These three bird species may also be nomadic or partially so. The site could contain food resources for them, eucalypt and wattle seeds, *Allocasuarina* seeds and grass seeds respectively. They nest in tree hollows or in the case of the Turquoise Parrot, sometimes in hollow stumps. No trees with hollows of a suitable size are present on the site.

While the abundance of forest in the local area ensures that it provides potential habitat to viable populations of these three species, it is considered unlikely that development would impact on the life cycle of them to a level that would place them at a risk of extinction (at a local level). This is because of the small area of forest habitat that occurs in the impact zone (0.4ha or less) and as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area.

Regent Honeyeater

This species is migratory or nomadic, following the flowering of the eucalypts and mistletoe upon whose nectar it feeds. It is primarily an inland species, irrupting to the coast occasionally when suitable resources are available there. The probability of it occurring on the site is very low. Most of the trees on the site are young and therefore likely to flower less profusely than older and larger trees.

It is considered unlikely that the development would impact on this species life-cycle that would place them at a risk of extinction because of the small size of the impact zone (0.4ha of forest habitat or less) and as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area.

Microchiropteran Bats and Grey-headed Flying-fox

The Greater Broad-nosed Bat, Eastern Freetail-bat and Eastern False Pipistrelle are forest dependent bat species. Habitat critical to their lifecycle includes forest (forage habitat) that contains hollow bearing trees (roost and breeding sites). The Common Bent-wing Bat roosts and breeds within caves and mine tunnels, and feeds on invertebrates above the forest canopy (Tanton 1994). Potential roost and maternity sites of these species would not be impacted by the works proposed.

The Grey-headed Flying-fox is a migratory species which feeds on eucalypt nectar and soft fruits of native and exotic tree species. It forms large roosts or camps, usually in wet sclerophyll forest or rainforest in gullies. The site does not provide suitable roosting habitat, though it may provide some food resources when the trees are in flower.

The development site provides potential foraging habitat for these five species. The removal of small area of regrowth forest, of a type that is well represented within the local area, would be unlikely to have a substantial impact on forage habitat available to these highly mobile species.

While the abundance of forest in the local area ensures that it provides potential habitat to viable populations of these two species, it is considered unlikely that development would impact on the life cycle of these species to a level that would place them at a risk of extinction (at a local level), given the extent of the impact zone combined with the abundance of similar forest in the local area.

Long-nosed Potoroo and Southern Brown Bandicoot

The Long-nosed Potoroo prefers thick contiguous undergrowth on sandy soils (Johnston 1983), it is generally restricted to coastal lowlands and foothills (Richards et al. 1990). It eats roots, tubers, hypogeal fungi and insects. Catling (1991) suggests optimum habitat for this species is a mosaic of regenerating, dense understorey resulting from periodic severe fires. Bennet (1993 in Broome 1994) points to a requirement for floristically diverse vegetation for foraging. In unlogged forest at Cabbage Tree, Claridge (1993) noted seasonal changes in nest site preference, with sheltered mid-slopes preferred in winter and gullies preferred in summer. Forages over a range of topographic positions, particularly on midslope sheltered areas and gullies.

In Goura Nature Reserve, the Long-nosed Potoroo favours understoreys with sedges (*Lepidosperma, Gahnia*) (Broome (1994), which would provide daytime shelter (Claridge pers. comm. in Broome 1994), and forest containing the bipinnate *Acacia irrorata* (on moist sites), and *A. falciformis* and *Allocasuarina littoralis* (on drier sites) with associated fungal food sources. Estimates of home range size vary from 1.8-2.0 hectares in fragmented forest habitat (Bennet 1987), to 10-20 hectares in Tasmanian coastal heath (Kitchener 1973 in Broome 1994). Mason (1992) noted the mobility of the species, and its ability to travel across roads and use narrow vegetated corridors.

Research suggests that the Southern Brown Bandicoot prefers scrubby habitat with low ground cover that is occasionally burnt (Braithwaite 1983). Stoddart & Braithwaite (from Cockburn 1990) argue that the species prefers regrowth habitat that has either been recently burnt or cleared. Geographic range prediction of *I. obesulus* in Gippsland identified optimum habitat as being lowland sclerophyll forest, from sea level to 300 m ASL, principal tree species are *Eucalyptus seiberi* and *E. globoidea*, with a sparse shrub layer consisting of a range of sclerophyllous species. The species has been known to inhabit pockets of heathland and rough pasture in the outer suburbs of Melbourne, although their abundance has been reduced significantly following the development of extensive housing estates (Dixon 1966; Seebeck 1977, from Menkhorst & Seebeck 1990). Lobert & Lee (1990) found a high proportion of *I. obesulus* hair and bone fragment in fox scats in an area populated by this species in Victoria and suggested that *I. obesulus* prefers habitat with thick undergrowth, that avian and mammalian predators would find extremely difficult to penetrate.

Conical shaped diggings were identified on-site but it is most likely that they were created by foraging Long-nosed Bandicoots, one of which was heard making an alarm call during spotlighting on the site.

While the abundance of forest in the local area ensures that it provides potential habitat to viable populations of these two species, it is considered unlikely that development would impact on the life cycle of these species to a level that would place them at a risk of extinction (at a local level). This is due to the small size of the impact zone (0.4 ha or less of forest vegetation) and as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area.

Koala

There are no recent Koala records from the Jervis Bay hinterland (C. Allen, DEC, pers. comm.) and only one of the tree species growing on the site (*E. eugenioides*) is known to be utilised by the species as a secondary feed tree. It is very unlikely that this species will be affected by the development because of the small size of the impact zone (0.5ha or less of forest habitat) and as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area.

White-footed Dunnart

A variety of habitats, ranging from rainforest, open forest, coastal scrub and dry coastal heath is utilised by this species. It feeds on invertebrates and lizards and requires tree hollows, rotting logs, wood piles and other such sites to provide shelter during daylight hours. Research in the Bega area suggests that preferred habitat comprises treeless ridges and mid slopes with sparse ground cover (Lunney *et al.* 1989) and that it inhabits recently disturbed areas, disappearing as the vegetation regenerates towards mature forest.

The site provides potential habitat for this species in the regenerating forest. While the abundance of forest in the local area ensures that it provides potential habitat to viable populations of this species, it is considered unlikely that development would impact on the life cycle of it to a level that would place them it a risk of extinction (at a local level). Similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area.

Yellow-bellied Glider

The Yellow-bellied Glider has a wide distribution along the east coast and adjacent ranges from north Queensland to western Victoria. However its occurrence within its range is patchy and its population density is generally low. Several studies on this species are reported in Goldingay & Kavanagh (1991) and an intensive study of their feeding behaviour and habitat requirements in the Bombala area in Kavanagh (1987). The import of most studies on this species is that they exploit a range of plant exudates including sap, manna (a substance formed by exudation of sap at the site of insect damage on branchlets and foliage of eucalypts) and nectar of eucalypt flowers. They are also known to feed on honeydew, an excretion of certain sap-sucking insects. Protein is obtained by foraging for insects and other invertebrates mostly under the peeling bark of smooth-barked eucalypts, and by consuming pollen when it is available in eucalypt blossom (Kavanagh 1987).

Habitat critical to the lifecycle of this species includes areas of contiguous tall sclerophyll forest, that provide large hollow-bearing trees (den sites), and a food source, including a variety of invertebrates, sap feed trees, eucalypt nectar and pollen, manna and insect exudates. Forest in the local area is likely to provide potential habitat to viable populations of this species.

A number of red bloodwood trees which appear to have been utilised by Yellow-bellied Gliders as sap feed trees are present on-site, but few of the markings appear current, and some may in fact be insect damage rather than from Yellow-bellied Gliders. The species was not heard in the vicinity, although being very vocal its presence is usually easy to detect. It is considered unlikely that development would impact on the life cycle of this species to a level that would place any population (including local population) of the species at a risk of extinction. This is due to the small size of the impact zone (0.4ha or less) and as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area. Although the road widening may reduce the ability of any population in the area to cross the Princes Highway at this point, Yellow-bellied Gliders are highly mobile, capable of making glides up to 100m in length (given a sufficiently tall tree as a starting point), and occupy quite large territories. They would most likely be capable of crossing the highway at another point close by if the gap between trees became too large for them to cross at this site.

Rosenberg's Monitor

This species inhabits dry forests, woodland and heath, principally in southern Australia, but with an outlying population around the Sydney Basin area. It preys on a wide range on vertebrate and invertebrate fauna and takes carrion. It shelters among rocks, in hollow logs or it burrows which it excavates in sandy soils.

A burrow which could have been constructed by this species was found on the site (refer to Photograph 8). It is located a few metres north-west of the Geodetic Survey marker located north of the intersection. This survey marker is well marked with spray-paint on a nearby fence post and flagging tape. No GPS reading was taken of the burrow. It is close to the western edge of the impact zone, possibly just outside it, and if the Geodetic survey marker is to be retained on the site, this should also protect the burrow from disturbance. The burrow may also have been constructed by a Common Wombat, scat of which was found on the site, though not close to the burrow. However, the burrow appeared small for a wombat, and did not have the characteristic platform of excavated subsoil at the entrance. The scat found on the site suggested a large animal, but the burrow size suggests an immature wombat. For these reasons it is considered that the burrow could be that of a Rosenberg's Monitor rather than that of a wombat.

While the abundance of forest in the local area ensures that it provides potential habitat to viable populations of this species, it is unlikely that this species will be affected by the development because of the small size of the impact zone (0.4 ha or less of forest habitat). Further as similar or better quality forested habitat is abundant nearby in Yerriyong State Forest, Conjola National Park, Morton National Park and Corramy State Conservation Area it is considered unlikely that development would impact on the life cycle of it to a level that would place them it a risk of extinction (at a local level). It is however recommended that the burrow be protected from disturbance.

Orchids *Caladenia tessellata* and *Cryptostylis hunteriana*

There is no known population of either orchid on the site. However, the habitat on the site is potentially suitable for both, and given the cryptic nature of many ground orchids and the fact that the survey was outside the flowering period of both species, there is a small chance that this species could be present.

It is considered very unlikely that any viable local population of either species would be put at risk of extinction by the proposed development. Populations which have been recorded to date of *C. hunteriana* have generally been of small numbers of individuals within a restricted area (e.g. 1, 3 and 15 plants recorded by Bell, 2001, though up to 150 plants by Clarke *et al*, 2004), although this may be in part because of the difficulty of locating the relatively inconspicuous flowers within the heathy vegetation in which they typically occur. It is likely that a number of other small populations exist however due to the inconspicuous flower they are difficult to survey for.

C. tessellata records in Shoalhaven LGA were made in the first two weeks of October, while *C. hunteriana* records are spread over a wider period between late November and early March, making its flowering period on the site much harder to predict.

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b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised,

No endangered populations have been listed for the local area within Schedule 1 part 2 of the *Threatened Species Conservation Act*.

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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 proposal will require the removal of vegetation located at the site for the construction of turning lanes on the Princes Highway, but due to the majority of the site being already disturbed by past logging and clearing, road construction and cable-laying, the site provides only limited resources for threatened fauna species. The proposal involves the removal of at most 0.4 hectares of a regionally common vegetation type, which does not constitute a significant proportion of known or likely habitat for any of the threatened fauna species potentially occurring in the area.

The area to be affected by the proposal is not likely to provide habitat for the orchids *Cryptostylis hunteriana* or *Caladenia tessellata*, though there is low possibility remains that it does, since the survey timing was not appropriate for detecting these species.

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d) whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community,

The proposed development would widen the Princes Highway by another 15m over a distance of 400m, and by a lesser distance for another 800m to the north of the intersection. It is not expected that threatened species, or populations of ecological communities would become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community as a result. The Princes Highway may already prevent dispersal of some smaller and less mobile fauna species, and the additional width is not likely to present a significant impediment to the movement of more mobile species. The development should not alter traffic intensity or speed in the vicinity, so is unlikely to contribute to increased road kill of fauna at the site.

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e) whether critical habitat will be affected,

The site does not contain habitat listed as critical, nor habitat that is considered significant to threatened species that may occur on-site.

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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,

It can be assumed that in general, species listed as threatened are under-reserved. Considering that the proposed impact zone is restricted to a small area, the development is not considered to pose a high threat to the threatened species discussed or their habitats.

The records of the orchid *Cryptostylis hunteriana* and *Caladenia tessellata* in the region are mostly within conservation reserves, Jervis Bay and Conjola National Parks. As much of the suitable woodland and heath habitat for *C. hunteriana* at least is in conservation reserves, it is likely that it is adequately represented within reserves in this part of its range. The reservation status of the rarer *C. tessellata* is less clear.

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

Clearing of native vegetation is listed as a key threatening process under the *TSC Act*. In its determination the Scientific Committee stated that:

Clearing of native vegetation is recognised as a major factor contributing to loss of biological diversity. Clearing of any area of native vegetation, including areas less than two hectares in extent, may have significant impacts on biological diversity.

Impacts from clearing often results in fragmentation…Fragmentation impacts include the creation of small isolated populations with limited gene flow between populations, leading to inbreeding depression and reduced potential to adapt to environmental change. Fragmentation also leads to the loss or severe modification of the interactions between species, including those interactions that are important for the survival of species.

The proposed works are unlikely to have a significant impact in this respect because of the small area to be affected, the fact that it is already substantially disturbed and the abundance of similar forest in the vicinity.

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

None of the threatened species identified as potentially using the site are at the limit of their known distribution.

Conclusion

This Eight-part Test has determined that the threatened fauna species identified as potentially using the site would not be significantly adversely affected by loss or modification of habitat due to the small size of the area to be developed, the poor quality of the existing site and the abundance of similar habitat in the vicinity. In relation to the orchids *Caladenia tessellata* and *Cryptostylis hunteriana* it has been assessed that the threatened and endangered species identified, would not be greatly impacted by loss or modification of habitat due to the small size of the area to be developed.

Based on this assessment a Species Impact Statement is not required.

6.2 Assessment of Significance, EPBC Act

Endangered and Vulnerable Species

The study area contains limited potential habitat for the two orchids, *Caladenia tessellata* (Thick-lip Spider Orchid) and *Cryptostylis hunteriana* (leafless tongue-orchid) species listed as vulnerable on the EPBC Act.

The following list of criteria assists in assessing whether an action has, or will have, or is likely to have a significant impact on an endangered or vulnerable species:

Will the action lead to a long-term decrease in the size of a population of a species?

Leafless Tongue Orchid
There is no known population of the Leafless Tongue Orchid or Thick-lip Spider Orchid on the site. However, the habitat on the site is potentially marginally suitable, and given the cryptic nature of these species and the fact that the survey was outside its flowering period, there is a small chance that it could be present.

While it is not known if there are viable populations of this species locally, the extent of works proposed, combined with an abundance of equivalent habitat that surrounds the site, it is considered unlikely that works would result in the long-term decrease in the size of a population of this species.

Will the action reduce the area of occupancy of the species?

Works will reduce the amount of potential habitat locally to these species, however the extent of works proposed, combined with an abundance of equivalent habitat that surrounds the site ensures that the area of potential habitat reduced would be of a low level.

Will the action fragment an existing population into two or more populations?

The works would widen an existing sealed area (Princes Highway) through forest habitat. As the proposed works would not prevent the existing east west connection of forested areas at and to the north and south of the site, it is not anticipated that work would fragment existing populations if these species of orchid occur locally.

Will the action adversely affect habitat critical to the survival of a species?

The potential habitat for these species within the study area is not considered to be a habitat critical for survival of these species.

Will the action disrupt the breeding cycle of a population?

The removal of a small area of potential habitat, that is well represented in the local and regional area, makes it unlikely that works would disrupt the breeding cycle of a population of these species.

Will the action modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The works proposed will result in the removal of up to 0.4 hectares of forest vegetation that is well represented locally, and does not contain habitat values that are in short supply. It is therefore considered unlikely that the works proposed would impact on habitat to the extent that the species is likely to decline.

Will the action result in invasive species that are harmful to a critically endangered or endangered/vulnerable species becoming established in the endangered or critically endangered species/vulnerable habitat?

There may be a risk of introducing weed species to the local area that would potentially out compete the orchids if they occur at the site. This risk would be managed by appropriate environmental controls (see section 7 below).

Will the action interfere with the recovery of the species?

Due to level of impact that will result from the development proposed, it is unlikely that the proposed works will have an impact on the recovery of these species. The proposed action will not interfere with the recovery of these species.

6.3 Ecologically Sustainable Development

a) the precautionary principle,

The assessment has adopted the precautionary principle in relation to impacts on flora. It has assessed that the development would not result in a threat of serious or irreversible environmental damage.

b) inter-generational equity,

The development would not impact on the health, diversity or productivity of the environment for future generations.

c) conservation of biological diversity and ecological integrity, and

The degraded nature of the site ensures that the development would have only a moderate impact on biological diversity and ecological integrity of the site.

d) improved valuation of pricing of environmental resources

This principle relates to giving monetary values to environmental resources. Re-use of vegetation from the site is proposed with the mulching of vegetation for spreading over disturbed areas.

7 MITIGATION MEASURES AND CONCLUSION

7.1 Key issues

Key issues are summarised below:

- A small number of large sized trees, some with hollows are present immediately adjacent to the site, in some cases with hollow-bearing limbs hanging over the site. These have potential to provide shelter for a number of threatened hollow dependent species and should be retained, and protected from impact (eg. root compaction and trunk damage) where they occur outside of the construction footprint.
- A burrow which may have been made by the Rosenberg's Monitor is located about 150m north of the Sussex Inlet Road intersection and close to the western boundary of the impact zone. The burrow is located outside of the impact zone. This burrow should be protected from disturbance, this would be achieved via the installation of site fencing on the eastern side of this feature. It is a few metres from the Geodetic Survey marker, which is well marked with paint and flagging tape.
- Potential threatened fauna habitat is present at the site. However an eight part test has identified that the development should not significantly impact on threatened fauna species.

7.2 Mitigation Measures

To ameliorate impacts, it is recommended that:

- Large mature eucalypts should be retained along the western edge of the site. These include trees identified as 13,15 and 16 in Table 5.2. The relevant trees should be conspicuously marked for retention and their location discussed with contractors or staff before work commences.
- Machinery to be used on the site should be thoroughly washed before its use to avoid introducing any weed seeds or soil pathogens onto the site.
- The burrow which may have been made by the Rosenberg's Monitor is located about 150m north of the Sussex Inlet Road intersection and close to the western boundary of the impact zone should be protected from disturbance. It is a few metres from the Geodetic Survey marker, which is well marked with paint and flagging tape.
- To reduce risk of impact on peripheral forested vegetation (potential habitat for flora and fauna species), the work site should be clearly delineated, with the potential Rosenberg's Monitor burrow particularly being protected by fencing. This would reduce machinery, vehicle and trampling damage and compaction.
- Where possible rehabilitation of the site should be encouraged. The site should be appropriately rehabilitated and revegetated to provide stability to disturbed areas and to reduce the potential of sediment and erosion damage.
- Site development should be managed to avoid indirect impacts on the adjacent vegetated areas by way of:
    - Sediment control measures, to avoid siltation of drainage lines.
    - Stockpile management, which will require careful consideration to avoid adverse soil and water impacts,
    - Disturbed areas should be stabilised and revegetated as soon as practical, to address landform stability and improve the site's resistance to weed infestation,
    - Pollution control measures, to reduce the risk of hydrocarbon spills during works and the discharge of increased nutrient loads into waterways during and following development,

- Weed management measures. The site is largely free of introduced plant species; ongoing monitoring of the site following construction work would ensure the spread and introduction of weeds to the site is appropriately managed. Fireweed is the main species of concern on the site.

- Vehicle movement, parking and stock piles should be confined to already the cleared area located south of the carparking area at the intersection, as indicated in the project plan.

7.3 Conclusion

The proposed works would widen an existing road easement by the construction of new turning and merging lanes, thereby increasing the width of cleared areas between proximate forested habitat.

This assessment has described the biodiversity values of the site and recommended means to reduce the level of impact of the development. The site, due to past disturbances, has few sensitive features. Potential fauna and flora habitat and resources are limited at the site. This report has identified that the site may contain habitat for a number of species of threatened fauna. However it has been assessed that the development is unlikely to have a significant impact on fauna species and in particular threatened species if the recommended mitigations measures are incorporated into the proposal.

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APPENDICES

APPENDIX A: FLORA SPECIES LIST

Relative abundance is given by a cover abundance scale (modified Braun-Blanquet):

1 1 to a few individuals present, less than 5% cover

2 many individuals present, but still less than 5% cover

3 5 - < 20% cover

4 20 - < 50% cover

5 50 - < 75% cover

6 75 - 100% cover

Cover/abundance scores relate to general abundance along two representative 600m transects.

*Introduced species are preceded by an asterisk.

Scientific name	Common name	Family	Abundance	
			Onsite	Nearby
TREES				
Acacia longifolia ssp *longifolia*	Sydney golden wattle	Fabaceae		1
Acacia parramattensis		Fabaceae		1
Acacia trachyphloia		Fabaceae	1	
Allocasuarina littoralis	black sheoak	Casuarinaceae	2	
Banksia serrata	saw banksia	Proteaceae		1
Corymbia gummifera	red bloodwood	Myrtaceae	3	
Eucalyptus eugenioides	narrow-leaved stringybark	Myrtaceae	3	
Eucalyptus pilularis	blackbutt	Myrtaceae	1	3
Eucalyptus sclerophylla	scribbly gum	Myrtaceae		3-5
Syncarpia glomulifera	turpentine	Myrtaceae	3	
SHRUBS, SUB-SHRUBS				
Acacia brownii		Fabaceae	2	
Acacia echinula		Fabaceae		1
Acacia myrtifolia	red-stemmed wattle	Fabaceae	1-3	
Acacia suaveolens	sweet wattle	Fabaceae	1-3	
Acacia terminalis ssp *angustifolia*	sunshine wattle	Fabaceae	1-3	
Acacia ulicifolia	prickly moses	Fabaceae		1
Amperea xiphoclada		Euphorbiaceae		1

Scientific name	Common name	Family	Abundance	
			Onsite	Nearby
Banksia spinulosa var *spinulosa*		Proteaceae	1-3	
Bossiaea heterophylla		Fabaceae	1-2	
Bossiaea obcordata		Fabaceae	1-3	
Cassinia ?uncata		Asteraceae	1	
Comesperma ericinum	match heads	Polygalaceae	1	
Daviesia mimosoides ssp *mimosoides*		Fabaceae	1-3	
Daviesia ulicifolia ssp *stenophylla*		Fabaceae		1-3
Dodonaea triquetra	hop bush	Sapindaceae	1	
Epacris pulchella		Epacridaceae	2	
Gompholobium glabratum		Fabaceae	1	
Hakea laevipes ssp *laevipes*		Proteaceae	2	
Hakea sericea	prickly hakea	Proteaceae	1	
Hibbertia empetrifolia	guineaflower	Dilleniaceae	1	
Hibbertia riparia		Dilleniaceae	1	
Hovea heterophylla		Fabaceae	1	
Isopogon anemonifolius		Proteaceae	2	
Kunzea capitata		Myrtaceae	2	
Lambertia formosa	mountain devil	Proteaceae	1-3	
Leptomeria ?acida	sour currant bush	Santalaceae	1	
Leptospermum continentale	prickly teatree	Myrtaceae		1
Leptospermum polygalifolium ssp *polygalifolium*	yellow teatree	Myrtaceae	0-3	
Leptospermum trinervium	paperbark teatree	Myrtaceae	3	
Lomatia ilicifolia	holly-leaved lomatia	Proteaceae	1	
Mirbelia rubiifolia		Fabaceae	2	
Ozothamnus diosmifolius		Asteraceae	1	
Persoonia levis	smooth geebung	Proteaceae	1	
Persoonia linearis	narrow-leaved geebung	Proteaceae	1	
Petrophile pedunculata		Proteaceae	2	
Phyllota phylicoides		Fabaceae		1
Pimelea linifolia ssp *linifolia*	rice-flower	Thymeleaceae	2	
Platysace linearifolia		Apiaceae	1	
Pultenaea linophylla		Fabaceae	0-3	

Scientific name	Common name	Family	Abundance	
			Onsite	Nearby
Pultenaea retusa		Fabaceae	0-2	
Rhytidosporum procumbens		Pittosporaceae	2	
FERNS				
Lindsaea linearis	screw fern	Lindsaeaceae	1	
Pteridium esculentum	bracken	Dennstaedtiaceae		1
VINES AND TWINERS				
Billardiera scandens var. *scandens*	apple berry	Pittosporaceae	1	
Cassytha glabella	devil's twine	Lauraceae	1	
Glycine ?clandestina	twining glycine	Fabaceae	1	
Hardenbergia violacea	native sarsaparilla	Fabaceae	1	
Kennedia prostrata	running postman	Fabaceae		2
FORBS				
Actinotis minor		Apiaceae	1	
*?*Aster subulatus*	wild aster	Asteraceae		1
**Bidens pilosa*	cobbler's peg	Asteraceae		1
Brunoniella pumilio	dwarf blue trumpet	Acanthaceae		1
Caladenia carnea var. *carnea*	pink fingers	Orchidaceae	1	
Centella asiatica	pennywort	Apiaceae		1
Cymbidium suave	snake orchid	Orchidaceae		1
Dianella caerulea	blue flax lily	Phormiaceae	0-2	
Drosera auriculata	sundew	Droseraceae	1	
Epilobium billardierianum ssp *cinereum*	willow herb	Onagraceae	1	
Euchiton gymnocephalus	slender cudweed	Asteraceae	1	
Glossodia major	waxlip orchid	Orchidaceae	1	
Glossodia minor	small waxlip orchid	Orchidaceae	2	
Gonocarpus tetragynus	raspwort	Haloragaceae	1	
Helichrysum scorpioides	button everlasting	Asteraceae	1	
**Hypochaeris radicata*	cat's ear, flatweed	Asteraceae	0-2	
Lagenifera gracilis	small blue bottle daisy	Asteraceae		1
Opercularia aspera	stinkweed	Rubiaceae	1	
Patersonia glabrata		Iridaceae	1-2	

Scientific name	Common name	Family	Abundance	
			Onsite	Nearby
Poranthera ericifolia		Euphorbiaceae	1	
Pterostylis sp	greenhood orchid	Orchidaceae	1	
**Richardia* sp		Rubiaceae	0-2	
**Senecio madagascariensis*	fireweed	Asteraceae	1	
**Sonchus oleraceus*	sow thistle	Asteraceae	1	
Stylidium graminifolium s. lat.	trigger plant	Stylidiaceae	1	
Thelymitra ixioides	spotted sun orchid	Orchidaceae	1	
Viola silicestris MS		Violaceae	1	
**Watsonia meriana* Cv. Bulbilifera	bulbil watsonia	Iridaceae	1	
Xanthosia tridentata		Apiaceae	0-3	
GRASSES				
**Andropogon virginicus*	whisky grass	Poaceae	1	
Anisopogon avenaceus	oat speargrass	Poaceae	1	
Aristida vagans	three awn grass	Poaceae	2	
Austrodanthonia tenuior	wallaby grass	Poaceae	1	
Austrostipa ?pubescens		Poaceae	3-4	
**Briza minor*	shivery grass	Poaceae	1	
Echinopogon ovatus	hedgehog grass	Poaceae	1	
Entolasia stricta	wiry panic	Poaceae	2-3	
Eragrostis benthamii		Poaceae	2	
Microlaena stipoides	weeping grass	Poaceae	1	
Panicum simile	two colour panic	Poaceae	2	
**Paspalum dilatatum*	paspalum	Poaceae	1	
**Paspalum urvillei*	Vasey grass	Poaceae	1	
**Sporobolus africanus*	Parramatta grass	Poaceae	1	
Themeda triandra	kangaroo grass	Poaceae	0-4	
GRAMINOIDS				
Caustis flexuosa	curly wigs	Cyperaceae	1	
Gahnia sieberiana	red fruited saw-sedge	Cyperaceae	1	
Lepidosperma concavum		Cyperaceae	1	
Lepidosperma gunnii		Cyperaceae	1	
Lepidosperma laterale	variable sword-sedge	Cyperaceae	1	

Scientific name	Common name	Family	Abundance	
			Onsite	Nearby
Lomandra glauca		Lomandraceae	2	
Lomandra micrantha ssp *tuberculata*		Lomandraceae	1	
Lomandra multiflora ssp *multiflora*		Lomandraceae		1
Lomandra obliqua		Lomandraceae	2	
Xanthorrhoea concava	grass tree	Xanthorrhoeaceae	1	

APPENDIX B: FAUNA SPECIES LIST

Common name	Scientific name	Observation Type*
Aves		
Australian Magpie	*Gymnorhina tibicen*	H
Striated Thornbill	*Acanthiza lineata*	S
Noisy Friarbird	*Philemon corniculatus*	H, S
Crimson Rosella	*Platycercus elegans*	S
Eastern Spinebill	*Acanthorhynchus tenuirostris*	S
Laughing Kookaburra	*Dacelo novaeguineae*	H
Pied Currawong	*Strepera graculina*	H
Rainbow Lorikeet	*Trichoglossus haematodus*	S
Red Wattlebird	*Anthochaera carunculata*	S
Superb Fairy-wren	*Malurus cyaneus*	S
White-browed Scrubwren	*Sericornis frontalis*	S
White-throated Treecreeper	*Cormobates leucophaeus*	H
Mammalia		
Common Wombat	*Vombatus ursinus*	Sc
Eastern Grey Kangaroo	*Macropus giganteus*	Road kill, Sc
Long-nosed Bandicoot	*Perameles nasuta*	H, conical shaped digs present
European Rabbit		Road kill
Sugar Glider	*Petaurus breviceps*	S
Swamp Wallaby	*Wallabia bicolor*	Sc
Anura		
Common Eastern Froglet	*Crinia signifera*	H (off-site)
Verreaux's Tree Frog	*Litoria verreauxii*	H (off-site)

Fauna species list recorded by Kate Gillespie adjacent to the Princes Highway approximately 200m south and 600m north of the Sussex Inlet Road junction (2 September 2005).

* H – Heard, S – Seen, Sc – Scat

Survey Details:

Weather 18°C, mild to warm, Cloud Cover 80%, light breeze from NE.

Bird transects were completed along the length of the study area.

Opportunistic fauna sightings were also recorded.

Night Survey –

Weather 14°C, mild to cool, South-east wind (moderate), 90% Cloud cover

Spotlighting – was conducted along the whole length of the study area from 6:15 to 7:00pm. Additional spotlighting was undertaken on the eastern side of the road in more mature forest vegetation.

-Sugar Glider detected in flowering eucalypt

-Long-nosed Bandicoot heard calling from study area approx. 100 north of intersection.

Anabat – was set up facing the intersection and street lights adjacent to the study area, no activity was recorded. This may be due to the cool weather and wind.

Playback – was not undertaken due to the close proximity of the study area to the Princes Highway. Weather conditions were not ideal with wind making it difficult for owls to detect the taped calls or surveyors to detect any response.

APPENDIX F
ADDITIONAL EPBC ACT ASSESSMENTS

Species Common name *Scientific name*	Status under EPBC Act	Distribution and preferred habitat	Likelihood of occurrence/ Impact
Avifauna			
Latham's Snipe, Japanese Snipe *Gallíango hardwickii*	MW MO	Breeding in Japan, this species is a regular visitor along the eastern and western coasts of Australia, preferring mangrove fringes, wet parts of paddocks, seepage below dams, and shallow water or soft wet ground with tussocks and other green or dead growth. Distribution on east coast extends inland through the Murray-Darling region. (Pizzey 1997).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
White-bellied Sea-Eagle *Haliaeetus leucogaster*	MT	Distributed around the entire Australian coast, this species prefers islands, estuaries, inland lakes, and reservoirs. On the mainland this species nests in tall trees and on islands nests on the ground. (Pizzey 1997).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Fork-tailed Swift *Apus pacificus*	MO	Breeding from Siberia and the Himalayas east to Japan and southeast Asia, this species is a regular summer migrant to Australia, and is found across all of the mainland and Tasmania. Habitat for the Fork-tailed Swift is aerial – over open country, occasionally over forests and cities. (Pizzey 1997).	• Species could potentially occur • No impact likely • No further assessment required
Great Egret, White Egret *Ardea alba*	MO	Habitat for the Great Egret is shallows of rivers and estuaries, tidal mudflats, freshwater wetlands, sewage ponds, irrigation areas, larger dams and the like. This species is distributed across mainland Australia and Tasmania where suitable habitat is present. (Pizzey 1997).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Cattle Egret *Ardea ibis*	MO	The range of the Cattle Egret is from coastal north, east and southeast Australia, south Western Australia and Tasmania. This species is found on stock paddocks, pastures, croplands, garbage tips, drains, tidal mudflats, and wetlands. (Pizzey 1997).	• Species could potentially occur • No impact likely • No further assessment required

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
Rainbow Bee-eater *Merops ornatus*	MO	The Rainbow Bee-eater is a breeding resident in north Australia, and a summer breeding migrant to southeast to southwest Australia. It is also found inland and in the dry west coast of Australia. Preferred habitat for this species is open woodlands with rainforest, woodlands and golfcourses. (Pizzey 1997).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
White-throated Needletail *Hirundapus caudacutus*	MT MO	This species is a regular summer migrant to eastern Australia (from mid-October to mid-April). It is rarely found in western and central Australia. Habitat for this species is airspace over forests, coasts, farmlands, lakes, plains, towns and woodlands.	• Species could potentially occur • No impact likely • No further assessment required
Swift Parrot *Lathamus discolor*	E MO	Distributed along the east coast of Australia, south from Bowen (Qld) to Mt Lofty Ranges (SA), this species breeds only in Tasmania. It is found in woodlands, forests, plantations, banksias, parks, gardens and street trees. (Pizzey 1997)	• Species could potentially occur • No impact likely • No further assessment required
Black-faced Monarch *Monarcha melanopsis*	MT MO	Distribution of the Black-faced Monarch is coastal eastern Australia and islands, mostly east of the Great Dividing Range. The species' range is from York QLD to far eastern VIC, and west to Glenalladale National Park. Preferred habitat of the Black-faced Monarch is eucalypt woodlands, coastal scrubs and rainforests. Usually found in damp gullies this species prefers more open woodland when migrating.	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Satin Flycatcher *Myiagra cyanoleuca*	MT MO	This species is distributed throughout eastern Australia from Cape York (QLD) to Tasmania, far west VIC to far southeast SA. Habitat for the Satin Flycatcher his heavily vegetated gullies in forests, taller woodlands (usually above the shrub-layer), and coastal forests, mangroves, woodlands, trees in open country during migration.	• No suitable habitat present on site • Species not likely to occur • No further assessment required

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
Rufous Fantail *Rhipidura rufifrons*	MT MO	Distributed along the east and north coasts of Australia, habitat for this species is the undergrowth of rainforests/ wetter eucalypt forests/ gullies, watercourses, mangroves, gardens and parks. (Pizzey 1997).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Australian Painted Snipe *Rostratula australis*	V	Distributed throughout the eastern half and northern Australia, this species inhabits shallow, vegetated, temporary or infrequently filled wetlands, occasionally where there are trees such as River Red Gum (*Eucalyptus camaldulensis*) or Poplar Box (*E. populnea*) or shrubs such as Lignum *Meuhlenbeckia florulenta* or samphire (Vestjens 1977, Leach *et al.* 1987). (Garnett and Crowley 2000)	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Painted Snipe *Rostratula benghalensis s. lat.*	MW MO		
Regent Honeyeater *Xanthomyza phrygia*	E MT	The Regent Honeyeater was formerly distributed from Kangaroo Island in SA along the eastern coastline of VIC and NSW, to Dalby in QLD, and from the coast to the western slopes of the Great Dividing Range as far inland as Narrabri, Parkes and the Warrumbungles. The species is currently patchily distributed, having undergone a dramatic decline in numbers. This species occurs in temperate eucalypt woodlands and open forest, mistletoe on river she-oaks, remnant stands of timber, roadside reserves, travelling stock routes, garden and street trees in south-eastern Australia.	• Species could potentially occur • No impact likely • No further assessment required
Amphibians			
Green and Golden Bell Frog *Litoria aurea*	V	Inhabits stream sides, marshes and dams, especially those containing *Eleocharis* spp. or *Typha* spp. Sometimes found in areas of high disturbance, such as brick pits, landfill areas, disused industrial sites and cleared land where there are permanent water bodies (NPWS 1999, Cogger 2000).	• No suitable habitat present on site • Species not likely to occur • No further assessment required

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
Giant Burrowing Frog *Heleioporus australiacus*	V	Associated with small headwater creeklines and along slow flowing to intermittent creeklines, the Giant Burrowing Frog favours sandstone ridgetop habitat (woodland, open woodland and heath) and broader upland valleys (NPWS 2001).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Littlejohn's Tree Frog *Litoria littlejohni*	V	Distributed along the coast and ranges of south-eastern Australia, from about Newcastle (NSW) to eastern Victoria, this species is found in sclerophyll forests, woodlands and heaths (Cogger 2000).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Stuttering Frog *Mixophyes balbus*	V	Distributed from northern NSW, east of the Great Dividing Range, to Victoria, this species is found in rain-, Antarctic beech or wet sclerophyll forests (Cogger 2000).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Fish			
Australian Grayling *Prototroctes maraena*	V	Found in Tasmania and south-east mainland Australia this is a mid-water species, occurring most commonly in clear, gravelly streams with a moderate flow. This species prefers slow flowing, deep pools (Inland Fisheries Service 2000).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Reptiles			
Broad-headed Snake *Hoplocephalus bungaroides*	V	Distributed on the coast and ranges within an area approximately 250km from Sydney (NSW), this species is found on Hawkesbury sandstone formation, usually under large slabs or rocky ridges, or in rocky crevices (Cogger 2000).	• No suitable habitat present on site • Species not likely to occur

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
			• No further assessment required
Mammals			
Large-eared Pied Bat *Chalinolobus dwyeri*	V	Roosting in caves and mines, this species is found in dry sclerophyll forests and woodlands, sub-alpine woodland, and the edge rainforest and wet sclerophyll forest from south-eastern Queensland to NSW, from the coast to the Great Divide. (Churchill 1998).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Spotted-tail Quoll, Tiger Quoll *Dasyurus maculatus maculatus*	E	Distributed from Fraser Island (QLD) to southwest VIC and Tasmania (Menkhorst and Knight 2001), the Spotted-tail Quoll uses habitat ranging from woodlands and sclerophyll forest, to rainforests and coastal heathlands (Dickman & Read 1992, Edgar & Belcher 1995). This species requires hollows, rock outcrops or caves as suitable den sites, as well as food resources such as small mammals and birds (NPWS 1999). Large areas of relatively intact vegetation are required by individual animals for foraging (NPWS 1999).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Southern Brown Bandicoot *Isoodon obesulus obesulus*	E	The Southern Brown Bandicoot is patchily distributed from south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River, southern coastal Victoria and the Grampian Ranges, south-eastern South Australia, south-west Western Australia and the northern tip of Queensland. Preferred habitat for this species is heath or open forest with a heathy understorey on sandy or friable soils. (DEC 2005)	• Species could potentially occur • No impact likely • No further assessment required

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
Brush-tailed Rock-wallaby *Petrogale penicillata*	V	In NSW, distribution of the Brush-tailed Rock-wallaby is from the Queensland border in the north to the Shoalhaven in the south, and west to the Warrumbungle Ranges. This species is found on rocky escarpments, outcrops and cliffs and show a preference for complex structures with fissures, caves and ledges facing north. (DEC 2005)	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Long-noised Potoroo *Potorous tridactylus tridactylus*	V	This species is distributed along the east coast of south Qld, NSW & Victoria, as well as in Tasmania. It inhabits coastal heathy woodland and rainforest adjacent to wet sclerophyll forest and coastal wallum; and moist sclerophyll forest with dense shrub layer in Tasmania. This species requires dense cover for shelter adjacent to more open areas for foraging. (Menkhorst and Knight 2001)	• Species could potentially occur • No impact likely • No further assessment required
Grey-headed Flying Fox *Pteropus poliocephalus*	V	Occurring along the east coast of Australia, the Grey-headed Flying-fox inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas (Eby 1998). The fruit from native figs (*Ficus* spp.) form a large part of their diet (Churchill 1998).	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Plants			
Albatross Mallee *ucalyptus langleyi*	V	Mainly found to the south-west of Nowra as far as Yarramunmun Creek, this species is also found north of the Shoalhaven River, in the vicinity of Bomaderry Creek. Preferred habitat for this species is mallee shrubland on poorly-drained, shallow, sandy soils on sandstone. (DEC 2005)	• Species not identified during field survey • Species not likely to occur • No further assessment required

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
Austral Toadflax *Thesium australe*	V	Found in very small populations scattered across eastern NSW, the coast, and from the Northern to Southern Tablelands, Austral Toadflax is also found in Tasmania, Queensland and eastern Asia. Preferred habitat for this species is grassland or grassy woodland, often in damp sites in association with Kangaroo Grass (*Themeda australis*). (DEC 2005)	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Biconvex Paperbark *Melaleuca biconvexa*	V	Biconvex Paperbark is found in scattered and dispersed populations in the Jervis Bay area to the south and the Gosford-Wyong area to the north. This species is generally found in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. (DEC 2005)	• No suitable habitat present on site • Species not likely to occur • No further assessment required
East Lynne Midge-orchid *Genoplesium vernale*	V	Currently known from a narrow belt approximately 12km wide, of predominantly Dry Sclerophyll Forest, from 17km south of Bateman's Bay to 24km north of Ulladulla, this species is found in 'poorer' dry sclerophyll woodland and forest on the south coast of NSW between Mongo and Ulladulla. The East Lynne Midge-orchid is confined to areas of well-drained shallow soils of low fertility. (DEC 2005)	• No suitable habitat present on site • Species not likely to occur • No further assessment required
Leafless Tongue-orchid *Cryptostylis hunteriana*	V	Distribution of the Leafless Tongue-orchid is from Orbost north along the coast of NSW to the Gibraltar Range, extending onto the Northern Tablelands. Preferred habitat for this species ranges from scrubby swamp fringes to steep bare hillsides in tall eucalypt forest. (Bishop 2000)	• Refer to **Appendix E** • Not identified on site during field survey • No significant impact likely
Magenta Lilly Pilly *Syzygium paniculatum*	V	The Magenta Lilly Pilly is found only in NSW, along a narrow, linear coastal strip from Conjola State Forest. On the south coast, it occurs on grey soils over sandstone, mainly restricted to remnant littoral rainforest (DEC 2005).	• Species not identified during field survey • No impact expected • No further assessment required

Species Common name *Scientific name*	**Status under EPBC Act**	**Distribution and preferred habitat**	**Likelihood of occurrence/ Impact**
Thick-lipped Spider Orchid *Caladenia tessellata*	V	Found in NSW, south from Swansea in coastal areas, to the southern tablelands. In addition, this species is found throughout the eastern half of VIC west to South Gippsland, from coast to ranges. Preferred habitat is low open forest with a heathy or grassy understorey. (Bishop 2000)	• Refer to **Appendix E** • Not identified on site during field survey • No significant impact likely

- 5km search radius

Abbreviations

E Endangered species
V Vulnerable species
MT Migratory terrestrial species
MO Marine overfly species
MW Migratory wetland species

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