Australian Government

Nation Building Program

RTA

Upgrading the Pacific Highway

Iluka Road to Woodburn

Devils Pulpit project

Preliminary environmental assessment

SEPTEMBER 2009

RTA/Pub. 09.396

Pacific Highway – Devils Pulpit upgrade
Preliminary Environmental Assessment

September 2009

ISBN: 978-1-921692-16-1

Contents

Attachments

Abbreviations and Glossary

Term	Definition
AADT	Annual Average Daily Traffic
AFG	Aboriginal Focus Group
AHIMS	Aboriginal Heritage Information Management System
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
CEMP	Construction Environmental Management Plan
CO	Carbon monoxide
CO_2	Carbon dioxide
DEC	Department of Environment and Conservation (now DECCW)
DECC	Department of Environment and Climate Change (now DECCW)
DECCW	Department of Environment, Climate Change and Water
DPI	Department of Primary Industry (now Industry and Investment NSW)
EEC	Endangered Ecological Community
EPA	Environment Protection Agency (now DECCW)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994*
I & I	Industry and Investment NSW
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LoS	Level of Service
LGA	Local Government Area
PAD	Potential Archaeological Deposit
PEA	Preliminary Environmental Assessment
PHUDF	Pacific Highway Urban Design Framework
PHUP	Pacific Highway Upgrade Program
Project	The Devils Pulpit upgrade
Project Footprint	The area directly impacted by the Devils Pulpit upgrade
REP	Regional Environmental Plan
RTA	Roads and Traffic Authority
SEPP	State Environmental Planning Policy
Study area	The area studied in the assessment of project impacts (direct and indirect).
SWMP	Soil and Water Management Plan
TSC Act	*Threatened Species Conservation Act 1995*
WARR Act	*Waste Avoidance and Resource Recovery Act 2001*

1 Introduction

1.1 Background

The proposed upgrade of the Pacific Highway at Devils Pulpit (the project) forms part of the Pacific Highway Upgrade Program, a joint commitment by the New South Wales (NSW) and Australian Governments to upgrade the standard of the Pacific Highway between Hexham and the Queensland border to a four lane divided highway. The regional context of the project is shown in Figure 1.1. The project is shown in Figure 1.2

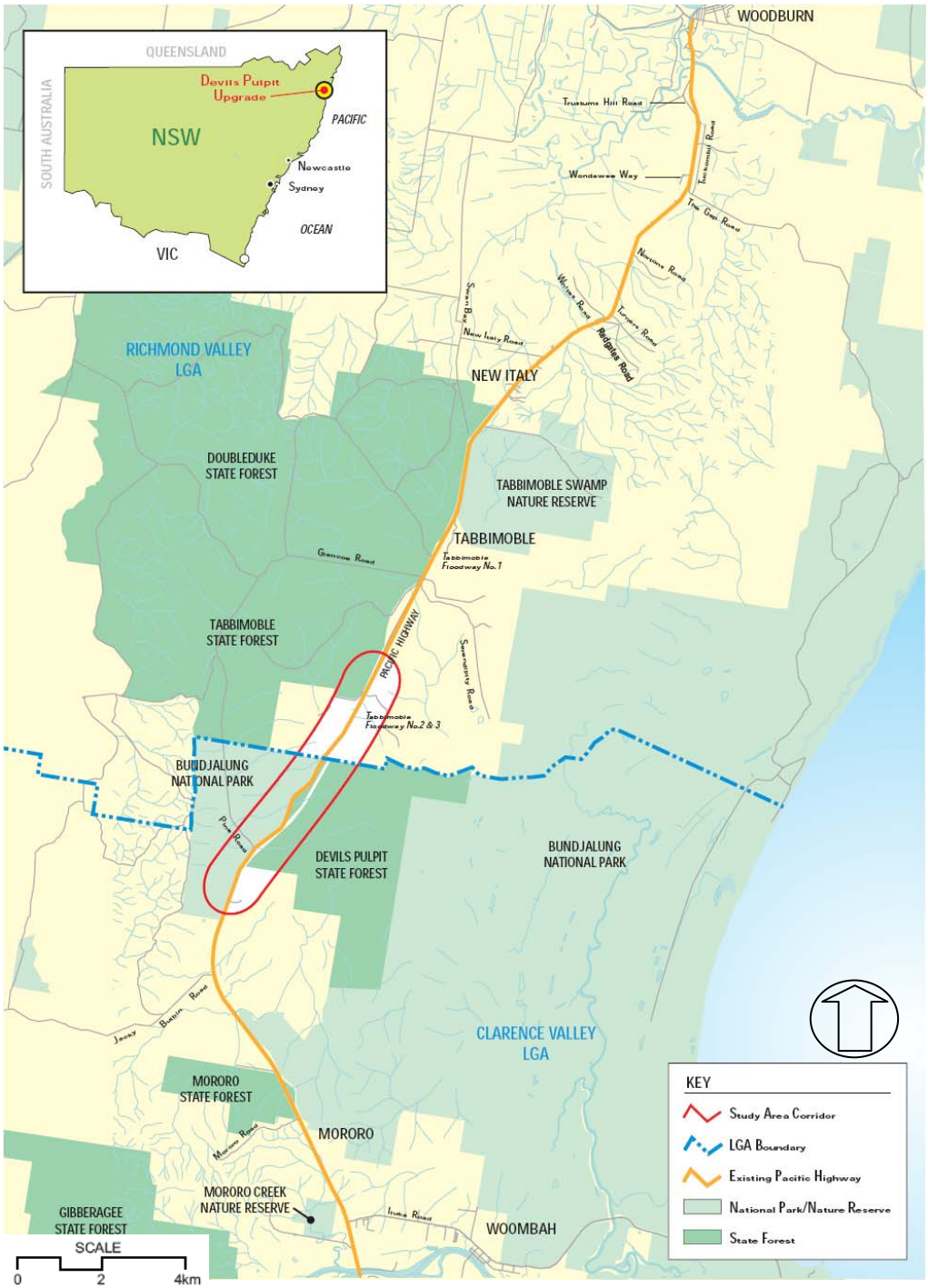

Figure 1.1 - Regional context of the project

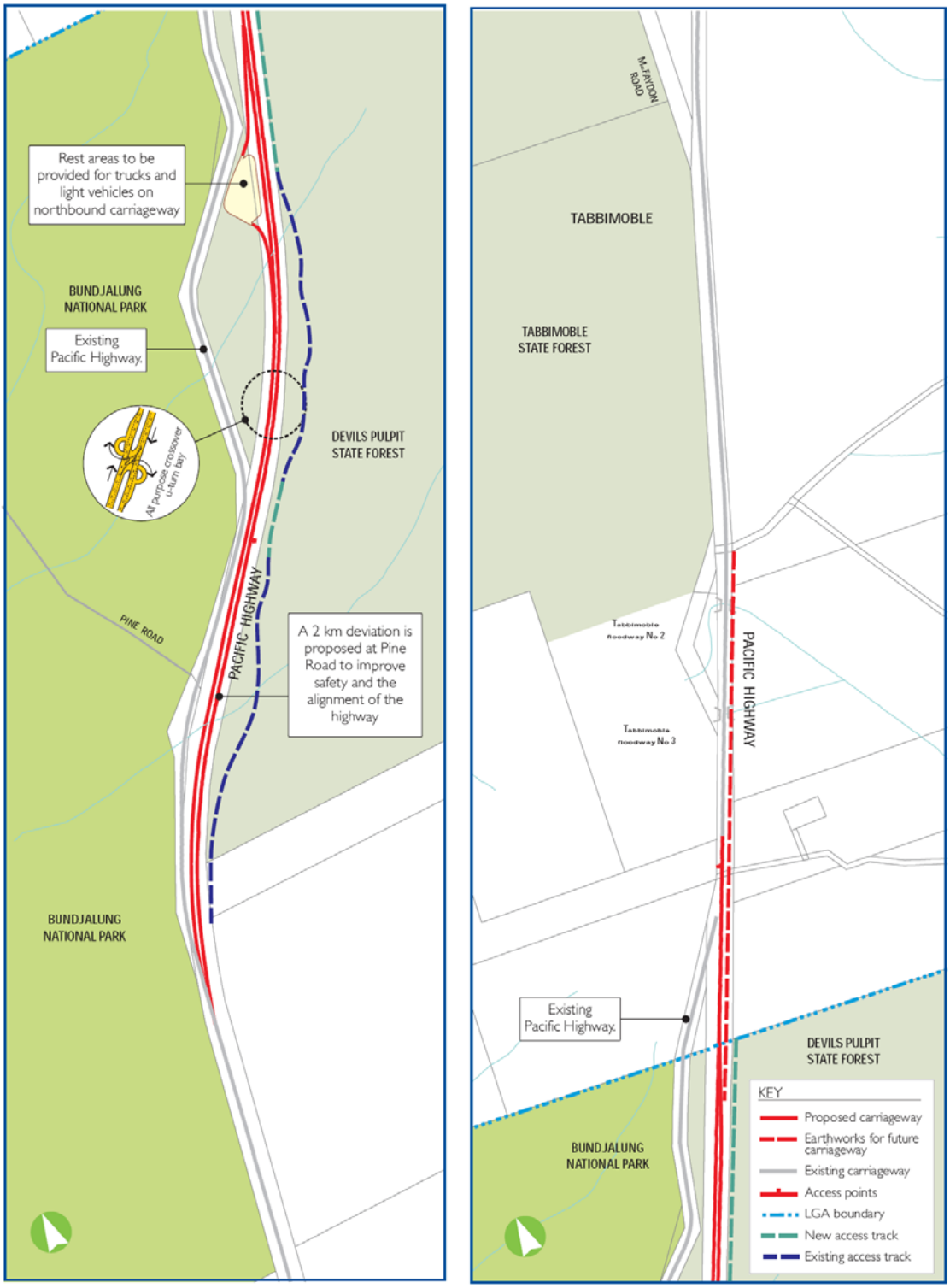

Figure 1.2 - The project

The project would involve the construction of about six kilometres of the Pacific Highway, along the 33 kilometre alignment defined in the *Iluka Road to Woodburn Preferred Concept Design Report* (RTA 2008a). The project would be located between about 66 and 72 kilometres north of Grafton. The southern end of the project is about 10.5 kilometres north of the Iluka Road turnoff, and the northern end of the project is about 10 kilometres south of New Italy (refer to Figure 1.2). The study area for this preliminary environmental assessment encompasses the existing Highway alignment and the proposed new alignment. Major features of the project are shown in Figure 4.1.

The preferred concept design for the Devils Pulpit project has been identified and developed as part of the proposed Iluka Road to Woodburn Pacific Highway Upgrade project, which has been declared to be a project to which Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) applies. The Iluka Road to Woodburn Pacific Highway Upgrade project has also been declared to be critical infrastructure under the EP&A Act. The Devils Pulpit project falls within these declarations.

Funding has been made available to improve the road safety of this section of two-lane highway by eliminating several lower standard curves and providing a four lane divided highway. The Federal and NSW governments have committed $3.6 billion under the Nation Building Program and Building Australia Fund to continue the upgrade of the highway during the five years to mid 2014. As part of this, the Federal government has committed $62 million towards the six kilometre Devils Pulpit section.

Construction of the project would improve the overall safety to road users on this section of highway and contribute to overall safety of an improved Pacific Highway. In addition, the project would add to improved travel efficiency and generate employment, providing support for the local and regional economy. The project is estimated to create 60 direct and 190 indirect jobs each year during the construction phase for the local and regional economies.

The Roads and Traffic Authority of NSW (the RTA) has conducted community consultation, environmental and engineering investigations to help develop a preferred concept design for the proposed Iluka Road to Woodburn Pacific Highway Upgrade project. The concept design was described and environmental, social and functional constraints outlined in the *Iluka Road to Woodburn Concept Design Report* (RTA 2006) and associated technical working papers. Each of these reports and working papers were made available to the public. Following the public display of the concept design, a preferred concept design was developed that addresses community and stakeholder input while taking into consideration all relevant constraints and design guidelines (RTA 2008).

1.2 Purpose of this document

This preliminary environmental assessment report has been prepared to support a major project application under Section 75E of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). The report does the following:

- Describes the project.
- Analyses the findings of the preliminary environmental assessments and nominates key environmental issues.
- Identifies the proposed scope of the subsequent environmental assessment for the project.
- Aims to assist the formulation of environmental assessment requirements by the Director-General under Section 75F(2) of the EP&A Act.

2 Planning and assessment process

2.1 Approval process under Part 3A of the *Environmental Planning and Assessment Act, 1979 (EP&A Act)*

Section 75B (2) of the EP&A Act provides that for Part 3A:

> *The following kind of development may be declared to be a project to which this Part applies:*
>
> *(a) major infrastructure or other development that, in the opinion of the Minister, is of State or regional environmental planning significance…*

In accordance with the above provision, the Minister for Planning has declared by Order dated 5 December 2006 and published in NSW Government Gazette No. 175 (copy in Attached A) that the 'Pacific Highway Upgrade Planning Projects' are to be a project to which Part 3A of the EP&A Act applies (the declared project). The project forms part of the declared project and therefore is a project to which Part 3A applies.

Section 75C of the EP&A Act provides that the Minister for Planning may declare a project to be a critical infrastructure project because it is, in the opinion of the Minister, essential for the State for economic, environmental or social reasons. The Minister for Planning has formed the view that the declared projects, which incorporates this project, is essential to the State for economic and social reasons and declared it to be a critical infrastructure project. The critical infrastructure declaration was published in NSW Government Gazette No. 175 on 8 December 2006 (copy attached in Appendix A).

2.2 Statutory planning

2.2.1 State Environmental Planning Policies (SEPPs)

Section 75R(2) of the EP&A Act states that SEPPs apply to:

> *(a) the declaration of a project to which this Part applies or as a critical infrastructure project, and*
>
> *(b) the carrying out of a project (but in the case of a critical infrastructure project) only to the extent that the provisions of such a policy expressly provide that they apply to an in respect of the particular project.*

The project (being a part of the gazetted 'Pacific Highway Upgrade Planning Project') has been declared to be a critical infrastructure project. To date, there are no SEPPs that expressly apply to the project.

SEPPs that may provide useful guidance, rather than statutory requirements, regarding potential issues to be addressed within the environmental assessment include:

- SEPP 14 – Coastal Wetlands.
- SEPP No. 44 – Koala Habitat Protection.
- SEPP No. 55 – Remediation of Land.
- SEPP No. 71 – Coastal Protection.
- SEPP (Infrastructure) 2007.

2.2.2 Other environmental planning instruments

Section 75R(2) of the EP&A Act states that *"environmental planning instruments (other than State environmental planning policies) do not apply to or in respect of an approved project.*

Section 75J(3) states:

"In deciding whether or not to approve the carrying out of a project, the Minister may (but is not required to) take into account the provisions of any environmental planning instrument that would not (because of section 75R) apply to the project if approved.

As the project is critical infrastructure, regional environmental plans (REPs) and local environmental plans (LEPs) do not apply to the project. The Minister may, but need not consider these plans in the determination of the application.

The following REPs and LEPs may apply to the land on which the project would be located and would be reviewed where relevant as part of the environmental assessment:

- North Coast Regional Environmental Plan.
- Richmond River Local Environmental Plan 1992.

2.3 Other State legislation

In addition to the EP&A Act, other NSW legislation contains requirements that may be relevant to the project. The application of these is limited by the provisions of Part 3A of the EP&A Act, however, requirements which remain potentially relevant include:

- Environmental protection licences under the *Protection of the Environment Operations Act 1997* for road construction and/or for the operation of ancillary facilities.
- Approvals under the *Water Act 1912* for access to ground or surface water during construction.

The RTA would continue liaising with relevant agencies to identify and satisfy any further requirements under NSW legislation prior to the commencement of works. Provisions of other legislation that would have applied to the project but for the application of Part 3A will be reviewed and considered in the detailed environmental assessment where required. While certain legislation does not apply or has limited application to the project, the relevant guidelines prepared by the Department of Planning and government agencies would be taken into account during the environmental assessment process.

2.4 Commonwealth legislation

The following Commonwealth legislation may have relevance to the project, and would be addressed in the environmental assessment, if applicable:

- Aboriginal and Torres Strait Islander Heritage Protection Act 1984.
- Environment Protection and Biodiversity Conservation Act 1999.
- Native Title Act 1993.

2.4.1 Commonwealth approvals

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides controls for impacts on:

- Matters of national environmental significance.
- The 'environment', where a proposed project would be carried out by the Australian Government or agency or on Commonwealth land.

If the proponent considers that there is likely to be a significant impact on any of the above matters (or if it is unclear whether a significant impact would occur), a referral is required to be made to the Australian Government Minister for the Environment, Heritage and the Arts in order to determine if the proposed project is considered to be a 'controlled action'. Should the project be deemed a controlled action then approval to carry out the works is required from the Australian Government Minister in addition to the necessary State approval(s).

Matters of national environmental significance of potential relevance to the project include nationally threatened species and migratory species (see Section 5.4). Based on investigations to date, a referral to the Australian Department of the Environment, Water, Heritage and the Arts is not considered necessary.

A bilateral agreement is in place between the Australian Government and NSW Government under section 45 of the *Environment Protection and Biodiversity Conservation Regulations 2000* relating to environmental impact assessment. Under the agreement, the preparation of an environmental assessment under Part 3A is a recognised form of environmental impact assessment to the Federal Government.

The bilateral agreement also establishes the mechanism for the assessment requirements of the Department of the Environment, Water, Heritage and the Arts to be incorporated into the relevant state environmental assessment requirements issued by the Director-General of the NSW Department of Planning. However, if the EPBC Act is triggered, approval from the Federal Minister for the Environment, Heritage and the Arts would still be required in addition to approval of the NSW Minister for Planning.

3 Strategic context and need for the project

3.1 Strategic context

The project is an important component of the Pacific Highway Upgrade Program (PHUP), which is needed to meet the NSW and Federal governments' commitments to upgrade the Pacific Highway between Hexham in NSW and the Queensland border. The objectives of the Pacific Highway Upgrade Program are to:

- Significantly reduce road crashes and injuries.
- Reduce travel times.
- Reduce freight transport costs.
- Develop a route that involves the community and considers its interests.
- Provide a route that supports economic development.
- Manage the upgrading of the route in accordance with ecologically sustainable development principles.
- Provide the best value for money.

The Pacific Highway Upgrade Program is needed, in part, because of population growth and the associated pressures placed on transport infrastructure. However, the program itself also plays a role in facilitating that population growth. The project has been developed to be consistent with the objectives of the Pacific Highway Upgrade Program.

AusLink White Paper

The AusLink White Paper *Building our National Transport Future* (the White Paper) (Commonwealth of Australia 2004) is the Australian Government's formal policy statement on land transport that identifies national objectives for the AusLink investment program.

The White Paper seeks to promote sustainable national and regional economic growth, development and connectivity by contributing to the development of an integrated national transportation network. The Pacific Highway is identified as part of the national network defined in the National Land Transport Plan under the AusLink investment program and is also the key road in the Sydney-Brisbane transport corridor. The overall Pacific Highway Upgrade Program, including the project would help to achieve the key objectives of the AusLink investment program by improving connectivity within and between communities in the growing region, enhancing road safety, incorporating ecologically sustainable development principles, and assisting in promoting economic growth and development.

Sydney-Brisbane Corridor Strategy

The *Sydney-Brisbane Corridor Strategy* has been jointly developed by the Federal Department of Transport and Regional Services, the RTA, NSW Ministry of Transport, Queensland Department of Main Roads and Queensland Transport. The strategy identifies the Sydney-Brisbane corridor as one of the busiest links on the Australian transport network, catering for passenger and commercial freight traffic moving between Sydney and Brisbane. Growth challenges to the corridor include strong population growth along the coastal regions, increased freight movements and significant and rapid growth in passenger and local traffic. The strategy identifies deficiencies along the corridor including safety, amenity, congestion and efficiency for freight operations. Key objectives of the strategy are to achieve substantial duplication of the Pacific Highway in the short-term and complete duplication of the Pacific Highway in the long – term. The Pacific Highway Upgrade Program, including the project, is consistent with these objectives.

NSW State Infrastructure Strategy

The *State Infrastructure Strategy – New South Wales* 2008-09 to 2017-18 (NSW Treasury 2008) provides strategic direction for planning and delivery of infrastructure in NSW to support the growing population. The strategy was first published in 2006 and is updated every two years. It is a rolling 10-year plan for infrastructure projects. The strategy highlights the continued upgrading of the Pacific Highway as a priority investment. The upgrading of the Iluka Road to Woodburn section of the highway is necessary for road safety. The project is part of the Iluka Road to Woodburn Pacific Highway upgrade and has been identified as a key area where safety improvements are required.

NSW State Plan

The *NSW State Plan: A New Direction for NSW* was released in November 2006, identifying priorities for the government over the next ten years. The Plan provides goals and targets focusing on areas such as strengthening regional economies, environmental protection, employment, and improving the efficiency and safety of the road network including maintenance of and investment in transport infrastructure. Development of safer and more efficient transport infrastructure such as the project, would work towards achieving some of the goals.

Mid North Coast Regional Strategy

The *Mid North Coast Regional Strategy* establishes the guiding principles for the planning and management of the future sustainable growth of the Mid North Coast. The strategy recognises the Pacific Highway as the primary north-south corridor for both inter/intra-regional movements. It identifies the growth pressures that will be faced by the region and the importance of safe and efficient transport connections within and between regions along the Sydney/Brisbane corridor. These growth pressures are further explained in Section 6.4. The project would assist by further improving traffic safety and efficiency within and to and from the Mid-North Coast region.

Action for Air

The NSW government initiative *Action for Air* (Environmental Protection Authority 1998) is a 25 year air quality management plan to improve air quality. The plan was updated in 2006. The highest priority has been given to reducing emissions from motor vehicles. The plan sets specific targets for reducing (per capita) the vehicle kilometres travelled. To achieve the targets, the government has developed two key transport initiatives:

- An integrated transport plan.
- An integrated freight management strategy across road, rail and other transport modes.

Action for Air has a focus on reducing air pollutants in urban environments in NSW. However, measures to improve the flow of traffic can also have beneficial effects in non-urban environments. In a related, but separate issue, improving transport efficiency can also have the effect of reducing greenhouse gas emissions per vehicle kilometre travelled.

Road Safety 2010

This strategy provides a framework for coordinating the road safety initiatives of the Australian, state, territory and local governments with the aim of reducing death and injury on Australian roads. The strategy target is to reduce the number of road fatalities per 100,000 people by 40 per cent, from 9.3 in 1999 to no more than 5.6 in 2010. Achieving this target will save 3,600 lives over the next ten years. Improving the safety of roads and improving road user behaviour are key strategic objectives to achieve this goal. Upgrading the Pacific Highway, which includes the project, would assist in achieving these safety aims.

3.2 Current road network limitations

3.2.1 Road conditions

The condition of the Pacific Highway between Hexham and the Queensland border varies considerably from high-standard, four lane divided carriageways to long sections of narrow two-lane roads. The roads also vary in their pavement condition and road geometry, which affects driver safety and transportation efficiency.

The section of the existing Pacific Highway that would be upgraded by the project is a two-lane single carriageway road with a number of overtaking lanes, and is typified by poor horizontal and vertical geometry, narrow shoulders and numerous traffic hazards in close proximity to the highway. The alignment on the adjacent sections of the Pacific Highway (both to the south and the north) to this project is significantly straighter with improved vertical and horizontal geometry. The reduction in the standard of the alignment for this project is inconsistent with the driving experience for motorists as they approach the project which may contribute to the poor accident history for this section of the highway. Accident histories show unacceptably high levels of traffic incidents in many areas. Many crashes have occurred on sections with substandard curves. The combination of these factors contributes to unacceptable road conditions on the section of the Pacific Highway proposed to be upgraded.

3.2.2 Traffic and road safety

Existing traffic

The RTA publishes historical Annual Average Daily Traffic (AADT) data for various Pacific Highway count stations, which have been used to provide an indication of historical growth in the study area. The AADT data for the study area was calculated by applying the linear traffic growth (235 vehicles/day/year) to 2006 AADT data. In 2007, the AADT for the section of the Pacific Highway in the study area was 8900 vehicles per day, of which about 1720 (19 %) are heavy vehicles.

Future traffic

Traffic volumes on the Pacific Highway have grown in recent years due to natural growth in demand for travel, improvements to the Pacific Highway, population growth in the Mid North Coast region and along the eastern seaboard, and the resultant increase in economic activity.

With the overall improved efficiency of the Pacific Highway, freight transport has shifted from the New England Highway corridor to the Pacific Highway. Although the settlements in the vicinity of the study area are expected to contribute little to the projected overall increase in travel demand, the Mid North Coast region in general will generate significant travel demand over the next 20 years.

The highway predominantly caters for through traffic travelling between Grafton and Ballina and vice-versa, and more generally between Sydney and Brisbane. It also serves a number of properties located along its length and provides local access to and between Iluka Road and Woodburn. The entire section of the Pacific highway within the study area has a posted speed limit of 100 km/hr.

Road safety

The section of the Pacific Highway that would be upgraded by the project has a poor crash record. Between 1999 and 2008, there were 35 crashes which comprised:

- 8 fatalities.
- 29 injuries.

The fatality rate for this section of the Pacific Highway is about 4 fatalities per 100 million vehicle kilometres travelled (MVKT), which is above the NSW State Plan target of 0.7 fatalities per 100 MVKT by 2016.

Travel times

There have been substantial improvements to the Pacific Highway in the last 12 years, which have resulted in a significant reduction of intra and inter-regional travel times.

Two of the objectives of the Pacific Highway Upgrade Program are to reduce travel times and freight transport costs. The project would assist in reducing travel times on the Pacific Highway with the combined benefits of the reductions in travel times and an efficient high standard dual carriageway highway would result in decreased freight transport costs.

3.3 Statement of project need

The Devils Pulpit project is part of the larger Iluka Road to Woodburn project declared as a critical infrastructure project under Section 75C of the *Environmental Planning and Assessment Act 1979* (EP&A Act). As a critical infrastructure project, it is considered essential to the state for economic and social reasons.

The Devils Pulpit project forms an essential part of the overall upgrade of the Pacific Highway between Hexham and the Queensland border. The projects that make up the Pacific Highway Upgrade Program are intended to achieve the core objectives of improved road safety and reduced travel times.

The NSW State Plan target for road safety is 0.7 fatalities per 100 MVKT by 2016. The fatality rate for the current Devils Pulpit section of the Pacific Highway is about 4 fatalities per 100 MVKT. This rate is above the NSW State Plan target, and is a key reason why the project is needed. . The alignment on the adjacent sections of the Pacific Highway (both to the south and the north) to this project is significantly straighter with improved vertical and horizontal geometry. The reduction in the standard of the alignment for this project is inconsistent with the driving experience for motorists as they approach the project which may contribute to the poor accident history for this section of the highway

There is a need to provide higher standard road to better serve existing and future road users and the project would fulfil this need. The project would improve road safety and efficiency by upgrading a two lane highway with substandard horizontal and vertical geometry, narrow shoulders and numerous traffic hazards in close proximity to the highway.

As a project funded by the Australian Government Nation Building Economic Stimulus Plan, the project would help support jobs, improve facilities and provide important long-term economic and social benefits for the people of Australia.

3.4 Project objectives

The objectives for the project are consistent with those identified for the Iluka Road to Woodburn Pacific Highway Upgrade project. Table 3.1 describes the objectives of the project and identifies how they relate to the overall objectives of the Pacific Highway Upgrade Program.

Table 3.1 Project objectives

Pacific Highway Upgrade Program Objectives	Objectives of the project
Significantly reduce road accidents and injuries	▪ Provide a dual-carriageway road with a maximum crash rate of 15 crashes per 100 MVKT over the project length. ▪ Minimise the number of access points onto the highway for Class A Freeway sections. ▪ Retain or replace existing rest areas within the study area. ▪ Provide a concept design that achieves a 100 km/h design speed for the vertical alignment and 110 km/h design speed for the horizontal alignment. ▪ Provide a route that can be upgraded to Class M or Motorway standard in the future (as applicable) with controlled access only via grade separated interchanges, and a parallel service road network for local traffic.
Reduce travel times	▪ Provide a route that maximises the reduction in travel time for Pacific Highway traffic. ▪ Provide intersections designed to at least a Level of Service LOS C, 20 years after opening for the 100th highest hourly volume. ▪ Minimise user delay from incidence and road closure on the highway including from flooding. ▪ Reduce delays from holiday congestion. ▪ Minimise disruption and delay during construction.
Reduce freight transport costs	▪ Provide a route that reduces the overall freight transport costs of trucks using the highway. ▪ Provide a route that meets or exceeds B-Double truck requirements.
Develop a route that involves the community and considers their interests	▪ Develop a project that meets the objectives of the community and stakeholders involvement plan. ▪ Minimise the physical and traffic impacts of the route such as traffic noise levels, intrusion, community severance and access patterns. ▪ Minimises the physical impacts on heritage (Indigenous and European) sites. ▪ Provide transport developments that are complementary with land use. ▪ Maintain access to affected properties and land during construction.
Provide a route that supports economic development	▪ Maintain accessibility for local industries to regional and interstate markets. ▪ Maintain access to local and regional centres of economic importance. ▪ Minimise impacts on business/service facilities dependent on Pacific Highway traffic.
Manage the upgrading of the route in accordance with Ecologically Sustainable Development (ESD) principles	▪ Provide a flood immunity on at least one carriageway of 1% AEP (annual exceedance probability). ▪ Minimise the effects on sensitive habitats. ▪ Minimise the effects on native vegetation. ▪ A route that minimises impacts on National Parks. ▪ A route which satisfies the principles of ESD.
Provide the best value for money	▪ Minimise the project's whole of life costs of the project. ▪ Maximise the use of the existing road reserve for duplicated sections of the project, where possible. ▪ Expenditure supports NSW government and Clarence Valley/Richmond Valley Council development policies.

4 Description of the project

The project involves the construction of an about six kilometre long section of dual carriageway located between Iluka Road and Woodburn (refer to Figure 1.1). At its southern extent the project will connect with the existing Pacific Highway alignment about 1.2 kilometre south of Pine Road, about 66 kilometres north of Grafton. At its northern extent the project ties into the existing Pacific Highway alignment at Tabbimoble Overflow No. 2, about 10 kilometres south of New Italy (refer to Figure 1.2).

The project involves constructing new carriageway on the eastern side of the existing Pacific Highway and utilising the existing highway alignment as a service and local access road where feasible. The project includes two deviations on the eastern side of the existing Pacific Highway. One of the deviations is about 2 kilometres in length and includes crossing several ephemeral drainage lines, including Pine Road Creek. The other deviation through Devils Pulpit State Forest is about 3 kilometres in length and includes a northbound rest area about 2.5 kilometres north of Pine Road between the existing alignment and the proposed new carriageways. The project also includes constructing a 1 kilometre section of new south bound carriageway at the northern end of the project on the eastern side of the existing alignment that includes a crossing of Tabbimoble Overflow No. 2 and No. 3.

Approval is being sought for a class M motorway style upgrade. This would comprise two lanes in each direction, with the capability of a 110 kilometres per hour posted speed through geometric design and restricting access to the roadway at grade-separated interchanges only. The median would be wide enough to accommodate future upgrading to three lanes in each direction. The environmental assessment would assess the impacts associated with the motorway-style upgrade. This would ensure that all impacts are assessed, should the project be constructed in stages.

Approval is being sought to construct the project in stages. The staging of project construction has not been finalised at this point in time and will be dependant on further investigations. Until finalised, it is likely that the initial stage would involve a combination of class A arterial style highway and class M motorway standard highway. As highlighted in Figure 4.1, the likely initial staging would comprise:

- Two kilometres of class A arterial style upgrade at the southern end of the project (about chainage 66000 to chainage 68000) where a new carriageway would be built for southbound traffic and the existing highway would be retained as the new northbound carriageway.
- One kilometre of foundation works at the northern end of the project (chainage 71000 to chainage 72000) where a new carriageway would be built for southbound traffic when the project is built to a class M motorway.
- A three kilometre class M motorway style upgrade (about chainage 68000 to chainage 71000) that includes a rest area between chainage 69100 and 69500. The existing highway would be retained as a local road for traffic.

Under the initial class A upgrade in the southern part of the project, direct local access to and from the northbound travel lane would be retained at Pine Road for access into Bundjalung National Park. As part of the initial class M upgrade in the northern part of the project, the existing Pacific Highway carriageway would cater for access into Bundjalung National Park and the residential properties via Thompsons Road on the western side of the Pacific Highway. Towards the northern end of the project where the carriageway ties into the existing Pacific Highway, a combined emergency crossover and u-turn facility would be provided for south bound access to the existing Pacific Highway. Access for a rural property on the eastern side of the highway near chainage 70900 would be further developed in the detailed design phase.

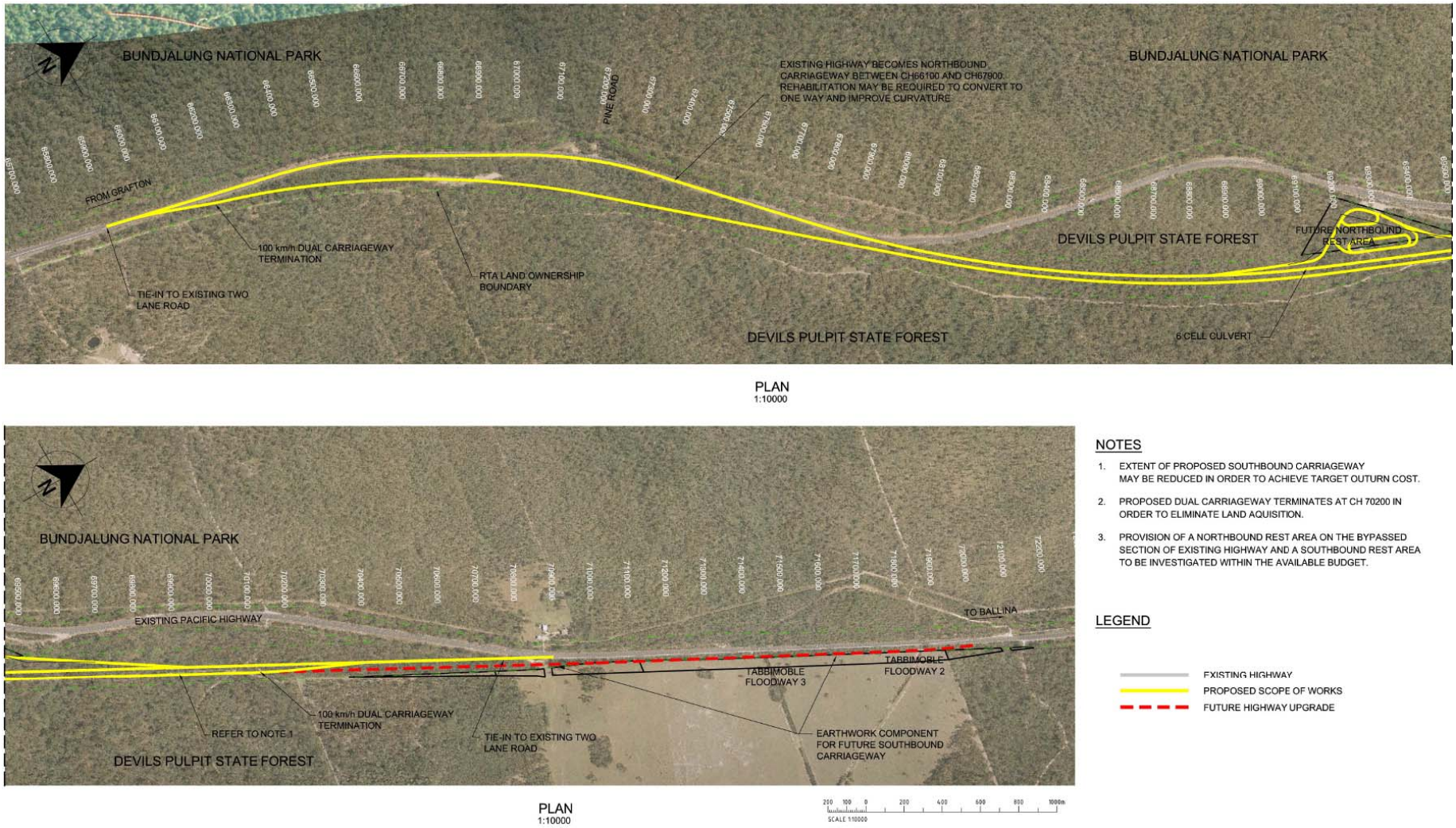

Figure 4.1: The project – possible initial staging option

For the future upgrade to class M, a new northbound carriageway would be constructed from chainage 66000 to chainage 68000 and the existing alignment of the Pacific Highway would act as a local access/service road. Further design refinement will occur in response to the outcomes of the environmental assessment.

As part of the project, three access tracks in Devils Pulpit State Forest would be altered. Khans Road, Mervs Road and Big Marsh Road provide access into and through the forested area for property owners, leaseholders and utility providers. Two sections of Khans Road totalling about two and a half kilometres in length are beneath the proposed project alignment and would be realigned to run alongside the highway boundary within Devils Pulpit State Forest. Formalised access from the project to Khans Road would be developed near chainage 70900. Mervs Road and Big Marsh Road currently connect to the Pacific Highway near chainage 68000 and 701000 respectively. Direct access to Mervs Road and Big Marsh Road from the existing Pacific Highway and the project would not be possible. Access to Mervs Road and Big Marsh Road would be possible via Khans Road.

Ancillary facilities such as batch plants, construction compounds and stockpile sites would be required to implement the project. Preliminary locations for these sites would be identified and assessed in the environmental assessment.

Urban design principles have been considered throughout the development of the Iluka Road to Woodburn upgrade, drawing on the RTA's *Pacific Highway Urban Design Framework* (PHUDF). The framework contains an overarching vision, objectives and design principles to achieve the objectives and vision as defined in the following extract:

> 'The upgrade should be a sweeping, green highway providing panoramic views to the Great Dividing Range and the forests, farmlands and coastline of the Pacific Ocean; sensitively designed to fit into the landscape and be unobtrusive; and characterised by simple and refined road infrastructure.

The following six urban design objectives would help achieve this vision and should be factored into the route selection and project development and procurement process:

- Provide a flowing road alignment that is responsive and integrated with the landscape.
- Provide a well vegetated, natural road reserve.
- Provide an enjoyable, interesting highway.
- Value the communities and towns along the road.
- Provide consistency-with-variety in road elements.
- Provide a simplified and unobtrusive road design.

5 Preliminary environmental assessment

5.1 Overview

The project is the construction of about six kilometres long section of dual carriageway between about 66 kilometres to 72 kilometres north of Grafton. The northern extent of the project is Tabbimoble Floodway No. 2, while the southern extent is approximately 1.2 kilometres south of Pine Road. Immediately adjacent to the eastern side of the project is Devils Pulpit State Forest, while to the west of the project is Bundjalung National Park. Scattered rural properties occur north and south of the project.

Preliminary environmental investigations have been undertaken during the development and refinement of the concept design for the proposed Iluka Road to Woodburn Pacific Highway Upgrade project, which includes the environments traversed by the project. This included desktop reviews of available information, predictive modelling and/or field verification, and targeted specialist investigations for many environmental aspects. Specialist investigations included:

- Traffic and transport.
- Terrestrial ecology.
- Aboriginal and European heritage.
- Land use and planning.
- Geotechnical.
- Socio-economic.
- Water quality.
- Hydrology.
- Noise.

These investigations assisted in the development of the concept design and are presented in the *Iluka Road to Woodburn Concept Design Report* (RTA March 2006) and the *Iluka Road to Woodburn Preferred Concept Design Report* (RTA 2008a).

The concept design was displayed for community participation and feedback in March 2006. Following the public display of the concept design, a preferred concept design was developed, based on the concept design and comments from the community and stakeholders. The preferred concept is presented in the *Iluka Road to Woodburn Preferred Concept Design Report* (RTA 2008a). The information presented in this chapter is sourced from the *Iluka Road to Woodburn Concept Design Report*, the *Iluka Road to Woodburn Preferred Concept Design Report* and associated investigations.

5.2 Preliminary risk analysis

A preliminary environmental risk analysis was undertaken for the project to identify key environmental issues. It comprised a qualitative assessment based on information gathered during preliminary investigations. The level of environmental risk was assessed by considering potential environmental impacts of the project and the ability to manage those impacts in a way that minimises harm to the environment.

While the approach is qualitative, it provides an important step in the process of project planning and assessment of environmental impact. In particular, it facilitates scoping of

environmental investigations and assessments, guides project design, and assists in identifying appropriate mitigation measures and management responses. The identified risks are based on the following risk categories summarised in Table 5.1.

Table 5.1: Environmental risk categories

Risk category	Description
A	May have high or moderate impacts. Detailed assessment necessary to determine the level of potential impact and to develop appropriate measures to mitigate and manage the impacts.
B	May have high or moderate impacts. These can be mitigated by the application of standard environmental management measures.
C	Has low impacts. These can be managed by standard environmental management measures.

Those issues that were assigned risk category A have been nominated as key issues.

5.3 Key environmental issues

Preliminary environmental assessment indicates that the following key environmental issue would require further detailed assessment and may require project specific impact mitigation measures:

- Biodiversity

A number of other environmental issues have also been identified in the preliminary environmental assessment. These issues are outlined in Chapter 6 and are generally considered to be common issues frequently encountered in road construction projects. The potential impact of these additional environmental issues can be mitigated during construction and/or operation, through the application of best practice impact mitigation and management measures.

The process of environmental risk analysis will continue throughout the preparation of the detailed environmental assessment using information obtained from detailed specialist studies and concept design refinements. The environmental risk analysis will:

- Examine the environmental issues associated with the project, including but not limited to the key issues identified in the Preliminary Environmental Assessment and Director-General's Requirements.
- Examine the potential environmental impacts and proposed impact mitigation measures for each of the identified issues.
- Identify the nature and extent of environmental impacts that are likely to remain after the proposed impact mitigation measures are applied.

This process will enable any additional issues associated with the project (other than those issues identified in this report) to be identified and also enable the risk category of known issues to be re-evaluated and appropriate mitigation measures developed.

5.4 Biodiversity

Preliminary environmental investigations into biodiversity are documented in the Ecological Assessment Working Paper prepared for the *Iluka Road to Woodburn Preferred Concept Design Report* (RTA 2008a). As described in these reports, the project is either directly adjacent or slightly to the east of the existing highway and passes through densely vegetated areas of Devils Pulpit State Forest. The project would involve clearing about 35 ha of native vegetation of which about 2.8 ha is State forest. These estimates of vegetation to be cleared would be further refined as part of the environmental assessment.

Vegetation Clearance

The vegetation impacted by the project is either dry sclerophyll forest or floodplain open forest. Much of the vegetation within the project footprint was previously part of Devils Pulpit State Forest and although subject to a long history of logging, it is generally in good condition with limited weed growth. The majority of the vegetation impacted by the project is dry sclerophyll forest growing on gently undulating rises and soils formed on fine to medium grained sedimentary rocks. In the low lying parts of the study area, the project would impact upon floodplain open forest vegetation. The preliminary environmental investigations identified the five following vegetation communicates in the project study area:

- Eastern Red Gums Floodplain Forest.
- Forest Red Gum Floodplain Forest.
- Scribbly Gum Dry Sclerophyll Forest.
- Blackbutt Dry Sclerophyll Forest.
- Spotted Gum Dry Sclerophyll Forest.

The Eastern Red Gums Floodplain Forest and Forest Red Gum Floodplain Forest growing on the low lying parts of the study area meet the definition of Subtropical Coastal Floodplain Forest, an Endangered Ecological Community (EEC) listed under the TSC Act. The project would result in about seven ha of this endangered ecological community being cleared.

The preliminary environmental investigations included database and literature searches, habitat assessment and survey generally in accordance with guidelines prepared by the Department of Environment, Climate Change and Water (DECCW) and the Industry and Investment NSW (DECC 2005a). Targeted surveys for threatened flora species recorded eight threatened flora species listed under the TSC Act (of which three are also listed under the EPBC Act). None of these flora species were recorded within the current project study area.

Table 5.2 Threatened flora species recorded

Scientific Name	Conservation Status	
	NSW	Commonwealth
Melaleuca irbyana	E	-
Cyperus aquatilis	E	
Lindsaea incisa	E	
Oberonia titania	V	
Desmodium acanthocladum	V	V
Prostanthera palustris	V	V
Prostanthera cineolifera	V	V
Maudia triglochinoides	V	

Twenty four threatened flora species were considered to have potential to occur in the Iluka Road to Woodburn route corridor based on database searches.

Table 5.3 Threatened flora potentially occurring

Scientific Name	Conservation Status	
	NSW	Commonwealth
Aldrovanda vesiculosa	E	
Allocasuarina defungens	E	E
Angophora robur	V	V
Arthraxon hispidus	V	V
Caesia parviflora var. minor	E	
Drynaria rigidula	E	
Eleocharis tetraquetra	E	
Eucalytpus glaucina	V	V
Eucalyptus tetrapleura	V	V
Geodorum densiflorum	E	
Gossia fragrantissima	E	E
Grammitis stenophylla	E	
Grevillea masonii	E	E
Haloragis exaltata ssp. velutina	V	V
Hibbertia marginata	V	V
Lindsaea fraseri	E	
Melichrus sp. "Gibberagee"	E	E
Oldenlandia galioides	E	
Persicaria elatior	E	E
Phaius australis	E	E
Phaius tankervilliae	E	E
Phyllanthus microcladus	E	E
Polygala linariifolia	E	
Rutidosis heterogama	V	V

Conservation status E: Endangered V: Vulnerable

Fauna Habitat Impacts

The study area provides roosting, nesting, breeding and foraging resources for a range of common and threatened fauna species. Hollow bearing trees occur along the length of the project and provide essential nesting, roosting and sheltering habitat for hollow dependant fauna, including threatened species. Targeted field surveys for threatened fauna species in the Iluka Road to Woodburn route corridor recorded 18 threatened fauna species listed under the TSC Act. This included 11 mammals, five birds and two frogs. One mammal is also listed as

threatened under the EPBC Act and two birds are listed as migratory under the EPBC Act.

Table 5.4 Threatened fauna species and migratory species recorded during preliminary investigations.

Common Name	Scientific Name	Conservation Status	
		NSW	Commonwealth
Wallum Froglet	*Crinia tinnula*	V	-
Green-thighed Frog	*Litoria brevipalmata*	V	-
Brown Treecreeper	*Cormobates picumnus*	V	-
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V	-
Grey-crowned Babbler	*Pomatostomus temporalis*	V	-
Masked Owl	*Tyto novaehollandiae*	V	-
Powerful Owl	*Ninox strenua*	V	-
Brush-tailed Phascogale	*Phascogale tapoatafa*	V	-
Squirrel Glider	*Petaurus norfolcensis*	V	-
Yellow-bellied Glider	*Petaurus australis*	V	-
East Coast Freetail Bat	*Mormopterus norfolkensis*	V	-
Grey-headed Flying-Fox	*Pteropus poliocephalus*	V	V
Hoary Wattled Bat	*Chalinolobus nigrogriseus*	V	-
Large-footed Myotis	*Myotis adversus*	V	-
Little Bent-wing Bat	*Miniopterus australis*	V	-
Eastern Bent-wing Bat	*Miniopterus Schreibersii oceanensis*	V	-
Eastern Long-eared Bat	*Nyctophilus bifax*	V	-
Eastern Cave Bat	*Vespadelus troughtoni*	V	-
Satin Flycatcher	*Myiagra cyanoleuca*	-	M
Rufous Fantail	*Rhipidura rufifrons*	-	M

Conservation status E: Endangered V: Vulnerable M: Migratory

In addition to the threatened fauna species recorded during the targeted field surveys, 30 threatened fauna species and two migratory species have the potential to occur in the study area.

Table 5.5 Threatened fauna species potentially occurring in the study area

Common Name	Scientific Name	Conservation Status	
		NSW	Commonwealth
Wallum Sedge Frog	*Litoria olongburensis*	V	V
Stuttering Frog	*Mixophyes balbus*	E	V
Fleay's Barred Frog	*Mixophyes fleayi*	E	E
Giant Barred Frog	*Mixophyes iteratus*	E	E

Common Name	Scientific Name	Conservation Status	
		NSW	Commonwealth
White-crowned Snake	*Cacophis harriettae*	V	-
Pale Headed Snake	*Hoplocephalus bitorquatus*	V	-
Stephen's Banded Snake	*Hoplocephalus stephensii*	V	-
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	V	-
Emu	*Dromaius novaehollandiae* (NSW North Coast Bioregion and Port Stephens LGA Population)	E2	-
Red Goshawk	*Erythrotriorchis radiatus*	E	V
Black-breasted Buzzard	*Hamirostra melanosternon*	V	-
Swift Parrot	*Lathamus discolor*	E	E
Square-tailed Kite	*Lophoictinia isura*	V	-
Hooded Robin Hooded Robin (southeastern subspecies)	*Melanodryas cucullata* *Melanodryas cucullata cucullata*	V	-
Osprey	*Pandion haliaetus*	V	-
Regent Honeyeater	*Xanthomyza phrygia*	E	E
Barking Owl	*Ninox connivens*	V	-
Masked Owl	*Tyto novaehollandiae*	V	-
Rufous Bettong	*Aepyprymnus rufescens*	-	
Eastern Pygmy-possum	*Cercartetus nanus*	-	
Spotted-tailed Quoll Spotted-tailed Quoll (SE Mainland Population)	*Dasyurus maculatus* *Dasyurus maculatus maculatus*	V -	- E
Long-nosed Potoroo Long-nosed Potoroo (SE Mainland Population)	*Potorous tridactylus* *Potorous tridactylus tridactylus*	V	
Koala	*Phascolarctos cinereus*	V	
Common Planigale	*Planigale maculata*		
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V
Golden-tipped Bat	*Kerivoula papuensis*	V	
Black Flying-Fox	*Pteropus alecto*	V	
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V	
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V	
Common Blossom-bat	*Syconycteris australis*	V	
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	-	M
White-throated Needletail	*Hirundapus caudacutus*	-	M

Conservation status E: Endangered V: Vulnerable M: Migratory

Several drainage lines are crossed by the project, including Tabbimoble Floodway No. 2 and No. 3 in the north, Pine Road Creek and an unnamed drainage line in the south. The drainage lines crossed by the project drain water from Bundjalung National Park eastwards into Devils Pulpit State Forest. Tabbimoble Floodway No. 2 and No.3. have defined channels with gently sloping vegetated banks and soil substrates. Tabbimoble Floodway No. 2 and No. 3 are considered to provide moderate fish habitat (Class 2) in accordance with Fairfull and Witheridge 2003.

Pine Road Creek and the unnamed drainage line in the south of the study area are ephemeral watercourses with undefined channels that support intact vegetation. Pine Road Creek and the unnamed drainage line in the south of the study area are considered to provide minimal fish habitat (Class 3) in accordance with Fairfull and Witheridge 2003. Four fish species listed as threatened under the FM Act have been recorded within 10 kilometres of the study area. Of particular relevance are the Oxleyan Pygmy Perch records downstream of the project study area in Bundjalung National Park. The Oxleyan Pygmy Perch can inhabit small ponds and pools of water in coastal wallum floodplain environments and the drainage lines in the study area could be used by this species. Targeted aquatic surveys for the Oxleyan Pygmy Perch and the other three threatened fish would be undertaken in the detailed environmental assessment.

Wildlife Corridor Impacts

The project would pass through a densely vegetated area of land to the east of the existing Pacific Highway. This vegetated area dissected by the project is adjacent Devils Pulpit State Forest and forms part of a broad vegetated link connecting the coastal floodplains in Bundjalung National Park with the Richmond Ranges to the west. This vegetated link is a recognised wildlife movement corridor considered valuable for maintaining migration, dispersal and predation. The existing Pacific Highway would already be a partial barrier to the movement of many fauna species, particularly the less mobile ground dwelling species. The project would result in additional carriageways being constructed in the study area, adding to the scale of the barrier. For many species of fauna such as highly mobile birds and bats, the increased size of the barrier would not affect their ability to move through the corridor. However for the less mobile fauna species such as ground dwelling animals or arboreal gliders, the increased width of the project could affect their ability to move through the corridor.

5.4.1 Summary of potential issues identified

The project would result in a range of biodiversity impacts, including impacts on species and ecological communities listed as threatened under the TSC Act and potential impacts to species listed under the EPBC Act.

As a result of preliminary ecological investigations undertaken, the following potential biodiversity issues have been identified for the project:

- The clearing of native vegetation comprising primarily dry sclerophyll forest communities dominated by Blackbutt and Scribbly Gum species.
- The clearing of native vegetation comprising floodplain open forest communities dominated by Narrow-leaf Red Gum, Forest Red Gum and Swamp Box species in the low lying parts of the study area. These communities are likely to constitute an Endangered Ecological Community (EEC) - Subtropical Coastal Floodplain Forest - listed under the TSC Act.
- The clearing of known and potential habitat for a range of state and Commonwealth threatened fauna species.
- An increase in the barrier to movement for a range of fauna and the need to make provision in the design for fauna connectivity measures.
- Potential alterations to down stream water quality affecting potential habitat for threatened fish species

5.4.2 Further assessments

Further investigation is required to assess the impact of the project on biodiversity and to confirm appropriate impact minimisation and mitigation measures. Further investigations would generally comprise:

- Detailed surveys to identify and confirm the flora and fauna impacted by the project. The surveys would include targeted surveys of those species previously identified in the study area and the potentially occurring threatened species that were not recorded during the preliminary environmental assessment.
- Assessment of the extent of clearing of native vegetation by native vegetation type for the project including the extent of endangered ecological community.
- Significance assessment for all potentially impacted threatened species would be undertaken in accordance with the draft *Guidelines for Threatened Species Assessment* (DECC 2005) and the *Significant Impact Guidelines* (DEH 2006).
- Identification of fauna species and groups whose movement may be impacted by the project and an assessment of the connectivity measures appropriate to the fauna groups.
- Targeted surveys for threatened aquatic species potentially impacted by the project and an assessment of the proposed waterway crossings and the impact on aquatic habitats.

5.4.3 Management and mitigation measures

Subject to the outcomes of further assessment the following management and mitigation measures are proposed to be adopted for the project:

- Minimise clearing of native vegetation, Endangered Ecological Community, threatened species and minimise loss of habitat features such as trees with hollows. Further design refinement would identify opportunities to reduce habitat clearing.
- Procedures would be applied to ensure that clearing limits are maintained.
- Procedures for managing any fauna found on site would be implemented.
- Implementation of habitat replacement measures (such as nest boxes and placement of coarse woody debris) where further assessment indicates that these are feasible and required to replace habitat features lost during construction.
- Subject to further assessment, measures to mitigate fauna barrier impacts would be developed for inclusion into the final design.
- The project would comply with provision for fish passage outlined in Guidelines and Policies for Aquatic Habitat Management and Fish Conservation (NSW Fisheries 1999) and Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge 2003).
- Provision of biodiversity offsets for residual impacts.

5.4.4 Brief scope of studies for the environmental assessment

Biodiversity – including but not limited to:

- Assessment of threatened terrestrial and aquatic species, populations and ecological communities.
- Targeted surveys for terrestrial and aquatic threatened flora and fauna species.

- Assessment of habitat including native vegetation loss, habitat fragmentation, loss of ecological connectivity, riparian habitat, impacts to groundwater dependent ecosystems and weed infestation.

6 Other environmental issues

The preliminary environmental risk analysis process indicated that the following issues could be addressed by standard mitigation and management measures, and subsequently are not considered to be key environmental issues for the purpose of the environmental assessment.

6.1 Aboriginal heritage

An Aboriginal heritage assessment was undertaken as part of the preferred concept design investigations for the Iluka Road to Woodburn project and is presented in the Indigenous Heritage Assessment Working Paper (RTA July 2008b). The assessment covered the area potentially impacted by the current project. The Aboriginal heritage assessment included:

- Background desktop assessment of the project corridor and surrounding areas.
- Aboriginal community consultation consistent with DECCW Interim Community Consultation Guidelines for Applicants and the then draft of the RTA *Procedure for Aboriginal Cultural Heritage Consultation & Investigation*.
- A comprehensive site survey to identify Aboriginal objects, places and potential archaeological deposits (PADs) within and adjacent to the project corridor.
- Mitigation measures for the management of cultural heritage items identified within the Iluka Road to Woodburn route corridor.

Background desktop assessment

Background desktop research was conducted to inform the site survey. A search of DECCW Aboriginal Heritage Information Management System (AHIMS) database was completed as part of the desktop assessment for an area within a 5 kilometre radius of the Iluka Road to Woodburn route corridor. The search area was larger and longer than the route corridor to inform predictive modelling and identification of unknown constraints prior to site survey.

In total 14 registered AHIMS sites were identified within the search area. None of the sites are within the Devils Pulpit project study area.

A subsequent search of the AHIMS database was undertaken 21 September 2009 to identify any Aboriginal sites that had been listed in the project study area since the previous AHIMS search in 2008. The search results indicated that no Aboriginal sites have been listed in the Devils Pulpit project study area since the previous AHIMS search.

The AHIMS search, along with research on relevant archaeological heritage reports, academic books and regional cultural heritage studies revealed that *no known Aboriginal objects or places* were located in the project corridor prior to site survey.

Searches of the National Native Title Register, Register of Native Title Claims, Register of Indigenous Land Use Agreements and the Applications Summary were undertaken as part of the Iluka Road to Woodburn preferred concept design investigations. One of the entries relevant to the project study area had been accepted for Native Title registration and is in the process of mediation. The entry relates to a 3,315 square kilometre area comprising all claimable land south from Broadwater Headland to Woody Bluff, inland to Naughtons Gap and Busbys Flat and encompasses the project study area.

Initial Aboriginal community consultation

Aboriginal community consultation extends back to the route selection study for the Iluka Road to Woodburn project in November 2004 and was in accordance with *DECC Interim Community Consultation Guidelines for Applicants* and the then draft of the RTA *Procedure*

for Aboriginal Cultural Heritage Consultation & Investigation. Initial consultation involved coordinators of the Yaegl, Bogal, Jali and Ngulingah Local Aboriginal Land Councils and the Native Title Claimant being contacted at the commencement of the route selection study in November 2004.

The initial consultation with the LALC representatives and Native Title Claimant identified the following five culturally significant sites in the landscape: a scarred tree, rock wells, a burial site, a traditional battle ground and a sacred area inhabited by a mythological being. None of these sites are within the project study area, the closest being the rock wells in the upper slopes of the Richmond Range more than 2.5 kilometres to the west of the existing Pacific Highway.

Archaeological field survey

An archaeological field survey was undertaken over six days between 31 May 2005 and 11 August 2005 with sites officers from Yaegl LALC, Ulgundahi Elders, Bogal LALC, Bandjalang Aboriginal Corporation, Jali LALC and Ngulingah LALC. The field survey approach was based on a predictive model for the area and covered the entire section of the Iluka Road to Woodburn project area that includes the current Devils Pulpit project study area.

To develop a predictive model, previous modelling in the Tabbimoble Rises was considered (Lilley 1984, Byrne 1986, Hall and Lomax 1993). Previous modelling predicted the landscape was likely to have been inhabited on a seasonal basis by small Aboriginal groups who camped along the margins of larger streams and shifted frequently to avail themselves of the patchy forest resources. Identified sites containing multiple artefacts tended to occur on level/low gradient ridge/spur crests, footslopes or mid slope benches. On this basis, the model for the Iluka Road to Woodburn archaeological investigations predicted that the archaeological record of the Tabbimoble landscape will be of a low-density nature only (in part due to a lack of exploitable stone resources), comprising mainly isolated stone artefacts and small artefact scatters distributed along ridge/spur lines that provided for expedient movement through the landscape and in the vicinity of streams and swamps on level well-drained foot slopes, flats and banks used for camping. It was concluded that Aboriginal archaeological sites within the landscape would most likely consist of isolated stone artefacts, stone artefact scatters, scarred trees and natural mythological sites.

The survey team used pedestrian survey techniques and focussed on parts of the landscape that contained ridge/spur lines, in the vicinity of streams and swamps on level well drained foot slopes, flats and banks. The entire Devils Pulpit project study area was surveyed on foot. Exposed surfaces suitable for artefact detection including unformed vehicle and cattle tracks, creek bans and drain profiles, erosion scours, rootballs of fallen trees, areas denuded of vegetation around trees, road shoulder exposures and other assorted shallow mechanical disturbances were surveyed. The trunks of any mature trees were inspected for signs of Aboriginal markings.

To assess Aboriginal cultural and social values and determine whether the integrity of any unidentified sites/places of particular concern would be affected, consultation was undertaken with all Aboriginal group representatives involved in the survey, as well as with local Elder and Native Title claimant and his immediate family.

Survey results

Five archaeological sites, comprising one low-density scatter of stone artefacts, three isolated finds and a scarred tree were recorded during the field survey in the general vicinity of the locations shown on Figure 6.1. Although the sites were within the Iluka Road to Woodburn project area, none of the sites are within the Devils Pulpit project study area. The nearest of the identified sites to the project study area was an isolated stone artefact on the creek flat south of Tabbimoble Creek, about 3.5 km from the southern extent of the project.

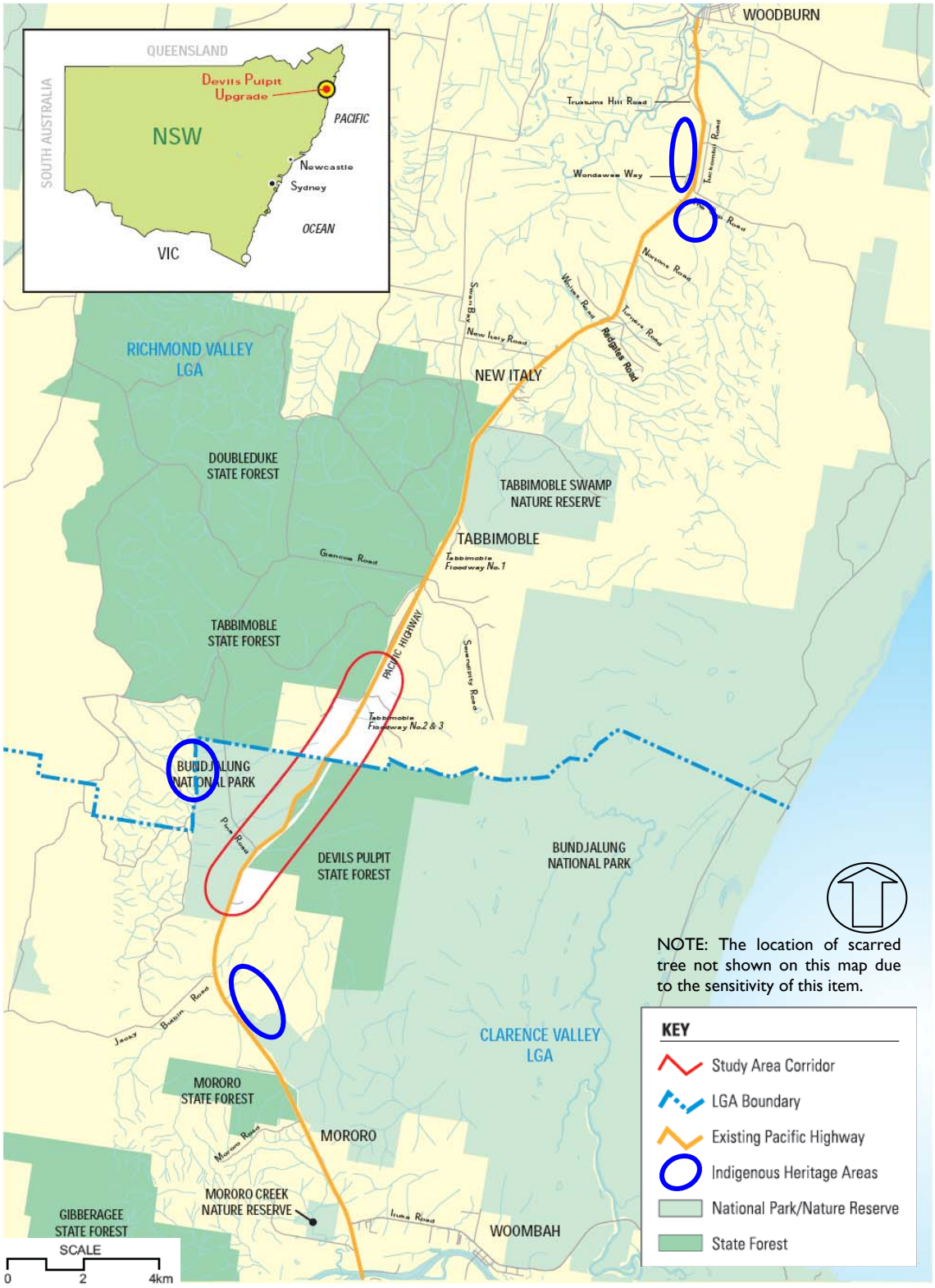

Figure 6.1 Aboriginal heritage areas

Subsequent Aboriginal community consultation

Following the initial Aboriginal community consultation, an Aboriginal Focus Group (AFG) was formed for the Iluka Road to Woodburn project in 2007 and the first meeting held on the 13

June 2007. In addition to a notice of invitation in the local newspapers, invitations to attend the meeting were posted to:

- Bogal LALC.
- Yaegl LALC.
- Ngulingah LALC.
- Jali LALC.
- Birrigan Gargle LALC.
- Bandjalang Aborginal Corporation.
- Ulgundahi Elders Aboriginal Corporation.
- Bunajalung Elders Council Aboriginal Corporation.
- NSW Aboriginal Land Council.
- NSW Native Title Services.
- Department of Aboriginal Affairs.
- NSW Heritage Office.
- Department of Environment and Climate Change.

The AFG forum allowed for the identification of appropriate cultural knowledge holders and gave registered stakeholders the opportunity to comment on survey methodologies and draft assessment reports. No Aboriginal heritage issues or constraints other than those previously identified in the initial consultation and the field surveys were identified by the Aboriginal stakeholder representatives, both of whom represented the Birrigan Gargle LALC of the lower Clarence.

6.1.1 Potential Aboriginal heritage issues

- There are no known Aboriginal heritage objects, places or potential archaeological deposits in the project study area.

No Aboriginal heritage constraints have been identified within the project study area following a process that included background literature research, consultation with the Aboriginal community and archaeological field surveys. Archaeological surveys indicated that the study area contains a low density of archaeological sites, reflecting the type of landuse strategy adopted the small groups engaged in itinerant resource gathering activities.

The assessment report considered that most of land in the vicinity project study area has suffered a reasonably high level of disturbance due to the construction of the existing and former realigned sections of the highway and a long history of timber harvesting in the adjoining forests. Any stone artefacts that may have occurred in these heavily modified areas will have been redeposited elsewhere or dispersed from their original place of deposition.

Strongly acid soil landscape units in the locality are considered to cause organic materials such as bone, shell and charcoal to degenerate rapidly unless deposited in relatively recent times in the study area's archaeological record.

Considering the survey results in conjunction with its environmental character and disturbance, it is concluded that the project study area is unlikely to contain any substantial undetected archaeological evidence. There is however a risk that Aboriginal heritage sites could be identified during the construction process.

6.1.2 Management and mitigation measures

Although no Aboriginal heritage constraints have been identified within the project study area, there is the risk that Aboriginal heritage sites could be encountered during the construction stage. The risk of disturbing previously unidentified Aboriginal heritage sites during construction is an issue frequently encountered and adequately managed on all road projects. It is not considered that further detailed assessment is necessary to develop measures to appropriately manage this risk. The management of the Aboriginal heritage risk would involve the application of standard environmental management measures including the following:

- Address unexpected finds during construction (including human remains).
- Site awareness induction for site staff.
- All measures would be in accordance with:
    - RTA *Procedure for Aboriginal Community Consultation and Investigation* (2008c).
    - DECCW's *Interim Community Consultation Requirements for Applicants* (2004).
    - DECCW's draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation: Part 3A, Environmental Planning and Assessment Act* (2005b).

6.2 Non Aboriginal heritage

A non-Aboriginal heritage assessment was undertaken as part of the *Iluka Road to Woodburn Preferred Concept Design Report* and is presented in the non-Indigenous Heritage Assessment Working Paper (RTA 2008d). The assessment covered the area potentially impacted by the current project.

The non-Aboriginal heritage assessment included:

- An overview of local history.
- A search of all relevant statutory and non-statutory heritage registers.
- Consultation with Richmond Valley Council and Clarence Valley Council.
- Review of the Richmond Valley Council Heritage Study.
- Consultation with local historical societies, New Italy Museum Incorporated and discussions with local residents.
- Preliminary mitigation measures for the management of non-Aboriginal heritage items identified within the study corridor.

Historic Overview

First opened to European settlement in 1828 by Captain Henry, the area around the Richmond and Clarence Rivers were mainly settled during the mid-nineteenth century by timber getters (particularly cedar-cutters). Harvested timber was transported to places such as Sydney via the water, with ships travelling from large ports such as Ballina. The existing landscapes within the study area are largely the product of this timber harvesting. Land was extensively cleared of timber and much of the existing forest cover is natural regrowth. In addition to timber, dairy, sugar cane and fishing became a staple of the local historic economy.

Among the most notable settlers within the area, were a group of Italian migrants (from a failed Spanish expedition) who arrived in the area that is now known as New Italy in 1882.

Literature and Database Review

Searches were undertaken for the proposed Iluka Road to Woodburn project. Searches included the following statutory and non-statutory heritage registers and schedules:

Statutory listings:

- World Heritage List (Australian Heritage Council).
- The Commonwealth Heritage List (Australian Heritage Council).
- The National Heritage List (Australian Heritage Council).
- The State Heritage Register (Heritage Branch Department of Planning).
- State Heritage Inventory (Heritage Branch Department of Planning).
- RTA Section 170 Heritage and Conservation Register.
- North Coast Regional Environmental Plan.
- Richmond River Local Environmental Plan 1992.

Non-statutory listings:

- Register of the National Estate (Australian Heritage Council).
- Register of the National Trust of Australia (NSW).

In addition to these listings, Industry and Investment NSW were consulted about known non-Aboriginal heritage items within or adjacent to Devils Pulpit State Forest.

The following two listed heritage items, both on the NSW State Heritage Register, were found the during the literature review and database search:

- High conservation value old growth forest in Bundjalung National Park.
- New Italy Settlement.

Neither of the above heritage items, including their curtilages occurs in the project study area and neither would be directly or indirectly affected by the project.

6.2.1 Potential issues

- There are no known non-Aboriginal heritage items in the project study area.

The preliminary non-Aboriginal heritage assessment involving searches of databases and consultation with local historical societies has indicated that no known non-Aboriginal heritage items occur within the project study area. There is however the risk that non-Aboriginal heritage sites could be identified during the construction process.

6.2.2 Management and mitigation measures

No non-Aboriginal heritage constraints have been identified within the project study area to date. It is not considered that detailed assessment is necessary to develop appropriate mitigation measures. The management of the identified non-Aboriginal heritage risk would

involve the application of standard environmental management measures including the following:

- The potential for heritage items to occur within the project study area would be further verified in the environmental assessment phase. Additional searches of Department of Land's records, parish maps, historical aerial photography and historic plans would assist in this process. Chronological mapping of settlement activities would enable prediction of archaeological risk.
- A comprehensive site survey would be conducted to ground truth heritage items identified from further research outlined above. This survey would also identify previously unknown heritage features that may exist within the project study area.
- If a relic or potential heritage item is discovered in the course of construction, a heritage consultant would be notified to assess the significance of the find, and determine whether further mitigation measures are required.

6.3 Noise

6.3.1 Background

Preliminary investigations for noise were undertaken in 2005 and are included in the *Iluka Road to Woodburn Preferred Concept Design Report* (RTA 2008a). Aerial photography interpretation was used to identify receivers potentially impacted by the project alignment. One receiver was identified within 300m of the project alignment. The receiver is a residential property at the northern end of the project on the western side of the Pacific Highway near chainage 70900. The front façade of the property is about 45m from the existing Pacific Highway alignment. The only other receiver in the near vicinity of the project is a property about 700m east from the southern end of the project.

6.3.2 Construction Noise

Construction noise impacts are influenced by the timing and duration of the noise level at receivers and the emergence of noise above existing background levels. Construction of the project is likely to result in localised noise and vibration impacts at the identified receiver near chainage 70900 and could affect the receiver south of the project. A detailed program of construction activities has not been determined, however it is likely that the following construction activities would occur in the vicinity of the receiver:

- Clearing and grubbing.
- Earthworks.
- Paving and asphalting.
- Delivery of construction materials and fill.

Based on the preliminary concept plans for the project, it is likely that in the vicinity of the residential receiver near chainage 70900 and towards the southern extent of the project, the project would be constructed on fill and as such would not involve activities such as any blasting or excavating significant amounts rock.

Construction noise will be managed in accordance with the Department of Environment, Climate Change and Water *Interim Construction Noise Guideline* (DECC 2009). The interim Construction Noise Guideline (CNG) provides two methods for assessment of construction noise, being either a quantitative or a qualitative assessment. A quantitative assessment is recommended for major construction projects of significant duration, and involves the measurement and prediction of noise levels, and assessment against set criteria. As part of the construction noise management levels during recommended standard work hours, the CNG has two distinct criteria, noise affected and highly noise affected receivers. For noise affected

receivers, construction noise levels should not exceed an $L_{Aeq(15min)}$ of more than 10 dB(A) over the measured background level. For highly noise affected receivers, a management level of $L_{Aeq(15min)}$ 75 dB(A) is recommended. These noise levels would apply to the proposal and may be unachievable during some works, particularly works in close proximity to the residence.

The construction environment management plan would identify the construction schedule, construction equipment and construction noise management methods to minimise impacts to the residential receiver near chainage 70900 and the receiver south of the project where considered reasonable and feasible. Where the recommended standard hours management levels are exceeded best practice methods, including consultation with the resident prior to noisy works would be adopted and a procedure for dealing with complaints would be implemented.

6.3.3 Operational Noise

For arterial road/freeway upgrades and re-developments, the Department of Environment, Climate Change and Water (DECCW) *NSW Environmental Criteria for Road Traffic Noise* (ECRTN) recommends 'baseline' noise assessment goals of 60dB(A) LAeq,15hr (daytime) and 55dB(A) LAeq,9hr (night-time). The goals are applicable at 1m from the most exposed external residential building facade at the road opening and ten (10) years after opening.

Where the existing traffic noise exceeds the 'baseline' goals, the DECCW: ECRTN 'allowance' goal requires the proposed road upgrades/re-developments be designed so as not to increase the 'future existing levels' by more than 2dB(A). Where predicted noise levels exceed the above noise assessment criteria by 5 dB(A) that is 65dB(A) LAeq,15hr (daytime) and 60dB(A) LAeq,9hr (night-time), this is referred to as acute noise and mitigation measures need to be considered where reasonable and feasible.

In the vicinity of the identified residential receiver near chainage 70900, the project aligns with the existing Pacific Highway and one carriageway would be built further away from the property. Therefore the "redevelopment of existing road" criteria would apply to assessing operational noise impacts on this residence.

Preliminary noise investigations for the purpose of developing conceptual noise control options were undertaken that took into account projected traffic growth and changes to road alignment. The investigations assumed that traffic speeds on the project would be 110 km/h.

Ambient background noise measurements were conducted at the residential property near chainage 70900 from 1 March 2005 to 8 March 2005. The day time (LAeq,15hr) and night time (LAeq,9 hr) road traffic noise levels at the property were 63dB(A) and 62 dB(A) respectively.

Initial noise predictions calculated as part of the noise assessment indicated that as a result of the project, the existing road traffic noise levels at the receiver would:

- Generally increase by 1dB(A) at road opening due to traffic growth.
- Generally increase by 2dB(A) ten years after road opening due to traffic growth.

The project would involve a combined emergency cross over, u-turn facility and stopping facility being constructed near chainage 70800. It is possible that the nearby residential receiver would be exposed to increased levels of road traffic noise as vehicles slow down to use this facility and then accelerate back onto the highway.

Rest Area Noise

As part of the project, a rest area would be located for northbound traffic between chainage 69100 and 69500. The nearest receiver for the project is about 1.5 km to the south east. It is considered unlikely that this receiver would experience operational noise from the proposed rest area, however this would be further considered in the environmental assessment.

6.3.4 Potential noise issues

Based on the preliminary noise considerations undertaken to date, one residential receiver is likely to experience noise impacts from the construction and operation of the project and another receiver to the south of the project could experience construction noise impacts. The following potential noise and vibration issues have been identified:

- Noise and vibration impacts would be expected at a residential receiver during the construction phase.
- Predicted small increase in operational noise levels to on residence near chainage 70900.

6.3.5 Management and mitigation measures

Construction noise and vibration impacts are common issues frequently encountered on road construction projects. Construction noise impacts on a single residential receiver can be adequately managed through the preparation of a construction noise and vibration management plan and through the application of best practise mitigation and management measures. Operational noise impacts from roads are frequently encountered and are managed in accordance with Practise Note 4 of the *RTA's Environmental Noise Management Manual* (RTA 2001). A noise assessment during the environmental assessment stage would assist in the development of measures to minimise impacts. This assessment would include:

- An assessment of noise and vibration impacts from the construction and operational stages of the project on the identified residence near the northern end of the project.
- Consideration of operational site noise from the proposed rest area.
- Recommendation of noise and vibration mitigation measures if required.

Assessments would be conducted in accordance with the following guidelines as relevant:

- Environmental Criteria for Road Traffic Noise (DECC).
- Industrial Noise Policy (DECC).
- Interim Construction Noise Guideline (DECC 2009).
- Environmental Noise Management Manual (RTA 2001).
- Environmental Noise Control Manual (DECC).
- Assessing Vibration: A technical Guideline (DECC 2006).
- Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration (ANZECC 1990).

6.4 Traffic

6.4.1 Background

The section of the existing Pacific Highway which would be upgraded by the project is a two-lane single carriageway road with occasional overtaking lanes. It is typified by substandard horizontal and vertical geometry, narrow shoulders and numerous traffic hazards in close proximity to the highway. Accident histories show unacceptably high levels of traffic incidents in many areas. Many crashes occur on sections with substandard curves. The combination of these factors contributes to unacceptable road conditions on the existing Pacific Highway within the study area.

The highway predominantly caters for through traffic travelling between Grafton and Ballina and vice-versa, and more generally between Sydney and Brisbane. It also serves a number of properties located along its length and provides local access to and between Iluka Road and Woodburn. The entire study route has a posted speed limit of 100 km/hr.

The RTA publishes historical Annual Average Daily Traffic (AADT) data for various Pacific Highway count stations, which have been used to provide an indication of historical growth in the study area. The AADT data for the study area, calculated in 2007 indicated that the section of the Pacific Highway in the study area carries about 8900 vehicles per day, of which about 1720 are heavy vehicles. Surveys showed that average daily heavy vehicle movements are higher during the week than the seven day average.

The fatality rate for this section of the Pacific Highway is about 4 fatalities per 100 million vehicle kilometres travelled (MVKT), which is above the NSW State Plan target of 0.7 fatalities per 100 MVKT by 2016.

6.4.2 Potential issues

- Local and highway motorist disruptions during construction.
- Local and regional traffic network impacts.
- Changes to local access.

Disruptions

Some temporary disruptions and delays to local and highway traffic could be experienced during construction of the project, however these are expected to be minimal as construction would be generally independent of the existing Pacific Highway.

Under the initial construction to a Class A highway, the southern part of the project from chainage 66000 to chainage 68000 would be duplicated to the east, generally parallel to the existing highway. The majority of works would be independent of the existing Pacific Highway and would not affect traffic except at the tie inns to the existing highway at each end of the project. Minor shoulder widening and improvements to the pavement on the existing Pacific Highway would be required, however this would cause minimal disruption to traffic as the timing of this work would involve switching the traffic to the duplicated carriageway for traffic movement.

The northern part of the project, from chainage 68000 to chainage 72000 would involve construction of two new carriageways that deviate to the east through Devils Pulpit State Forest. As this section would be independent from the existing highway, it is not expected that construction works would impose significant delays on highway motorists or on people living nearby the project. Where there are tie-ins to the existing highway, it is standard practice that a 'construction speed zone' would be implemented, reducing travel speeds to provide a safe working environment. Through effective traffic management, delays to traffic could be minimised. Traffic delays would be managed under the Pacific Highway strategy for managing the impact of delay.

Network impacts

The project would result in significant road safety benefits, capacity improvements, minor travel efficiency benefits and minimal negative impacts on the road network. Impacts of the project on local traffic patterns would be limited as the proposed upgrade is located in an area with few intersections and direct property accesses. Changed traffic patterns are expected to only cause short term negative impacts while road users adjust and become familiar with the changed traffic patterns.

Changes to Access

The existing Pacific Highway provides access for Bundjalung National Park, Devils Pulpit State Forest, residences and farmland. Currently these accesses allow unrestricted movements to and from both carriageways. Some access would be changed as a result of the project.

Two roads on the western side of the existing highway provide access to Bundjalung National Park and residential properties. The southern-most of these is Pine Road near chainage 67200, which also extends into Tabbimoble State Forest. The northern-most road is Thompsons Road near chainage 70100, located along the northern boundary of the state forest, which provides access to Bundjalung National Park and residential properties.

Under the likely initial construction to a class A highway, local access to the project would be retained at Pine Road via left in left out arrangements. Thompsons Road would not have direct access to the project under the construction to a class A highway. Access to Thompsons Road would be via the existing Pacific Highway carriageway that would be retained as a local access road in the northern part of the project. Vehicles using Thompsons Road would access the existing Pacific Highway carriageway in the northern part of the study area via a u-turn facility on the project near chainage 70800.

Near chainage 70900, a rural property on the eastern side of the Pacific Highway currently has unrestricted access to the Pacific Highway. Access for this property on the eastern side of the highway near chainage 70900 would be further developed in the detailed design phase.

There are several informal access roads connecting the existing Pacific Highway with Devils Pulpit State Forest. These tracks provide access into and through the forested area for property owners, leaseholders and utility providers. Three of these tracks, Khans Road, Mervs Road and Big Marsh Road, would be affected by the project. Khans Road generally runs in a north-south direction and connects to Mervs Road and Big Marsh Road, which generally run east-west through Devils Pulpit State Forest. Khans Road currently has direct access to the Pacific Highway near chainage 70900. Two sections of Khans Road totalling about two and a half km in length are beneath the proposed project alignment and would be realigned to run alongside the highway boundary within Devils Pulpit State Forest. Formalised access to Khans Road would be maintained near chainage 70900. Mervs Road and Big Marsh Road would not have direct access to the project, however access would be possible via Khans Road.

6.4.3 Management and mitigation measures

Traffic impacts and temporary disruptions to traffic are common issues that are frequently encountered on road construction projects. These impacts are adequately managed through the RTA's Traffic Control at Worksites Manual (2003). Further consideration of traffic and access arrangements would be completed during the environmental assessment stage of the project when more information about the construction schedule is known. This assessment would include:

- Retaining some of the existing Pacific Highway alignment as a local access and service road on the western side of the project and provision of an access track on the eastern side of the project to enable access on either side of the proposed new alignment.
- The overall function of local and forest roads affected by the project would be maintained.
- Traffic delays would be managed under the Pacific Highway Road User Delay Management Strategy for managing the impact of delay.
- Effective traffic management during construction to provide a safe working environment and to minimise delays for the community and highway motorists.
- Property access would be maintained for the duration of the construction. Temporary access requirements (if necessary) would be developed in consultation with affected landholders.

Advance notification would be given to property owners and occupants on project schedules, construction works and access arrangements

6.5 Hydrology and flooding

A hydrology and hydraulics investigation report was prepared to support the preferred concept design stage of the preferred route selection for the Pacific Highway Upgrade between Iluka Road and Woodburn (RTA 2009). The report divided the Iluka Road to Woodburn Pacific Highway Upgrade into the following three areas: Clarence River floodplain; Tabbimoble Creek and floodways; and the Richmond River floodplain.

The project occurs within the Tabbimoble Creek and floodways area and would involve constructing crossings at Tabbimoble Floodway No. 2 and No.3. Tabbimoble Floodway No. 2 and No.3 have defined channels with gently sloping vegetated banks and soil substrates. Hydraulic modelling indicated that the existing Pacific Highway in the vicinity of Tabbimoble Floodway No. 2 and No.3. has 100 year ARI immunity and that this is unlikely to change as a result of constructing or operating the project.

To the south of the Tabbimoble Floodway No. 2 and No.3, the project crosses an unnamed drainage line near chainage 69100 and Pine Road Creek near chainage 67300. These drainage lines carry water eastwards into Devils Pulpit State Forest. In this part of the study area surface water flows in sheets and the drainage lines have poorly defined earth channels vegetated by dry sclerophyll vegetation. Some erosion was observed on the upslope side of the existing Pacific Highway where sheet flows are directed into drainage culverts.

Pine Road Creek drains into SEPP14 wetland 153, about 2 kilometres from the project. This large wetland area extends along the coast between the north arm of the Clarence River in the south to the Evans River in the north. Much of the wetland is contained within Bundjalung National Park and Devils Pulpit State Forest.

There are no long term flooding issues associated with the Pine Road Creek or other drainage lines crossed by the project, however, there is potential for occasional short duration, high velocity flood events and climate change is predicted to increase the frequency and intensities in the North Coast region.

6.5.1 Potential issues

- Preliminary assessments of hydrology and flooding to date have considered that there are no flooding issues associated with the project.

6.5.2 Management and mitigation measures

- Crossing designs would accommodate at least 20 year ARI peak flows and consider increased storm intensity due to climate change.

6.6 Land use and socioeconomic

The majority of the project is surrounded by forested land. Bundjalung National Park is located immediately to the west of the existing highway, extending from the southern end of project to about 750 metres from the northern end of the project. The park offers various facilities for tourists, including accommodation, kiosks and outdoor activities. However the section of the park west of the existing highway is isolated from the main body of Bundjalung National Park, which extends along the coast between Iluka and Evans Head.

Devils Pulpit State Forest is located immediately to the east of the existing highway. The State Forest is about 1462 hectares in size and extends from about 750 metres from the southern

end of the project to 750 metres from the northern end of the project. Devils Pulpit State Forest was harvested for timber throughout the 1970's and has been subject to grazing leases since early this century. Forestry management zones indicate that Devils Pulpit State Forest includes 'general management', 'special prescription' and 'areas for further assessment' zones.

Outside of the forested areas, the study area is characterised by rural development. A residential dwelling is located at the northern extent of the project and the low lying floodplain areas east of Tabbimoble Floodplain No. 2 and No. 3 is cleared grazing land. The nearest rural-residential settlements are about six kilometres south at Woombah and Banana Road and about three kilometres north at Serendipity Road.

The majority of the project is within the Clarence Valley local government area. The northern section of the project in the vicinity of Tabbimoble Floodplain No. 2 and No. 3 is within Richmond Valley local government area. The economy of the Clarence Valley and Richmond Valley is based on agriculture, tourism and transport. Forestry is the predominant economic activity in the vicinity of the project.

The *Mid North Coast Regional Strategy* (Department of Planning 2009) does not identify any regionally significant farmland, proposed urban areas or proposed employment lands within the study area.

6.6.1 Potential issues

The following potential land use and socioeconomic issues have been identified for the project:

- Acquisition.
- Economic productivity.
- Changes to the character and amenity of the local area.
- Land connectivity and contiguity.
- Utilities.
- Planned development.
- Construction stage impacts.

Acquisition

The majority of land required for the project has already been acquired by the RTA. Only a small 2.87 hectare parcel of State Forest land for the proposed rest stop area and a linear strip of private property at the northern end of the project still need to be acquired.

Economic productivity

The project would require the acquisition of about 2.87 hectares of Devils Pulpit State Forest. The State Forest land is not currently classified as productive forestry land. Forestry activities on this land are governed by the Forest Management Zones. About 0.01 hectares of this land falls within management Zone 8 – Areas for further assessment. The remaining 2.86 hectares of land fall within management Zone 3b – Special prescription.

Two narrow parcels of State Forest land located between the existing and proposed alignment would potentially become isolated from the remainder of Devils Pulpit State Forest. Given the location, size and linear nature of these two parcels of land, it is considered unlikely that these isolated parcels of land would remain an area for viable forestry operations. Based on the small proportion of Devils Pulpit State Forest land affected, it is not anticipated that there would be any substantial impact on timber production activities or the viability of forestry businesses.

Strip acquisition immediately adjacent to the existing road corridor would not be expected to have substantial impact on the agricultural productivity of private holdings. Property acquisition

requirements would be negotiated with affected landholders, in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*. Access to the highway would be maintained for the property therefore the efficiency of transporting local produce would not be compromised by the project.

Construction of the project would require the import of some materials. Locally sourced materials are often preferred to limit haulage distances and minimise heavy vehicle use of the road network. Sourcing materials from local quarries has the potential to deplete sand and gravel supplies for the region. However the project would be expected to generate business for local material suppliers and could generate local employment for the duration of construction.

Local amenity

Changes to the amenity of the surrounding areas would be limited to the residences at the northern end of the project. The carriageway would move substantially closer to the residences, however the scale of the highway would be considerably increased. Increases in vehicle noise and vehicle emissions would not directly result from the project. However the project would facilitate future traffic growth in the region. Visual amenity may be reduced as a result of the project. There is also increased potential for impacts of this nature during the construction stage.

Land connectivity and contiguity

Several informal access points currently provide direct access from the Pacific Highway into Devils Pulpit State Forest and Bundjalung National Park. The project would formalise these access points and in doing so remove the safety risks associated with east-west movement across the highway.

Under the possible staging for construction, the project would utilise a 2 km section of the existing Pacific Highway. Direct access to the remainder of the highway would be maintained for the residential property at the northern end of the project. Under the future development of the project to a Class M Motorway, the existing Pacific Highway would be retained for local access and use by cyclists.

Section 6.4 of this preliminary environmental assessment describes measures that the RTA would use to mitigate potential construction traffic impacts occurring as a result of the project.

Utilities

A Sydney to Brisbane Telstra trunk cable is present along the eastern edge of the existing highway and parts are beneath the intended alignment of the project. Parts of this cable would be relocated further to the east as part of the project.

Planned development

Land use change in the vicinity of the project is subject to strategic planning initiatives and statutory controls prepared by Clarence Valley Council, Richmond Valley Council, the Department of Planning, the Department of Industry and Investment and other agencies. However, the project would assist in providing key transport infrastructure which supports local and regional economic development in the future. The project has been developed with consideration of existing strategic planning documents such as:

- Mid North Coast Regional Strategy 2006-2031.
- Mid North Coast Farmland Mapping Project 2009.
- Upper North Coast Regional Strategy 2006-2031.
- Clarence Valley Settlement Strategy 1999.

The project would not hinder nor prohibit the achievement of the strategic goals or objectives outlined in these documents.

Construction stage impacts

The main impacts that may occur during the construction phase of the project would relate to property and local access and the establishment of construction compounds. It is unlikely that land outside the operational road corridor would be required for temporary construction access or construction compounds. Preliminary locations for major work sites and ancillary construction facilities would be detailed in the environmental assessment.

6.6.2 Management and mitigation measures

- Land acquisition would be in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*.
- Remove any harvestable timber within the project footprint prior to commencement of construction.
- In consultation with the Department of Industry and Investment, access to and within state forest land adjacent to the project would be retained for forestry management purposes.
- Traffic connectivity would be maintained wherever possible during construction.
- Advance notification would be given to property owners and occupants on project schedules, construction works and access arrangements.
- Relocation and protection of existing public utilities as required.

6.7 Air quality

There is limited information about air quality in the vicinity of the project. Long-term monitoring is not usually undertaken outside metropolitan and/or industrial areas because pollutants typically do not exist in concentrations that would cause adverse environmental or health impacts.

Given the characteristics of the surrounding environment (predominately state forest), air quality in the vicinity of the project is considered to be generally good.

6.7.1 Potential issues

Construction

Construction activities have the potential to result in dust emissions which may impact on the two residences in the vicinity of the project. One of the residences located at the northern end of the project near Tabbimoble Floodway No. 2 and No. 3 is within 50m of the existing highway and would have the potential to be affected by construction dust impacts. The other residence is near the southern end of the project, about 700m from the existing highway and separated from the construction works by a well vegetated buffer. Construction dust impacts at this residence are expected to be minimal.

Operation

Once operational, emissions from the project would comprise mainly hydrocarbons, carbon monoxide, nitrous oxide and particulate matter. The level of concentration of vehicle emissions and their subsequent impacts in the immediate vicinity of the project depends on the traffic volume, vehicle speed and make-up (eg percentage of heavy vehicles) as well as the ability of the local environment to disperse emissions.

Short-term air quality monitoring was undertaken at Korora, which is located in an urban area about 140 km south of the project from October 2005 to January 2007. The AADT at Korora was about 19,700 over the monitoring period, which is more than double the current AADT

for the project. The key outcomes of the Korora monitoring was that the peak readings, and the commonly used 90th percentile readings for the measured parameters were all considerably less than the air quality goals specified by the National Environmental Protection Measures, the air quality standards adopted by DECCW. Based on the monitoring undertaken at Korora, it is expected that potential changes to air quality occurring as a result of the project would be well within the DECCW criteria.

CO concentrations measured close to the Pacific Highway are well below the relevant DECCW eight hour criteria of nine parts per million. It is considered that, given the comparatively low traffic volume on the project, air quality could also be expected to meet the DECCW guidelines. CO Concentrations would further diminish with distance from the project, resulting in negligible operational impacts.

6.7.2 Management and mitigation measures

Best practice management measures (particularly dust suppression measures) would be implemented during construction of the project and would be detailed in the statement of commitments. These measures would be in accordance with applicable RTA QA Specifications.

6.8 Climate change

Solar radiation passes through the atmosphere, warming both the earth and the atmosphere. Some of the radiation is reflected by the earth, but some is trapped by atmospheric greenhouse gases. This is known as the "greenhouse effect", keeping temperatures higher than they otherwise would be, like a glass greenhouse keeping plants warm. The principal greenhouse gases are water vapour, carbon dioxide, methane, and nitrous oxide.

There has been an increase of greenhouse gases in the atmosphere, which is causing climate change. The increase is due to human actions, particularly burning fossil fuels, affecting the balance between the incoming solar energy and losses from the earth and atmosphere. One of the important factors in determining the amount of radiant energy absorbed in the atmosphere is the concentration of carbon dioxide. Changes in this concentration are likely to cause changes in the temperature of the atmosphere near the earth's surface. Increases in carbon dioxide concentrations are expected to cause increases in temperature.

The project is located in the Northern Rivers catchment, specifically the catchment of the Clarence River. In a 2007 report prepared for DECC by the CSIRO, projections are provided for climate change in the Northern Rivers area. By 2030 average temperatures are expected to increase by +0.2 to +1.8°C. Projections suggest that there will be more frequent hot days, bushfires, droughts and intense storms.

Greenhouse gases attributable to the project can be assigned as Scope 1, Scope 2, or Scope 3. Scope 1 emissions are direct emissions generated on site, such as those from plant and equipment and land clearing. Scope 2 includes use of energy where emissions are generated off site, such as electricity. Scope 3 are emissions in the supply chain, or those from the use of a product. These include embodied energy in construction materials, and vehicles travelling on the completed project.

6.8.1 Potential issues

Construction

The total volume of greenhouse gases emitted during the construction process would depend largely on the amount of vegetation cleared and the quantity of energy consumed during construction, in particular fuel consumption for both construction plant and also light vehicles. Another source of energy that would be used is electricity for site compounds (computers,

lights etc.).

The main sources of greenhouse gas emissions are likely to include fuel use, embodied energy in materials (bitumen, concrete and steel), and land clearing.

The principal climate change impact affecting the project during construction would be the potential for more frequent storms and more intense storms. These could cause impacts such as more severe erosion and sedimentation.

Operation phase

Greenhouse gases emissions during operation of the project include fuel use in road maintenance, embodied energy in maintenance materials, and any electricity use for lighting. Vehicles travelling on the completed project will also use fuels.

The principal climate change impact affecting the project during operation would be the potential for more intense storms. This could change the volume and intensity of rainfall events causing local flooding and damage to road infrastructure. Sensitivity assessments will be undertaken in the detailed environmental assessment stage to ensure that the capacity of drainage line crossings reflect possible climate change impacts.

6.8.2 Management and mitigation measures

- The construction contractor, where reasonable and feasible, would use electrical energy derived from a renewable energy source accredited by the National Green Power Accreditation Steering Group (or equivalent) for the supply of at least 50 per cent of the on-site electrical energy required during construction.
- Construction plant and equipment would be serviced regularly and maintained in optimum condition to ensure exhaust emissions meet or surpass existing air quality standards.
- The use of secondary waste materials, such as fly ash and steel slag in construction materials would be considered to reduce indirect greenhouse emissions.
- The reduction of greenhouse gases by adopting energy efficient work practices would be promoted.
- Increased storm intensity (such as the design of culverts and pavements) would be considered in the environmental assessment and detailed design of the project.
- Initiatives to minimise greenhouse gas emissions from road transport would be considered.
- A calculation of the greenhouse gas emissions from the construction and operation of the project would be undertaken in the environmental assessment stage.

6.9 Hazards and risks

Hazards and corresponding risks to human health and the environment could arise as a result of incidents during construction or operation of the project.

The main potential incident of concern for the project is the accidental release of toxic, flammable or explosive material during storage, use or transport of hazardous substances.

The project is located along a sparsely populated section of the Pacific Highway, so any incident would have a limited potential to impact those not directly involved in a crash or incident.

6.9.1 Potential issues

The following potential hazards and risks issues have been identified for the project.

Construction stage

During the construction period, hazardous substances such as fuels and explosives (if required), would be transported to and from work sites. This activity poses a potential risk to people and the environment in the event of a traffic accident resulting in the release of hazardous material. The transportation and unloading of hazardous substances would be undertaken in accordance with the *Road and Rail Transport (Dangerous Goods) (Road) Regulation 1998* and the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (National Transport Commission 2008).

The likelihood of a traffic accident occurring and leading to the release of hazardous substances as a result of construction of the project is considered to be very low. Additionally, as the volumes of fuels and explosives to be transported would be relatively low and all hazardous substance transport would be undertaken in accordance with relevant legislation and codes, the overall risk associated with hazardous substances transport during construction would be minimal.

A number of hazardous substances required for construction would be stored and used within defined work areas for the project. The majority of these substances would be stored within the major construction site compound areas. The handling and storage of hazardous substances would be undertaken in accordance with relevant legislation and standards, including:

- Occupational Health and Safety Act 2000.
- Australian Standard (AS) 1940-2004 – The storage and handling of flammable and combustible liquids.
- Storage and Handling of Dangerous Goods: Code of Practice (WorkCover 2005).

The quantities of hazardous substances that would be stored at construction compounds and sites are anticipated to be relatively small and where applicable, less than the 'screening thresholds' set out in *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines* (DUAP 1994) and *Draft Applying SEPP 33 Guidelines* (DoP 2008). This would be further assessed, if necessary, by the preparation of a preliminary hazard analysis (PHA) in accordance with the guidelines, should any hazardous substances exceed threshold levels.

In the event of an incident leading to a spill of a hazardous substance during construction, standard incident control measures would be deployed. Additionally, containment of spills would be achieved in a series of sediment control basins to be installed.

Operational stage

The potential for a spill of hazardous substances from a vehicle transporting dangerous goods along the project is considered to be very low in view of the following factors:

- Dangerous goods vehicle movements along the project are expected to account for a very minor proportion of total daily traffic movements, (estimated to be 0.2 per cent) hence the likelihood of an accident involving a truck containing dangerous goods is very low.
- The high road design standard of the project would reduce the potential for road accidents relative to the existing situation.
- The existing stringent legislative controls on the transport of dangerous goods.
- In the event of a traffic accident involving a vehicle carrying hazardous substances, any spills would typically be contained to the roadway area by the appropriate incident and emergency response teams.

A Preliminary Hazard Analysis (PHA) would be prepared during the preparation of the environmental assessment, if the quantities of hazardous substances exceed threshold levels. This would assess the transport and storage of hazardous materials during construction in accordance with *Applying SEPP 33: Hazardous and Offensive Development Application Guidelines* (DUAP 1994) and *Draft Applying SEPP 33 Guidelines* (DoP 2008).

6.9.2 Management and mitigation measures

Construction site hazards and risks would be managed through the implementation of a standard environmental management measures.

Occupational health and safety risks associated with construction would be managed through the implementation of an occupational health and safety plan.

Specific risks associated with the transport of hazardous substances to and from work sites, including the risks associated with temporary changes in local traffic conditions during the construction period, would be managed through the implementation of standard environmental management measures.

The risks associated with the use and storage of hazardous materials during construction would be mitigated through appropriate design and establishment of bunded areas within construction sites.

The final locations of construction site compounds where hazardous substances would be stored would be determined during detailed design based on specific environmental criteria.

Construction stormwater control basins and operational water quality control basins designed to reduce the environmental effects of pollutant runoff from the road surface and to contain spills of chemicals and hazardous substances would be installed in strategic locations.

6.10 Contaminated land

A Phase 1 preliminary contamination assessment was conducted in April 2007 along the alignment of the project. The assessment aimed to identify potential contaminant sources and assess the risk associated with the proposed highway upgrade.

The assessment indicated that no significant or gross potential sources of industrial contamination, such as service stations or major industrial facilities, occur along the boundaries of the project. A number of potential sources of contamination were identified in the vicinity of the project including:

- Seven Cattle Dip sites.
- Heavy timber industries east of the highway near Tabbimoble Floodways 2 and 3.
- Disused quarry east of Tuckombil Road.
- Former Mororo landfill off Lewis Lane.
- Electricity sub-station at Tuckombil Road.

The nearest of these sites to the project is the heavy timber industries located east of the highway and near Tabbimoble Floodways No. 2 and No. 3. The land In the vicinity of Tabbimoble Floodways No. 2 and No. 3 is low lying floodplain and the project would be built on fill. It is considered unlikely that the project would either affect contamination at this location or be affected by contamination.

The project would involve the construction of a new southbound carriageway through a cleared area of land between chainage 66900 and chainage 67000 that contains an existing spoil mound.

An assessment for acid sulphate soils and acid rock involved a desktop study and field soil sampling. The desktop study was conducted to assess the risk of acid sulphate soils and acid rock within the area and to provide for targeted field sampling. The results of the desktop assessment and targeted field surveys concluded that there are no areas of known or potential acid sulphate soils likely to be crossed by the project.

6.10.1 Potential issues

Construction of a new road through a greenfield area, including areas historically/currently used for forestry and agricultural purposes may result in exposure of areas of contaminated materials.

6.10.2 Management and mitigation measures

- A risk assessment will be undertaken prior to the commencement of works to determine the likelihood of encountering contaminated land. Should it be required the presence and extent of contamination will be determined at potentially contaminated sites, and where required, remediation will be planned and undertaken in accordance with the RTA's *Contaminated Land Management Guide*, State Environmental Planning Policy 55 – Remediation of Land and the *Contaminated Land Management Act 1997*.

6.11 Waste management

Various waste streams would be generated during the construction of the project, including construction and demolition waste, vegetation waste, packaging materials and liquid wastes.

6.11.1 Potential issues

The following potential waste streams have been identified for the project:

- Demolition wastes from existing structures that require demolition, pipe work, and pavements.
- Excavation wastes, although the project would be designed with the aim of achieving a cut/fill balance. Some excavation material may be produced which would not be able to reused within the project.
- Vegetation from removal of shrubs and trees; however, where possible this would be mulched for re-use on site as part of the landscaping works.
- Packaging materials associated with items delivered to site such as pallets, crates, cartons, plastics and wrapping materials, all of which need to be disposed of once the product has been used. Minimisation of packaging of raw materials would be strongly encouraged. Components of this waste stream could be recycled or reused.
- Wastes produced from the maintenance of various heavy construction equipment including liquid wastes from cleaning, repairing and maintenance. Likewise leakage or spillage of fuels/oils during construction would need to be managed and disposed of appropriately. Sewage wastes would be generated through the use of worker's facilities such as toilets.
- General office wastes such as paper, cardboard, beverage containers and food wastes.

6.11.2 Management and mitigation measures

All wastes would be managed and disposed of in accordance with relevant state legislation and government policies including the *Waste Avoidance and Resource Recovery Act 2001* (WARR Act), the *Waste Avoidance and Resource Recovery Strategy 2007* and the RTA's *Waste Reduction and Purchasing Policy* (WRAPP). The DECCW's *Waste Classification Guidelines* (DECC 2008) would be used to classify the different types of waste, and the management, treatment and disposal of the wastes.

- Sites wastes would generally be managed using the following principles (moving from most desirable to least desirable):

- Avoiding unnecessary resource consumption.
- Recovering resources for reuse.
- Recovering resources for recycling or reprocessing.
- Disposing of residual waste (as a last resort).

Avoidance of waste can be accomplished for the project by providing realistic predictions on the quantities of resources such as construction materials. The potential to re-use waste materials either on-site or off-site including re-use of topsoil and fill material would be identified during detailed design. Trees and plant material could be mulched or chipped on-site and used for landscaping. Where possible, waste would be segregated and recycled and recycling facilities would be provided for paper, plastic, glass, aluminium cans and other recyclable materials. Waste disposal would only occur where there are no other options for waste avoidance, reuse and recycling. All waste disposal would occur in accordance with the DECCW's *Waste Classification Guidelines* (DECC 2008).

RTA's contractors are required to propose recycled content construction materials where they are cost competitive and performance competitive. The cost competitiveness of materials is assessed on a project life-cycle basis considering issues such as impacts on construction practices and disposal requirements. RTA's contractors are also required to report waste minimisation quantities, initiatives and barriers. In addition, the RTA has allowed for recycled and recovered materials procurement for road construction and maintenance works. The use of these products with recycled content and products that produce low waste quantities would reduce demand on resources. Opportunities to reduce the demand on resources, where reasonable and feasible, include using secondary waste materials such as fly ash, slag and silica within concrete mixes.

Standard site specific waste management measures would therefore include requirements for:

- The application of the waste minimisation hierarchy principles of avoid/reduce /re-use/recycle/dispose.
- Waste handling, storage and disposal.
- Any waste material that is unable to be re-used, re-processed or recycled would be disposed at a facility approved to receive that type of waste.
- Secondary waste materials, such as fly ash would be used in construction materials where reasonable and feasible.
- Waste management impacts during construction are expected to be low, given the management and disposal activities outlined above.

6.12 Water and soil

Several drainage lines are crossed by the project. In the northern end of the study area, the project crosses Tabbimoble Overflow No. 2 and No. 3, an unnamed drainage line and Pine Road Creek are crossed in the southern portion of the project study area. All the drainage lines crossed by the project drain water from Bundjalung National Park eastwards into Devils Pulpit State Forest. Tabbimoble Floodway No. 2 and No. 3 have defined channels with gently sloping vegetated banks and soil substrates. At the time of site inspections, water in Tabbimoble Floodway No. 2 and No. 3 consisted stagnant pools of water.

Both Pine Road Creek and the unnamed creek pass through Bundjalung National Park and Devils Pulpit State Forest. Consequently, the banks of both creeks are stabilised by native riparian vegetation.

To the east of the project is a large SEPP 14 wetland that covers much of Bundjalung National Park. The northern part of the project where Tabbimoble Floodway No. 2 and No. 3 are

crossed is within 1.5 kilometres of the western boundary of the wetland. The drainage lines crossed by the project drain eastwards into Bundjalung National Park and eventually feed into this wetland.

The topography of the study area can be described as undulating rises and low hills. The elevation of the study area ranges between 10 and 50 metres Australian Height Datum. Slopes range between two to 15 percent gradient. Areas of higher elevation are characterised by weathered soils underlain by bedrock of extremely weathered, low strength sandstone/siltstone.

Geotechnical investigations found soils in these areas to be stiff to hard clays or sandy clays, between one and six metres deep. Soil sediments overlay strata of extremely weathered to medium strength sandstone and siltstone. The soils have a high erosion potential and are dispersive. No potential acid sulphate soils were identified within the study area.

A preliminary contamination assessment undertaken in April 2007 indicates that there are no significant or gross potential sources of industrial or agricultural contamination within the study area.

6.12.1 Potential issues

Construction Stage

- Construction of the project may impact on the physical and chemical nature of surrounding creeks and presents a low to moderate risk to water quality from:
    - Exposure of soils during earthworks.
    - Increased sediment loads — which can reduce light penetration through the water column, impacting on aquatic flora and fauna.
    - Silting of waterways — this can smother aquatic flora and fauna.
    - Decay of organic matter and some hydrocarbons — these can decrease dissolved oxygen levels.
    - Increased nutrients (nitrogen and phosphorus) — these can stimulate the growth of algae and aquatic plants.
    - Heavy metals (including copper, zinc, lead, aluminium and iron) from vehicle and tyre wear — these may be toxic to aquatic biota and fish.
    - Accidental spills of chemicals — these can impact aquatic (and terrestrial) ecosystems.
    - Litter, oil and grease — these can pollute waterways and are unsightly and can cause water quality problems.
- Soils exposed during excavation and vegetation removal have the potential to erode and result in sedimentation of receiving environments and discharge of turbid water. During construction, work may be required in the main flow paths of ephemeral creeks, including Pine Road Creek and the unnamed creek. This would potentially result in increased turbidity and sediment loads.
- During the likely initial staging of the project at its northern end, preliminary foundation works for approximately 1 kilometre of new southern carriageway would be commenced (chainage 71000 to chainage 72000). There would be potential for runoff from this material to adversely affect water quality in Tabbimoble Floodplain No. 2 and No. 3.

Operational Stage

- Operation of the project may impact on the physical and chemical nature of surrounding creeks and presents a potential low risk to water quality from:

- Heavy metals (including copper, zinc, lead, aluminium and iron) from vehicle and tyre wear — these may be toxic to aquatic biota and fish.
- Accidental spills of chemicals — these can impact aquatic (and terrestrial) ecosystems.
- Litter, oil and grease — these can pollute waterways and are unsightly and can cause water quality problems.

- Roads and waterway crossings have implications for long-term water quality and may facilitate surface run-off of contaminants or sediment into aquatic habitats. The project may also impact on habitat loss and changes in sediment transport. The project may also impact on the erosion of beds, banks and channels of receiving waterways.
- Potential erosion on the upslope side of the new carriageways where sheet flows are being directed into culverts.

6.12.2 Management and mitigation measures

Construction and operational soil and water issues are commonly encountered issues on all road projects. These issues are adequately managed through the development of construction management plans and appropriate consideration during the detailed design process. The following measures would adequately address the soil and water risks on the project:

- The environmental assessment would describe the drainage channels within the study area, identifying the frequency of flow, the substrate of the channel, width and depth of channel, slope of banks and any potential for erosion.
- The environmental assessment would measure and describe the water quality of drainage channels in the study area.
- Best practice measures would be implemented in the construction phase of the project to manage erosion and sedimentation control in accordance with *Managing Urban Stormwater: Soils and Construction, Volume 2D – Main Road Construction* (Blue Book 2 - NSW DECC 2008). The design of the project would follow the RTA draft Procedure for Erosion and Sedimentation Management, including assessment of sedimentation basin sizing criteria.
- If necessary an appropriately qualified officer would be appointed to the project during detailed design and construction to advise on the appropriate treatments to minimise erosion and sedimentation.
- The operational stormwater quality objectives would be further defined in the environmental assessment with consideration given to relevant guidelines. The operational stormwater design would incorporate a treatment train approach to manage potential water quality impacts. Consideration would be given to the potential impact of spills on the receiving environment.
- Where feasible, operational runoff should be treated using non point source or dispersed techniques. For example the use of table drains, grass buffer strips, grass swales, edge drains and grassed median strips. In sensitive environmental locations and where required, sedimentation basins installed for the construction phase would be converted to water quality treatment basins for the operation phase.
- Energy dissipaters or scour protection methods would be used to prevent erosion at all outlets and to protect natural water courses.
- The environmental assessment would describe how construction activities would be managed and monitored to minimise and mitigate impacts on groundwater and include a description and identification of groundwater resources affected by the project; groundwater dependant ecosystems and proposed groundwater management and

monitoring measures. This would include issues related to groundwater seepage and potential aquifer severance through major bedrock cuttings.

6.13 Landscape character and visual impact

The landscape within the study area is characterised as undulating lands. The low hills of the study area are transitional between the Richmond Range and coastal plain dunes and swamps. The Richmond Range rises steeply to a maximum elevation of about 250 metres Australian Height Datum to the west of the project, within Bundjalung National Park. The majority of the study area is vegetated by forest. Devil's Pulpit State Forest occurs to the east and Bundjalung National Park to the west. As these areas are either protected for conservation or managed for forestry, there is diversity in the vertical structure of the vegetation. Together, the groundcover, understorey and canopy vegetation layers create a strong sense of enclosure. State forests further create a distinct feeling, with more regimented planting and structure, and often the dominance of one canopy species. At the northern extent of the project, forest gives way to cleared land on the eastern side of the highway.

6.13.1 Potential issues

Landscape character impacts

The project would represent a new element in the landscape. In accordance with the objectives of the Pacific Highway Upgrade Design Framework, the project would be closely integrated with the natural topography and natural vegetation. Landscape patterns have been considered and preserved where possible; views of the landscape and area have been identified for retention; and visual impacts have been avoided and minimised as far as possible.

Landscape character impacts are calculated by combining an assessment of landscape sensitivity with an assessment of the magnitude of the project. The sensitivity of this landscape is considered relatively low with the rolling (concealing) landform, dense forest and the presence of the existing highway combining to provide a good capacity to absorb change. The magnitude of the project is considered medium. Generally, the alignment is considered to be topographically responsive. There are two cuts of significance: a six metre cut north of the deviation of the existing highway; and an eight metre deep cut to the immediate north of the proposed rest area. A three metre deep fill section would be located to the immediate south of the proposed rest area. The remainder of cut and fill sections are less than two metres deep. It is expected that revegetation of all cuttings is possible. The inclusion of a rest area in the design increases the scale of the project and the extent to which the infrastructure intrudes into the adjacent forest environment.

The combination of sensitivity and magnitude results in a medium low landscape character impact.

Visual impacts

The project achieves the design principles of the Pacific Highway Urban Design Framework. The new alignment has been located close to the existing highway, in a densely forested and undulating topography. The project would not result in the highway being moved any closer to the residence at the northern end of the project. However, the scale of the highway would increase at this location. The magnitude of the impact of the project on the adjacent residence is therefore considered low to medium.

Visual impacts are calculated by combining an assessment of sensitivity of the view with an assessment of the magnitude of the project in that view. The population density in proximity to the project is very low, however the sensitivity of the view to the project from the one adjacent property is considered medium. The existing view to the east is of cleared low lying farm land with adjoining forested areas that are considered to represent an attractive, rural character. However, this view is already interrupted by the existing highway and traffic. The project would

involve an increase in the width of the highway at this location and the u-turn facilities would also increase the scale of the highway. In the context of the existing highway, the magnitude of the project would be considered low.

Views from the project would be similar to those currently experienced. The highway would be of a greater scale than the existing highway, and the proposed rest stop would temporarily interrupt views to the forest. However, the forested nature of the landscape would persist.

The combination of sensitivity and magnitude results in a medium – low visual impact.

6.13.2 Management and mitigation measures

- The project would continue to be designed in accordance with the RTA's Pacific Highway Urban Design Framework. This would ensure that impacts are avoided and minimised as the concept design is developed further.
- Residual impacts that cannot be avoided such as removal of native vegetation, visual and noise impacts would need to be mitigated in the urban design process through the use of false cuttings, mounds and screen planting and landscape designs comprising local native species. These measures would be integrated into the development of the concept design and detailed design.

7 Proposed scope of environmental assessment

Table 7.1 outlines the proposed scope of the environmental assessment for the project. The proposed scope of the environmental assessment is based on the preliminary assessment of key issues discussed in Section 5.2 to 5.4. On the basis of information gathered to date, the RTA considers that all other issues can be managed through the detailed design stage and with the application of standard environmental management measures and site-specific safeguards.

Table 7.1: Scope of the environmental assessment

Issue	Scope of the environmental assessment
General	▪ Consideration of planning and statutory requirements. ▪ Strategic justification for the project. ▪ Description of the project. ▪ Discussion of project options. ▪ Outline of construction activities. ▪ Consideration of the principles of ecologically sustainable development in the context of the project.
Stakeholder consultation	• Description of consultation activities conducted to date and issues identified. • Outline of stakeholder consultation and communication strategy.
Environmental risk analysis	▪ Identification of potential environmental impacts associated with the project, proposed mitigation measures and potentially significant residual impacts after the application of proposed mitigation measures. ▪ Should any additional key environmental impacts be identified, an appropriately detailed impact assessment would be included in the environmental assessment.
Biodiversity	▪ Targeted surveys of terrestrial and aquatic threatened flora and fauna species. ▪ Identification of fauna species whose movement through the study area could be affected and consideration of appropriate mitigation measures. ▪ Assessment of habitat including native vegetation loss, habitat fragmentation, loss of ecological connectivity, riparian habitat, impacts to groundwater dependent ecosystems and weed infestation.
Other environmental issues	▪ Assessment of potential noise and vibration impacts from construction and operation on identified residences and other noise sensitive locations. ▪ Description of the traffic impacts in relation to the objectives of the Pacific Highway Upgrade Program. ▪ Construction traffic impacts. ▪ Land use and socio economic impacts would be described. ▪ Climate change – greenhouse gas emissions would be calculated. ▪ Soil and water construction and operation impacts and management would be outlined. ▪ Landscape character and visual assessment would be prepared.
Draft statement of commitments	▪ A draft list of the measures to avoid, minimise, manage, mitigate, offset and/or monitor impacts.

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Attachment A