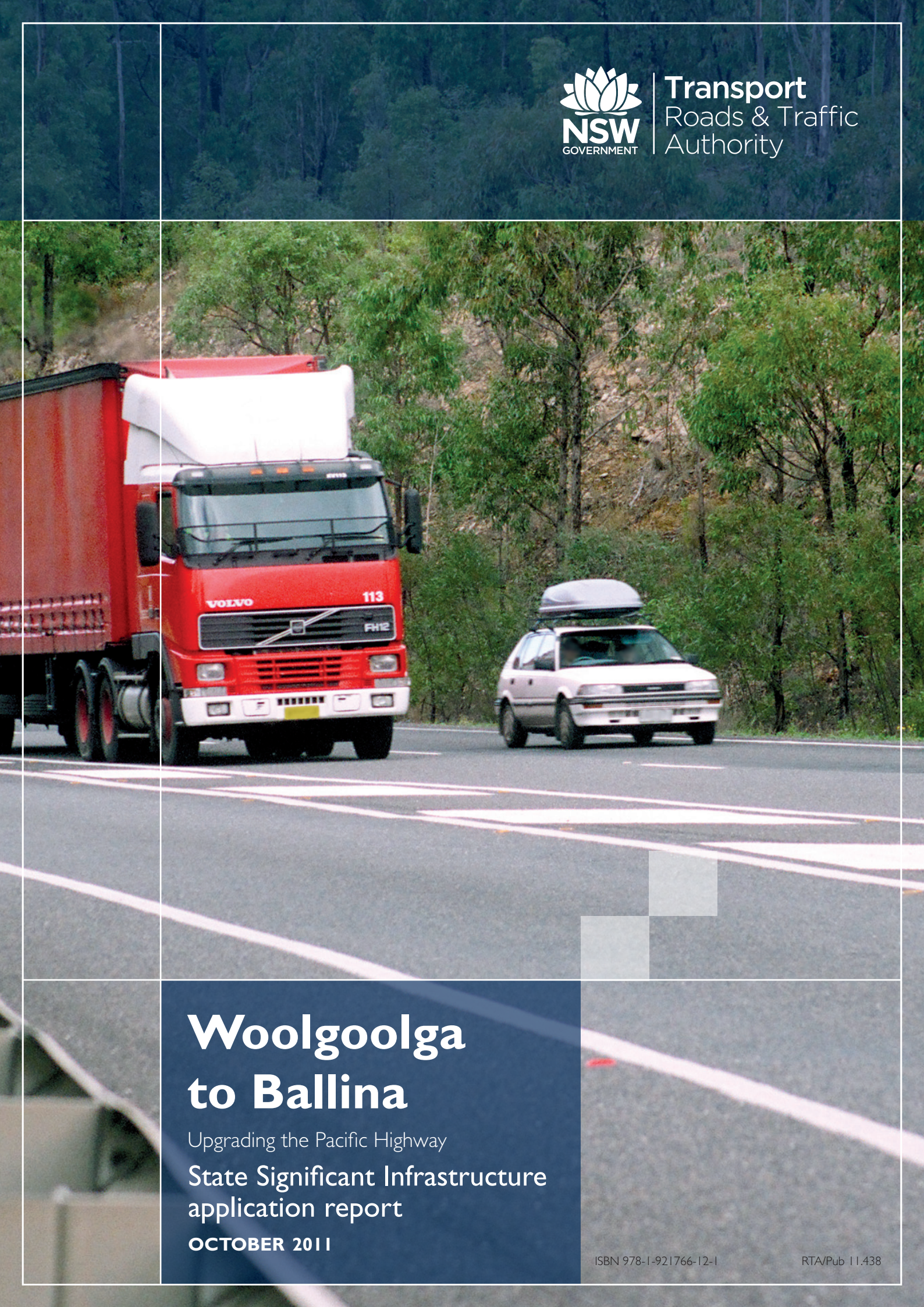


# Woolgoolga to Ballina

Upgrading the Pacific Highway

## State Significant Infrastructure application report

**OCTOBER 2011**

ISBN 978-1-921766-12-1 RTA/Pub 11.438

# Document controls

| Title: | **Pacific Highway upgrade - Woolgoolga to Ballina**<br>State significant infrastructure application report |
|---|---|
| **Prepared by:** | NSW Roads and Traffic Authority |

| Location | File Name |
|---|---|
| G:\ENVIRNMNT\Planning and Assessment_Projects\0910\PH Woolgoolga to Ballina\Part 5.1 EIS\Application\Final | W2Bapp.doc |
| **Document Status** | **Date** |
| Final | 7 October 2011 |

October 2011
ISBN: 978-1-921766-12-1
Publication number: 11.438

# Contents

# 1 Introduction

## 1.1 Overview of the project

The NSW Roads and Traffic Authority (RTA) is seeking approval to upgrade around 155 kilometres of the Pacific Highway from Woolgoolga to Ballina. The project would achieve four lanes of divided highway from about five kilometres north of Woolgoolga to about six kilometres south of Ballina. The approval sought is for a class M (motorway) upgrade standard however staging of the project would result in some sections being initially constructed to a class A (arterial) upgrade standard.

The project does not include the upgrades at Glenugie and Devils Pulpit, which are located between Woolgoolga to Ballina, because these two projects have already been approved. The general location of the project is shown in Figure 1.1 and an overview of the project is shown in Figure 1.2. Refer to Chapter 3 of this report for a description of the project and staging.

## 1.2 Statutory process

The Pacific Highway Projects are declared to be critical State significant infrastructure and State significant infrastructure under the *Environmental Planning and Assessment Act, 1979* (EP&A Act) by virtue of the *State Environmental Planning Policy (State and Regional Development) 2011*.

The Woolgoolga to Ballina upgrade is part of the Pacific Highway Projects and is therefore to be assessed under Part 5.1 of the EP&A Act, requiring preparation of an environmental impact statement. The project requires the approval of the Minister for Planning and Infrastructure and does not require development consent under Part 4 of the EP&A Act.

The requirements of clause 192 of the *Environmental Planning and Assessment Regulation 2000* for applications seeking approval of the Minister for Planning and Infrastructure to carry out State significant infrastructure are addressed in Attachment A to this report.

## 1.3 Purpose of this report

This report supports an application under section 115X of the EP&A Act to carry out State significant infrastructure. It aims to assist the formulation of environmental assessment requirements by the Director-General under section 115Y of the EP&A Act.

This application report:

- Describes the project.
- Identifies issues raised by the community, government agencies and other stakeholders.
- Considers the potential environmental impacts of the project.
- Considers key environmental issues for the project.

The application report and Director-General environmental assessment requirements would inform the preparation of an environmental impact statement for the project. The form and content of the environmental impact statement would be in accordance with clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* or as otherwise notified by the Director-General.


Figure 1.1: General project location (data provided courtesy of the Land and Property Management Authority)

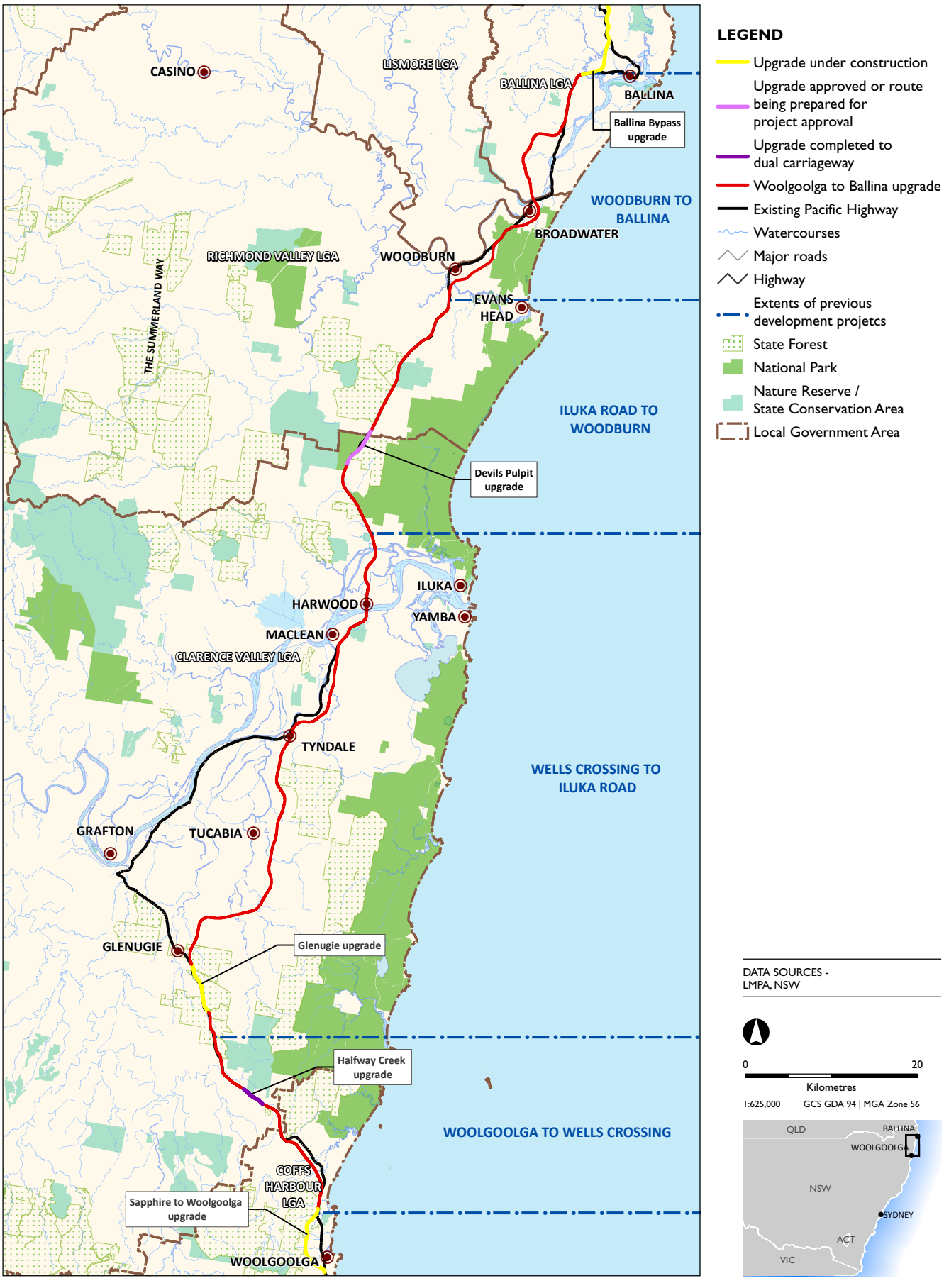


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**Figure 1.2 - Project overview**

# 2 Background

## 2.1 Strategic and project need

The Pacific Highway is one of Australia's most important roads. Tens of millions of tonnes of freight, and millions of vehicles traverse its length every year. Successive Australian and NSW Governments have committed to upgrading the Pacific Highway to four lanes as a high priority. Both Australian and NSW Governments have indicated a desire to complete the full length of the Pacific Highway from Hexham to the Queensland Border by the end of 2016. Funding is being made available to prepare the remaining sections to be upgraded from Woolgoolga to Ballina to be ready for construction.

The Pacific Highway is two lanes between Woolgoolga to Ballina. It has substandard horizontal and vertical geometry, narrow shoulders and numerous traffic hazards in close proximity to the highway. The crash history between Woolgoolga to Ballina is double the Pacific Highway Upgrade Program target. The upgrade is needed to improve driver safety, reduce fatalities resulting from crashes and improve travel efficiency for freight and other vehicles.

In June 2011, Infrastructure Australia identified the Pacific Highway Corridor Upgrades, of which the Woolgoolga to Ballina project is a part, in the category of 'Ready to proceed'. This category contains projects that meet all of Infrastructure Australia's criteria, i.e. they make a strong contribution to strategic policy goals, are supported by a methodologically robust cost benefit analysis that suggests the benefits will considerably outweigh the costs, and have a robust delivery plan in place. The capital expenditure estimate for the Pacific Highway Corridor Upgrades is $7.6 billion ($2010) and has an estimated benefit cost ratio of 1.5.

The project is consistent with relevant strategic planning documents as listed below:

- NSW 2021 A Plan to Make NSW Number One (NSW Government 2011).
- NSW Government's Nation Building Program.
- Sydney-Brisbane Corridor Strategy (DOTARS 2007).
- NSW State Infrastructure Strategy 2008-2018 (NSW Treasury, 2008).
- National Road Safety Strategy 2011 – 2020 (Australian Transport Council, 2011).
- National Land Freight Strategy Discussion paper, February 2011 (Infrastructure Australia 2011).
- Mid North Coast Regional Strategy 2009 (DoP 2009).
- Far North Coast Regional Strategy 2006 (DoP 2006).
- Action for Air (DECCW 2009).

## 2.2 Project objectives

The Pacific Highway Upgrade Program objectives are:

- Significantly reduce the number and severity of road crashes.
- Reduce travel times.
- Reduce freight transport costs.
- Develop a route that involves the community and considers their 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.

## 2.3 Identification of the preferred project

The process to identify a preferred project between Woolgoolga to Ballina started in 2005 and was undertaken with the community and other stakeholders via four previous development projects:

- Woolgoolga to Wells Crossing.
- Wells Crossing to Iluka Road.
- Iluka Road to Woodburn.
- Woodburn to Ballina.

The process included investigating study areas (except for from Iluka Road to Woodburn where the process started by considering route options along the existing alignment of the Pacific Highway), identifying and investigating route options, selecting a preferred route option and making refinements during the concept design stage. Input was sought from the community and other stakeholders at key points in the process (refer to Table 2.1 below for an overview of the issues raised). A range of consultation methods were used to seek input, identify issues and to assist selection of preferred routes and development of concept designs. These methods included:

- Providing a point of contact at the Pacific Highway office in Grafton.
- A toll free information and feedback telephone line.
- Letterbox drops.
- Advertisements.
- Media announcements.
- Community information brochures and newsletters.
- Websites with information and details for how to provide feedback.
- Meetings with government agencies and other stakeholders.
- One-on-one visits to members of the community.
- Cane industry meetings and meetings with cane farmers (individually and in groups).
- Community focus groups eg flood group.
- Formation of Aboriginal Focus groups
- Advisory committees.
- Landowner workshops.
- Site open days.
- Questionnaires.
- Field information packages sent to landowners.
- Public displays of options and preferred route reports and concept design reports.
- Staffed public displays.
- Community information evenings and workshops.
- Phone calls to community members and property owners.

In 2008 and 2009 concept designs were announced and were published in the following reports:

- *Woolgoolga to Wells Crossing concept design report* (RTA 2008).
- *Wells Crossing to Iluka Road concept design report* (RTA 2009).
- *Iluka Road to Woodburn preferred concept design report* (RTA 2008a).

- *Woodburn to Ballina concept design report* (RTA 2008b).

During public display of the preferred route and concept design from Wells Crossing to Iluka Road, concerns were raised about impacts on high yielding cane land and property between Tyndale and Maclean. In January 2009, representatives of the cane industry including Clarence canegrowers, the Harwood Sugar Mill and the Australian Workers Union (AWU) met with the NSW Minister for Roads to discuss these concerns. The Minister asked RTA to work with local canegrowers and affected landowners to investigate the feasibility of an alternative route that avoided the high value cane land along the South Arm of the Clarence River and the sensitive areas to the east.

A discussion paper into the feasibility of an alternative route from Tyndale to Maclean was placed on public display in October 2010 and comments were received until 26 November 2010. On 22 August 2011, RTA announced that the alternative route from Tyndale to Maclean which skirts around the high value cane land is now the preferred route (RTA, 2011).

A concept design for the Woolgoolga to Ballina upgrade has now been developed. It consolidates the concept designs for the four previous development projects including the new preferred route from Tyndale to Maclean and is described in Chapter 3 of this report. RTA publicly displayed the concept design during October 2011.

## 2.4 Issues raised during consultation

An overview of issues raised during consultation to identify the preferred route and concept design is in Attachment B. Wherever possible, issues were addressed during route selection and refinement of the concept design. On 9 August 2011 the Department of Planning and Infrastructure held a planning focus meeting (PFM) for the Woolgoolga to Ballina upgrade. The stakeholders in attendance and the issues raised at the PFM are summarised in Attachment C. The issues raised by the community and stakeholders continue to be considered and have assisted identification of the proposed key issues for the project.

# 3 Project description

## 3.1 The project

The project would achieve four lanes of divided highway from about five kilometres north of Woolgoolga to the southern extent of the Ballina bypass at the Bruxner Highway intersection, about six kilometres south of Ballina. The approval sought is for a class M (motorway) upgrade standard however staging of the project would result in some sections being initially constructed to a class A (arterial) upgrade standard. Refer to section 3.1.1 below for a description of class M and A standards and to section 3.2 for identification of potential staging.

The project does not include the Pacific Highway upgrades at Glenugie and Devils Pulpit, which are located between Woolgoolga to Ballina, as these two projects have already been approved. The project is shown in Figures 2.1 to 2.5. A Geographic Information System (GIS) mapping tool showing the project and based on aerial photography, is available on the project web site at:

http://whome.rta.nsw.gov.au/roadprojects/projects/pac_hwy/coffs_harbour_ballina/woolgoolga_ballina/index.html

The project is described below from south to north.

*From Arrawarra to Franklins Road*

The Pacific Highway would be widened from around five kilometres north of Woolgoolga at Arrawarra Beach Road until Eggins Close. From Eggins Close there would be a new alignment to the west, bypassing the village of Corindi. The alignment would rejoin the existing Pacific Highway alignment south of Range Road. From Range Road, the Pacific Highway would be widened and would largely follow the existing alignment until the southern end of the construction works at the Glenugie upgrade near Franklins Road.

Key features would include a grade separated interchange south of Range Road, bridge creek crossings and three overbridges carrying local traffic over the upgraded highway.

*From Eight Mile Lane to the southern end of the Devils Pulpit upgrade*

From Eight Mile Lane there would be a new alignment northward through the Pillar Valley, bypassing South Grafton, Grafton and Ulmarra. The new alignment would be east of Wooli Road and Tucabia Road. It would re-approach the existing highway near Tyndale and then take a new alignment to the east to skirt around high value cane land before joining the existing highway at Maclean. North of Maclean the Pacific Highway would be widened to the intersection with Iluka Road.

Key features would include viaduct, bridge and embankment structures through the Pillar Valley and major bridge crossings of the Clarence River at Harwood and Mororo. There would be six grade separated interchanges at:

- Eight Mile Lane, Glenugie.
- North of Sheey's Lane, Tyndale.
- Goodwood Street, Maclean.
- South of Yamba Road, Maclean.


**Figure 3. 1 | The project**

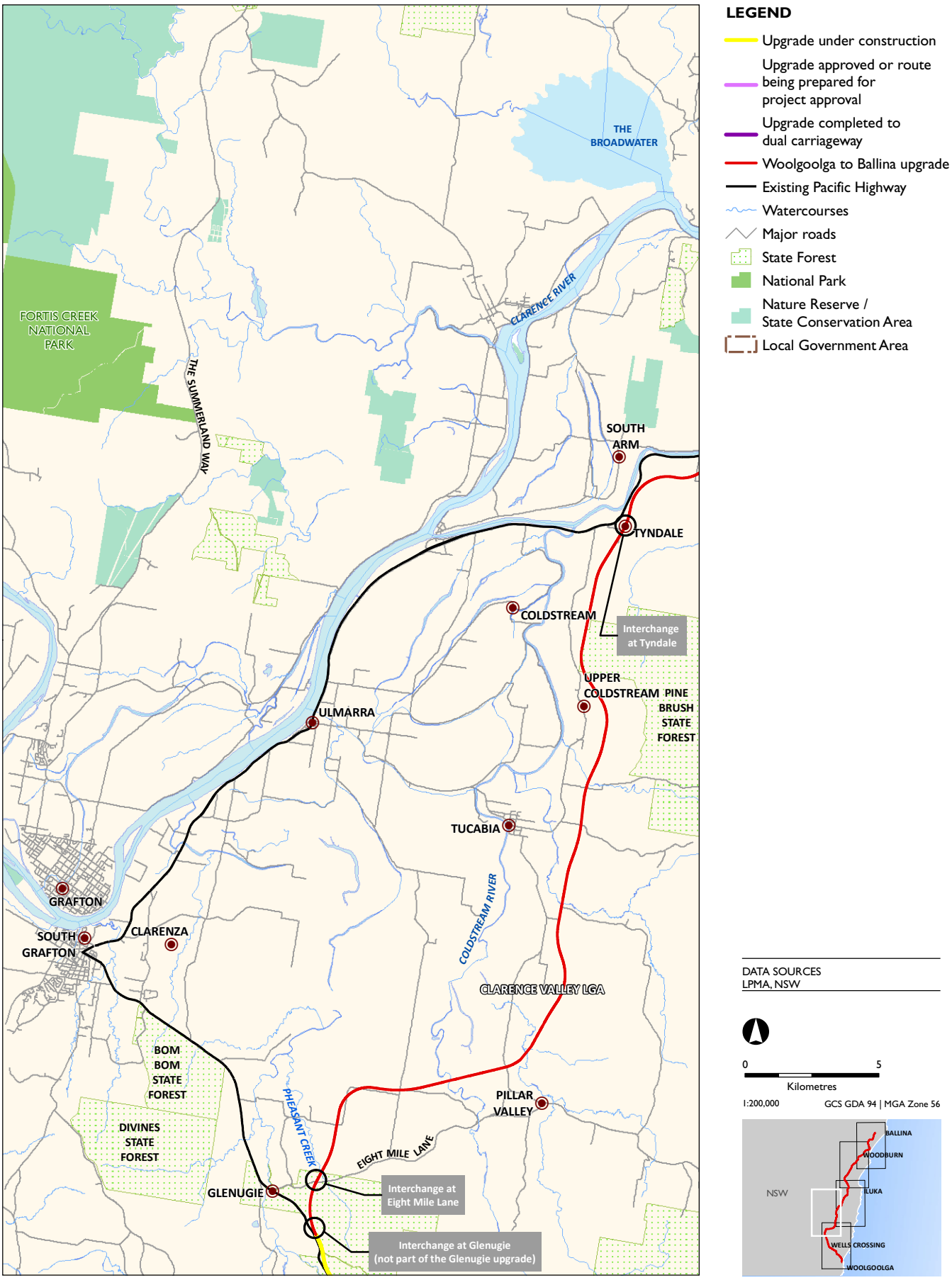


**Figure 3. 2 | The project**


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**Figure 3.3 | The project**

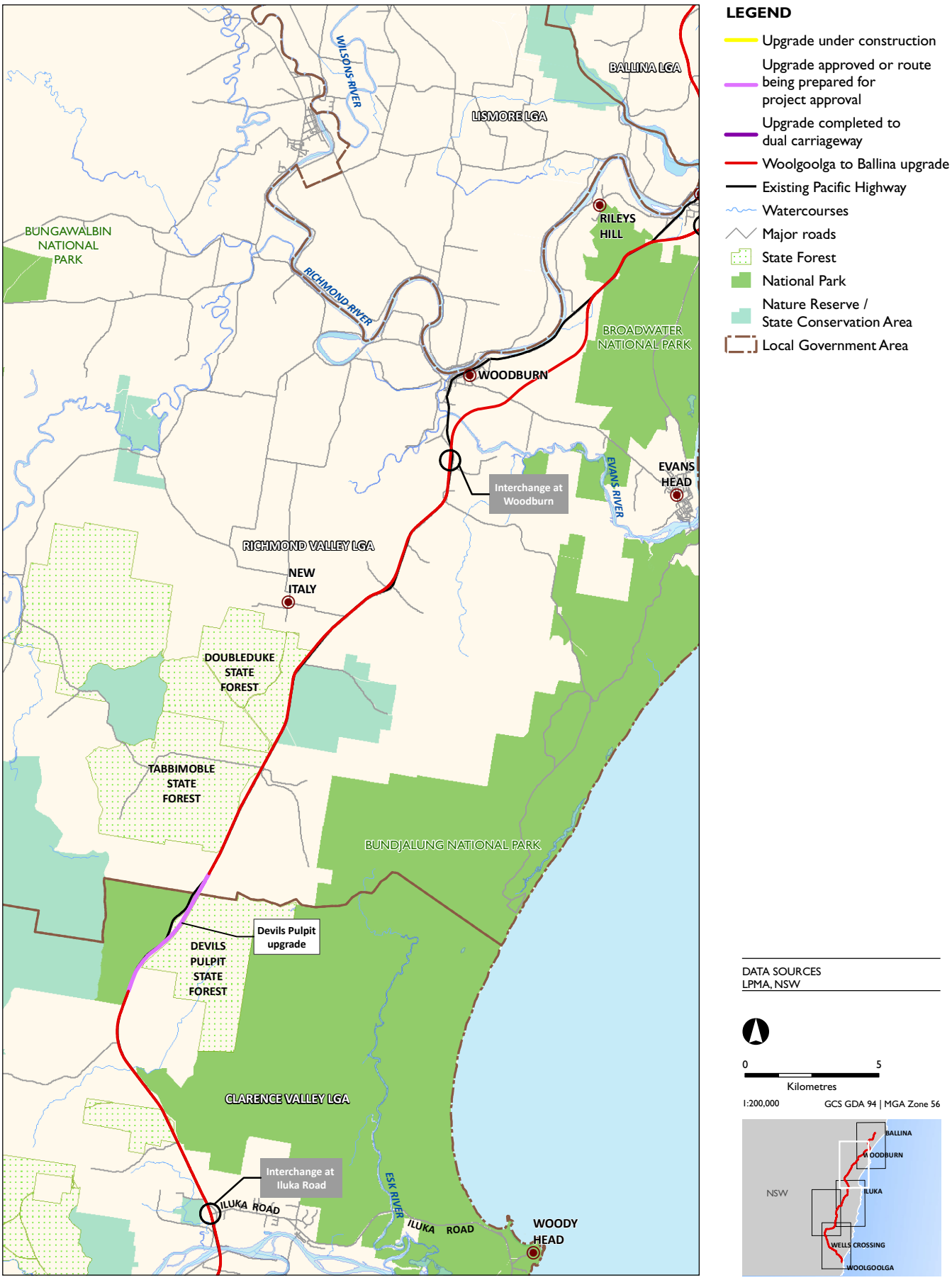


**Figure 3. 4 | The project**

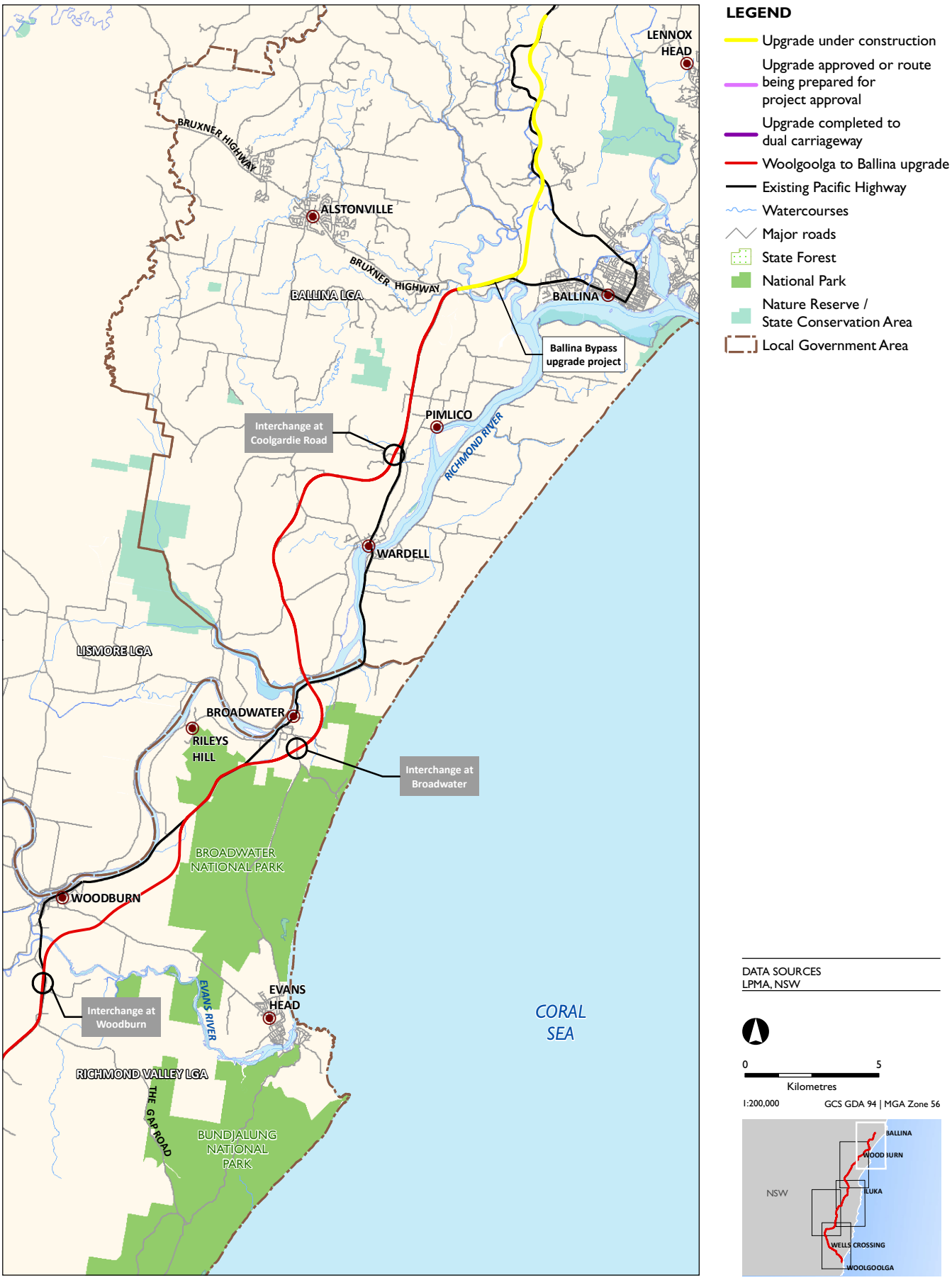


**Figure 3. 5 | The project**

- Watts Lane, Harwood.
- Iluka Road, Woombah.

*From the northern end of the Devils Pulpit upgrade to south of Ballina*

The Pacific Highway would be widened from the northern end of the Devils Pulpit upgrade Iluka Road to around 1.5 kilometres south of Woodburn near Trustums Hills, with only minor deviations. The highway would then take a new alignment bypassing Woodburn to the east, crossing Tuckombil Canal, traversing the Richmond floodplain, and crossing McDonald's Creek before rejoining the existing Pacific Highway alignment just south of the Broadwater National Park. The Pacific Highway would be widened through Broadwater National Park and would then take a new alignment to the north-west to cross the Richmond River. North of the Richmond River, the project would skirt the edge of the Blackwall Range before adjoining the existing Pacific Highway alignment to the north of Wardell. From here the Pacific Highway would mainly be widened to the southern extent of the Ballina bypass at the Bruxner Highway intersection, about six kilometres south of Ballina.

Key features include local road overpasses, a major bridge crossing of the Richmond River and viaducts and cross drainage bridges. There would be three grade separated interchanges at:

- Trustums Hill Road, south of Woodburn.
- Evans Head – Broadwater Road, Broadwater.
- Coolgardie Road, Wardell.

### *3.1.1 Class M and Class A standards*

*Class M standard upgrade*

The approval sought is for a motorway standard highway upgrade, referred to as class M. A class M standard upgrade has two lanes in each direction and the width of the median allows for future upgrading to three lanes in each direction when required. The posted speed limit would be 110 km/h.

The class M standard would control access to the highway via ten grade separated interchanges. New or realigned local and service roads would connect properties and local roads to the interchanges and some local roads or accesses may be closed. There would be no direct access to or from property from the highway. Local service roads would be connected to the upgraded highway via grade separated interchanges.

*Class A standard upgrade*

An arterial standard highway upgrade is referred to as class A. The class A standard upgrade has two lanes in each direction and the width of the median allows for future upgrading to the class M standard and to three lanes in each direction when required. The posted speed limit is a minimum of 100 km/h and there is a combination of at grade intersections and grade separated interchanges. There may also be local roads constructed to rationalise access to and from the new highway.

### *3.1.2* Urban design and landscaping

Urban design principles and objectives have been considered throughout the route selection and concept design processes of the four previous development projects, drawing on the RTA's

*Pacific Highway Urban Design Framework* (RTA 2005). This framework provides guidelines for urban design considerations to be incorporated into all stage of project development.

The project would be undertaken consistently where relevant with the Pacific Highway urban design framework objectives:

- 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 the towns along the road.
- Provide consistency-with-variety in road elements.
- Provide a simplified and unobtrusive road design.

## 3.2 Staging

The project would be delivered in stages as further funding becomes available and to best manage construction and material resources. Stages would be identified that prioritise and target upgrades and works that would best deliver safety and traffic efficiency improvements and deliver value for money outcomes.

Stages could include:

- Delivery of the project through a number of upgrades.
- Initially achieving a combination of class M and class A standard highway upgrades.
- Works to source quarry materials within and outside of the project corridor.
- Priority works such as safety upgrades at intersections.

# 4 Key environmental issues

## 4.1 Overview

Key issues are those that may have high or moderate impacts (actual or perceived) and further assessment is necessary to determine the level of potential impact and to develop appropriate measures to mitigate and manage the impacts.

The broad range of information already available including from specialist environmental studies and from consultation with the community and stakeholders indicate the following key environmental issues will require further detailed assessment and may require project specific impact mitigation measures:

- Traffic and transport
- Hydrology and flooding
- Water quality
- Ecology
- Aboriginal cultural heritage
- Noise and vibration
- Urban design and landscape character
- Land use and property
- Socio-economic

## 4.2 Traffic and transport

### *4.2.1 Overview*

Between Woolgoolga and Ballina the Pacific Highway is mainly a two lane road with sealed shoulders. A total of 645 crashes occurred between 2004 and 2009 including 27 fatalities, 262 injury crashes and 356 non-injury crashes. The speed limit varies and is generally 100 km/h between townships and 50 km/h within some townships. Speeds are limited to 40 km/h near schools at drop off and pick up times including at Woodburn and Ulmarra.

The annual average daily traffic (AADT) across 17 traffic counting locations between Woolgoolga to Ballina is 9019 vehicles per day. There is considerable variability at each location, indicating an influence from local traffic movements near intersections to towns and locales and interactions with other regional roads such as the Bruxner Highway. Peaks of over 10, 000 vehicles per day are found at West Ballina, Harwood and Grafton (South Grafton).

Traffic has increased steadily over the past 25 years with the average linear growth rate from 1982 to 1997 between 2.3 and 2.9 per cent. The level of service relates to the performance of a section of road and is estimated from the road capacity and the volumes of traffic. The criteria range from A to F. The level of service for the Pacific Highway from Woolgoolga to Ballina varies between B (good) between towns and locales to D (congestion and intolerable delays) near some intersections.

The regional road network includes the:

- Gwydir Highway, west of Grafton.
- Bruxner Highway, near Ballina.
- Summerland Way, north of Grafton.
- New England Highway, an alternative north-south route inland from the Pacific Highway.

Public roads connect to the Pacific Highway and provide access to towns and villages such as Wooli, Minnie Water, Pillar Valley, Tucabia, Yamba, Iluka and Evans Head. There are also numerous direct accesses including for private roads, driveways and fire trails.

Bus and coach services along the Pacific Highway provide services between Sydney and Brisbane, regional services and local services including school bus routes. The North Coast rail line between Sydney and Brisbane provides train services and includes stations at Coffs Harbour, Grafton and Casino. There are regional airports at Coffs Harbour, Grafton, Ballina, Evans Head and Lismore.

The NSW Coastline Cycleway project identifies a cycle route between the Richmond Valley and Evans Head that includes the Pacific Highway between Broadwater and Wardell. Pedestrian facilities are generally restricted to townships.

### *4.2.2 Summary of issues*

*Operation*

- Improved road safety.
- Improved traffic efficiency and level of service including for freight and public transport on the highway.
- Changed local access for some towns, villages, locales and properties which may increase travel times.
- Potential for altered traffic patterns on adjacent roads which will provide alternative routes and the suitability of these routes (in terms of width, alignment, pavement condition and safety) to carry traffic.
- Potential change to regional and local bus services including school bus services.
- Improved provisions for cyclists and pedestrians.
- Improved rest area provisions for management of driver fatigue.

*Construction*

- Increased risk to road safety during construction.
- Delays and reduced efficiencies for regional and local traffic movements, including bus services, during construction.
- Construction traffic including for haulage and delivery of materials and equipment may damage local roads.
- Changed local access for some towns, villages, locales and properties, which may increase travel times for local traffic.

### *4.2.3 Proposed further assessment*

- Identification of the existing traffic and transport performance of the local and regional road network including road safety, efficiency and access arrangements, public transport services and provisions for pedestrians and cyclists.

- Assessment of operational traffic impacts to the local and regional road network including:
    - Road safety.
    - Traffic efficiencies including ability to cater for predicted growth.
    - Performance of interchanges and intersections.
    - Access arrangements including for properties and changes to local roads.
    - Travel times including for local access.
    - Potential for altered traffic patterns on the adjacent road network.
- Assessment of operational impacts on regional and local public transport, including bus services and impacts on cyclists and pedestrians.
- Assessment would include quantification of traffic impacts where possible, eg numeric changes in crash numbers, changes in accident severity, travel time savings in minutes for cars and heavy vehicles.
- Identification of appropriate rest area provisions in accordance with the *RTA Strategy for major heavy vehicle rest areas on key rural freight routes in NSW* (RTA 2010).
- Assessment of construction traffic impacts including:
    - Road safety.
    - Haulage routes.
    - Access arrangements including for properties and changes to local roads.
    - Delays including to regional and local bus services.
    - Impacts on local and regional roads.
- Identification of appropriate management and mitigation measures.

## 4.3 Hydrology and flooding

### *4.3.1 Overview*

The project is in the Northern Rivers catchment area which includes three main catchments:

- Coffs Harbour waterways.
- Clarence River catchment.
- Richmond River catchment.

Coffs Harbour waterways is a small catchment of around 508 square kilometres. It has 13 short sub-catchments and includes the Corindi River and its floodplain and the short coastal catchment of Arrawarra Creek.

The Clarence River catchment covers an area of approximately 22,716 square kilometres. It has 56 sub catchments. The Clarence River is the largest river on the east coast of NSW and has a tidal limit around 90 kilometres from the ocean. It has numerous tributaries and other minor waterways including Shark Creek, Serpentine Channel, Clarence River North Arm and South Arm, Coldstream Creek, Chaffin Creek, Champions Creek, Pillar Valley Creek, Glenugie Creek, Pheasant Creek and the Esk River.

The Richmond River catchment covers an area of approximately 7,022 square kilometres. It has 23 sub catchments. The Richmond River has a tidal limit around 90 kilometres from the ocean and a large coastal floodplain stretching from Evans Head north to Byron Bay. Tuckombil Canal relieves flooding in the Richmond Valley, directing flows from the Richmond River to flood storage east of Woodburn and then to the ocean via Evans River. There is an existing natural constriction of the Richmond River near Broadwater. The Tuckean Swamp is located west of

Wardell and provides significant flood storage upstream of the constriction and the Richmond floodplain. The Bagotville Barrage acts as a tide gate to limit the tidal influences on the Tuckean Swamp. The Richmond River tributary floodplains of Duck Creek and Emigrant Creek are in the northern part of the project.

The region is subject to frequent and extensive flooding which can be caused by one of or a combination of, upper catchment river rain events, local catchment rain events and ocean storm tides. Flooding impacts are concentrated on and around the floodplains and inundation can extend over a number of weeks. Levees provide some flood mitigation for towns including Grafton, South Grafton, Ulmarra and Maclean. The level of the existing Pacific Highway is below the 20 year average recurrence interval for flood events in many locations, affording a low level of flood immunity for the highway in those areas.

There are numerous groundwater bores present which are used for stock and domestic purposes. Rous Water Regional Water Supply has three groundwater bores east of Woodburn that supply drinking water. Groundwater is generally within one metre of the natural ground surface on the floodplain areas and can also be found at depth. Dams, freshwater wetlands and other vegetation communities present may be fed by springs.

In the Commonwealth Scientific and Industrial Research Organisation (CSIRO) report *Climate change in the Northern Rivers Catchment* (CSIRO 2007) projections are provided for the impacts of climate change. By 2030 average temperatures could increase by +0.2°C to +1.8°C. Projections suggest that there will be sea level rises and an increased frequency of hot days, bushfires, droughts and intense storms causing flooding.

### *4.3.2 Summary of issues*

- Infrastructure such as viaducts, bridges and embankments and modifications to waterways may potentially change the velocity, location and magnitude of floods and flood characteristics including time of inundation, depths, rates of recession and could cause scour. This could impact agriculture including sugar cane, flood refuges, property, infrastructure and natural resources.
- The flood immunity of the project may be affected by climate change including more frequent and intense storms and sea level rises.
- Cuttings or embankments could cause localised changes to groundwater levels and flows potentially impacting drinking water catchments, groundwater users, spring fed dams and groundwater dependent vegetation communities.

### *4.3.3 Proposed further assessment*

- Identification of the existing local and regional hydrology taking into account agriculture and natural resources.
- Assessment of the potential surface hydrology and flooding impacts including on the flood immunity of the upgraded highway, agriculture, flood refuges, property, infrastructure and natural resources with consideration to changing weather patterns and increases in sea level as a result of climate change.
- Assessment of the potential impacts of local groundwater flows and levels with consideration to drinking water catchments, groundwater users, spring fed dams and groundwater dependent vegetation communities.
- Identification of appropriate design requirements and of management and mitigation measures including an adaptive and risk based approach to plan for changing weather patterns and increases in sea level as a result of climate change.

## 4.4 Water quality

### *4.4.1 Overview*

The Corindi River, its floodplain and a number of minor creeks are located north of Woolgoolga. Water quality in Corindi River and its tributary creeks is generally good. Water in the creeks tends to be tannic and brown in colour, due to staining from tannins in the native vegetation, and to have low dissolved oxygen levels. The creeks are seasonally dry. Water quality is impacted by agricultural land use in some areas.

The Clarence River (mainstream) and Clarence River North Arm have generally good water quality. The Clarence River South Arm, Coldstream River, Pillar Valley Creek, Chaffin Creek, Champions Creek, Shark Creek, and Serpentine Channel tend to have poorer water quality. This can include low dissolved oxygen levels, occasional high turbidity, and low pH. The creeks crossed at the southern end of the Clarence Valley generally have good water quality. In the mid and northern ends of the Clarence Valley water quality reflects land use and is affected by erosion and runoff, modified channels, weeds, drainage from sugar cane fields, and lack of flow. Acid sulfate soils are widespread in these areas and may be responsible for low pH values (acidity).

The Richmond River is affected by acid sulfate soils, and runoff from agricultural and urban areas. Low dissolved oxygen and low pH levels are identified as the cause of recorded fish kills within the estuary. Floodplain management also contributes to poor water quality. A range of measures are being implemented to improve short and long term river health.

Numerous groundwater bores are present throughout the area. These include the three bores located east of Woodburn in the Richmond Valley which are operated by Rous Water Regional Water Supply. Groundwater is used for a variety of purposes including for drinking, agriculture and domestic, indicating good water quality.

Sensitive receivers include the Clarence River, the Richmond River, floodplains, tributaries and groundwater sources. Wetlands mapped as *State Environmental Planning Policy No 14 – Coastal wetlands* (SEPP 14 wetlands) are located near Corindi, Maclean and Ballina. The Solitary Island Marine Park and adjacent wetlands are located east of the coast from Coffs Harbour north to Sandon. Commercial and recreational fishing activities occur in waterways near the project.

Topographical conditions within and near the project include elevated and lowland landforms. The underlying topography and geology give rise to a variety of soil landscapes including erosional, transitional and alluvial landscapes. Soils within these landscapes are mostly highly erodible and have low bearing strength.

Acid sulfate soils are commonly associated with low lying estuarine areas at elevations less than five metres above sea level. Acid sulfate soils occur extensively across the Clarence and Richmond River floodplains either as actual or potential acid sulfate soils.

### *4.4.2 Summary of issues*

*Operation*

- Accidental spillages of hazardous materials including chemicals and fuels as a result of accidents and leakages.
- Contaminated run-off from the road surface.

*Construction*

- Erosion and sedimentation could occur during works that expose soils and could reduce water quality at sensitive receivers such as SEPP 14 wetlands, floodplains and waterways.
- Direct disturbance of waterway beds and banks may result in soil and stream bank erosion and increased sediment loads in nearby creeks.
- Accidental spillages of materials including chemicals and run-off.
- Potential exposure of acid sulfate soils due to excavation or lowering of the groundwater table may generate sulfuric acid and mobilise heavy metals. This may impact waterways, groundwater, soils and structures.
- Groundwater intersection could cause pollution of groundwater sources including those used for drinking, domestic and agricultural purposes.
- Potential release of untreated groundwater that has been extracted during treatments to stabilise soft soils.

### *4.4.3 Proposed further assessment*

- Identification of sensitive surface and groundwater receiving environments.
- Identification of locations with a high erosion risk, areas of actual or potential acid sulfate soils and areas of soft soils.
- Identification of activities and potential hazards and risks that may increase erosion and other risks to soils and to surface and groundwater quality during construction and operation.
- Modelling the area of land required for sedimentation basins and operational water quality treatment measures.
- Assessment of potential impacts to water quality during construction and operation and identification of management and mitigation measures.

## 4.5 Ecology

### *4.5.1 Overview*

The NSW North Coast bioregion is one of the most diverse in NSW with a complex of soil and vegetation patterns resulting from the diversity of substrates, topographic and climatic variation. The project is in the Clarence Basin and the Richmond-Tweed subregions of the NSW North Coast bioregion. A number of national parks, nature reserves, conservation areas and state forests are present near the project including:

- Bundjalung National Park.
- Broadwater National Park.
- Yuraygir National Park.
- Yaegl Nature Reserve.
- Wedding Bells State Forest.
- Barcoongere State Forest.
- Glenugie State Forest.
- Pine Brush State Forest.

- Mororo Creek Nature Reserve.
- Tabbimobil Swamp Nature Reserve.
- Little Pimlico Nature Reserve.
- Yuraygir Conservation Area.
- Mororo State Forest.
- Devil's Pulpit State Forest.
- Tabbimobil State Forest.
- Newfoundland State Forest.

The Pacific Highway currently crosses the Clarence and Richmond Rivers and their floodplains as well as numerous smaller waterways. Riparian and estuarine vegetation occurs, including wetlands listed under the *State Environmental Planning Policy No 14 (Coastal Wetlands)* (SEPP 14 Wetlands) including near Corindi, Maclean and at Duck Creek south of Ballina.

Seven vegetation formations occur:

- Dry sclerophyll forests.
- Wet sclerophyll forests.
- Swamp sclerophyll forests.
- Rainforest.
- Wetlands.
- Estuarine vegetation.
- Modified communities.

These formations consist of 57 vegetation communities including six threatened ecological communities listed as endangered under the *Threatened Species Conservation Act, 1995* (TSC Act). These are:

- Sub-tropical coastal floodplain forest.
- Swamp sclerophyll forest.
- Swamp oak floodplain forest.
- Coastal Cypress Pine Forest.
- Freshwater Wetlands.
- Lowland Rainforest.

At least 37 threatened flora species potentially occur within the range of vegetation communities identified. Of these, 17 species have been recorded during surveys including:

- Two endangered and seven vulnerable flora species listed under the EPBC Act.
- Six endangered and 11 vulnerable flora species listed under the TSC Act.

Fauna habitats present include dry open forest, rainforest, woodlands, floodplains, wetlands and wet heath. There are numerous tree hollows and other resources available for fauna species. Regional key fauna habitats and linking habitat corridors, including current corridors and corridors likely to become important as a result of climate change are present (DEC 2003 and DECC 2007). These corridors provide connectivity for ecological processes such as migration, colonisation and interbreeding of flora and fauna between areas of habitat.

At least 106 threatened fauna species potentially occur within the range of habitats identified, including five fish species. Of these 40 fauna species were recorded during surveys including:

- Two endangered and two vulnerable fauna species listed under the EPBC Act.
- Three endangered fauna species, one endangered population (the emu population *Dromaius novaehollandiae* on the NSW north coast bioregion) and 35 vulnerable fauna species listed under the TSC Act.
- Migratory fauna species listed as vulnerable under the EPBC Act.

In addition, the Oxleyan Pygmy Perch (*Nannoperca oxleyana*) and which is listed as endangered under the *Fisheries Management Act, 1994* (FM Act) and the EPBC Act occurs in waterways near the project including McDonalds Creek. Preliminary critical habitat identified for this species includes habitat in Broadwater National Park and Tabbimobil Swamp Nature Reserve.

### *4.5.2 Summary of issues*

- Threatened ecological communities and flora and fauna species listed under the TSC Act, FM Act and/or the EPBC Act and their habitats, SEPP 14 wetlands and aquatic and riparian habitat would potentially be impacted by clearing, edge effects, fragmentation, modification to waterways and spread of weeds.
- Regional key fauna habitats and linking habitat corridors including climate change corridors and riparian corridors would be intersected potentially reducing connectivity and causing fragmentation.
- The endangered emu (*Dromaius novaehollandiae)* population would potentially be impacted by clearing of habitat and reduction of connectivity to habitat areas.
- The Oxleyan Pygmy Perch (*Nannoperca oxleyana*) listed under the FM Act and the EPBC Act and its preliminary critical habitat would potentially be impacted by change to water quality and modification to waterways.
- Contribution to key threatening processes listed under the TSC Act, FM Act and/or the EPBC Act.
- Strip acquisition would be required at Broadwater National Park and Yaegl Nature Reserve. Land would also be acquired from state forests including from special management areas which may have ecological or heritage values (refer to Section 4.9 of this report – Land use and property impacts).

### *4.5.3 Proposed further assessment*

- Identification of the ecological values present, supported by targeted and seasonal surveys to provide information on the distribution of species, populations and communities targeted, specific habitat resources, such as hollow-bearing trees and key connectivity locations.
- Assessment of potential impacts, including cumulative impacts, on threatened ecological communities and flora and fauna species listed under the TSC Act, FM Act and/or the EPBC Act and their habitats.
- Assessment of potential impacts on SEPP 14 wetlands, aquatic and riparian habitat and as a result of modification of waterways. This would include consideration of impacts on fish passage.
- Assessment of connectivity and fragmentation impacts and consideration of key threatening processes.
- Assessment of potential impact to the Oxleyan Pygmy Perch (*Nannoperca oxleyana*) listed under the FM Act and the EPBC Act and its preliminary critical habitat.
- Further research into the movement patterns and specific life history traits of the endangered emu (*Dromaius novaehollandiae)* population to identify appropriate emu crossing locations and structures.
- Identification of appropriate management and mitigation measures to avoid, minimise, mitigate or offset the potential impacts to ecology.

## 4.6 Aboriginal cultural heritage

### *4.6.1 Overview*

The north coast region supported a number of distinct but interrelated groups of Aboriginal people, each associated with defined geographical areas. Aboriginal people would have used the great diversity of coastal, riverine, upland and ocean shore environments for food and other resources. As well as sites relating to millennia of traditional occupation there are sites related to the period of incursion by non-Aboriginal people and recent cultural survival. Sites and places present may have cultural significance as traditional sacred places or for recent Aboriginal history.

Since 2005, the Aboriginal community has been consulted and involved in the identification of the preferred route options between Woolgoolga to Ballina. Aboriginal community consultation included the formation of four Aboriginal Focus Groups. Aboriginal groups and organisations consulted to date include:

- Grafton-Ngerrie Local Aboriginal Land Council.
- Yaegl Local Aboriginal Land Council.
- Yaegl Native Title Claimants Group.
- Ulgundahi Elders Aboriginal Corporation.
- Numbahjing Clan within the Bunjalung Nation.
- Yarrawarra Aboriginal Corporation (including the Garby Elders and Jalumbo Cultural Heritage Research Unit).
- Burra:way Wa:jad Traditional Owners Group.
- Bogal Local Aboriginal Land Council.
- Burabi Aboriginal Corporation.
- Ngulingah Local Aboriginal Land Council.
- Yabur and Yulgun Community Development and Employment Program Aboriginal Corporation.
- Ngulingah Local Aboriginal Land Council.
- Bandjalang Aboriginal Corporation.
- Burabi Aboriginal Corporation.
- Bundjalung Elders Council Aboriginal Corporation.
- Bandjalung People (1) Native Title Group.
- Coffs Harbour and District Local Aboriginal Land Council.
- Widjabul Aboriginal people.
- Birrigan Gargle Local Aboriginal Land Council.
- Jali Local Aboriginal Land Council.
- Bunjum Aboriginal Co-Operative Ltd.
- NSW Aboriginal Land Council.

Archaeological site database searches have been undertaken, a predictive model of traditional land use and settlement developed, and field survey of around 75 per cent of the project corridor has been carried out with representatives from the Aboriginal community. It is predicted that the most common Aboriginal heritage sites would be artefact scatters, followed by isolated artefacts, quarries, scarred trees, shell middens and ceremonial sites. Human burials may be present in sandy aeolian or alluvial deposits.

Fifty seven Aboriginal heritage sites are currently identified within or near the project of which 21 are listed on the OEH Aboriginal Heritage Inventory Management System (AHIMS). The majority of sites present are potential archaeological sites (PADS - 32 present). Other items present are:

- Scarred trees (four present).
- Artefact scatter, shell deposit and PAD (one present).

- Artefact scatter and PAD (seven present).
- Isolated artefact and PAD (seven present).
- Isolated artefacts (six present).

Eighteen Aboriginal heritage cultural sites occur within or near the project. These are:

- Corindi massacres.
- Burials (historic).
- Corindi Beach movement corridors.
- Halfway Creek ceremonial site.
- Birrugan and Mindi spiritual sites.
- Tyndale and Woodford Island movement corridors.
- Pillar Valley men's and women's sites.
- Pillar Valley movement corridors.
- Cooks Hills movement corridors.
- Cooks Hill massacre site.
- Cooks Hills camp site.
- Reedy Island.
- Blue Hole.
- Chinese gambling areas
- Derrangan - spiritual site.
- Wardell scarred trees.
- Duck Creek meeting place
- Cooks Hills to Teven Junction landscape.

The Native Title claimants relevant to the project are:

- Numbahjing Clan with the Bundjalung Nation.
- Bandjalang People #1.
- Bandjalang People #2.
- The Yaegl People.
- Baryulgil Bundjalung.
- Widjabul Aboriginal People.
- Byron Bay Bundjalung People (Byron Bay Bundjalung People #3).

### *4.6.2 Summary of issues*

- Impacts to potential archaeological deposits (PADs), scarred trees, artefact scatters, isolated artefacts, shell deposit.
- Impacts to a range of cultural sites including corridors of movement and landscapes.
- Potential impact to a cluster of archaeological and cultural sites centred on Cooks Hill.
- Potential impacts to burial sites.
- Native title claims are present.
- Potential impacts to unknown Aboriginal heritage.

### *4.6.3 Proposed further assessment*

- Identify and investigate the Aboriginal archaeological and cultural heritage values that are known or are predicted to be present including by undertaking additional field survey, test excavations and consultation with the registered Aboriginal stakeholders and Aboriginal knowledge holders as required.
- Assessment of the potential impacts, including cumulative impacts, on Aboriginal archaeological and cultural heritage values, including intangible cultural values.

- Consult with the Aboriginal community and undertake investigations in accordance with the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW 2010), *Code of Practice for Archaeological investigation of Aboriginal Objects in NSW* (DECCW, 2010) and the *RTA Procedure for Aboriginal cultural heritage consultation and investigation* (2011).
- Identify appropriate management and mitigation measures in consultation with the registered Aboriginal stakeholders.

## 4.7 Noise and vibration

### *4.7.1 Overview*

Sensitive receivers present for noise and vibration include:

- Residences.
- Schools including indoor and outdoor areas.
- Places of worship.

Most of the sensitive receivers are concentrated in towns, villages and locales while in rural areas sensitive receivers are relatively scattered. Sensitive receivers located along the existing Pacific Highway have high levels of road traffic noise, which have been increasing over time. Less densely settled areas such as the Clarence Valley and Wardell Heath generally experience low background noise levels.

Other sections of the project would be adjacent to state forests and conservation areas such as national parks where there are no or few sensitive receivers.

### *4.7.2 Summary of issues*

*Operation*

- Introduction of new traffic noise to areas with existing low background noise levels. For example:
  - Rural residences in the Clarence Valley and the Wardell Heath.
  - Villages including Pillar Valley, Tucabia, Gulmarrad, Upper Coldstream, Doonbah, Meerschaum Vale, Coolgardie and Bagotville.
  - Residences along the alignment of new bypasses, such as at Woodburn and Broadwater.

- Increase in noise levels where the Pacific Highway is widened or realigned closer to sensitive receivers that are already affected by road traffic noise. For example:
  - Villages and locales between Arrawarra and Corindi Beach.
  - Sensitive receivers at Tyndale, Townsend, Maclean, Harwood and New Italy.

- Decrease in traffic noise where the Pacific Highway would be realigned away from sensitive receivers or when areas are bypassed. For example:
  - Highway is realigned away from Corindi and Corindi Beach.
  - Bypass of South Grafton, Grafton, Ulmarra, Woodburn and Broadwater.
  - Bypass of the existing Pacific Highway from near the Glenugie State Forest to Tyndale.
  - Bypass of the existing alignment of the Pacific Highway north and south of Wardell.

*Construction*

- During construction, there would be impacts to sensitive receivers in both rural and urban areas. This may include both noise and vibration impacts. The level of impact would be

largely affected by the proximity to works, the length of works, when works are undertaken and the types of equipment used.

### *4.7.3 Proposed further assessment*

- Identify sensitive receivers.
- Consider construction activities including the types of plant and equipment to be used during construction and working hours.
- Noise monitoring to identify the prevailing ambient noise environments.
- Modelling of predicted existing and future noise levels for each potentially impacted sensitive receiver with and without the project.
- Modelling of predicted construction noise and vibration impacts.
- Assessment of the potential operation and construction noise and vibration impacts against the relevant noise and vibration criteria.
- Identification of feasible and reasonable noise mitigation and management measures.

Investigations would be in accordance with the following guidelines as relevant:

- *NSW Road Noise Policy* (DECCW, 2011)
- *Industrial Noise Policy* (EPA 2000).
- *Interim Construction Noise Guideline* (DECC 2009).
- *Environmental Noise Management Manual* (RTA 2001).
- *Assessing Vibration: A Technical Guideline* (DECC 2006).
- *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZECC 1990).

## 4.8 Urban design and landscape character

### *4.8.1 Overview*

The project traverses ten landscape types:

- Floodplain.
- Cleared land (pasture).
- Cultivated land (crops).
- Valley lands – foothills.
- Open woodlands.
- Forest.
- Littoral scrub.
- Ranges and hilltops.
- Waterways.
- Urban settlement.

The dominant landscape types are forest and floodplains. Much of the rural/agricultural land is located on floodplains cut by rivers and creeks. Coastal plains to the east and mountain ranges to the west can be viewed from a number of locations. Sugar cane fields are predominant in some areas, in other areas the land opens up to grazing paddocks with scattered rural residences. Extensive native forests are encountered frequently along the Pacific Highway.

A key characteristic of the region is the agricultural landscapes encountered between the towns and villages. Areas of aesthetic significance are associated with forested conservation areas,

scenic views across rivers and floodplains and to escarpment in the west. A number of the small towns along the highway, such as Woodburn have a high visual character. In particular, the historic area of New Italy is of regional cultural landscape interest.

### *4.8.2 Summary of issues*

- Where the project deviates from the existing highway alignment new infrastructure would be introduced and could represent a highly visible change to existing views including views to and from residences, towns and villages that were previously out of sight of the Pacific Highway.
- Potential to change existing characters and to alter or obstruct key viewpoints.
- Impact to the existing cultural associations and character of landscapes and of towns and villages, including New Italy and Woodburn.
- There is potential that the sense of place and landmark values for travellers would be altered, particularly where towns would be bypassed and/or where views, including distinct landmarks, would be altered.
- The existing character of towns and cultural landscapes may be altered where towns would be bypassed or where the existing Pacific Highway would be widened through towns or cultural landscapes.
- Key areas where urban design and landscape issues would need to be addressed include:
    - Cutting through Dirty Creek Range.
    - Cutting through Bondi Hill.
    - Bridges over Clarence and Richmond River and their approaches.
    - Bridge structures crossing the Coldstream and floodplain.
    - Interchanges.
    - Overpasses.
    - Rest areas including heavy vehicle rest areas.
    - Alignment through Bingal Creek vegetated region.
    - Noise mitigation barriers.

### *4.8.3 Proposed further assessment*

- Identification of the visual qualities present, including the existing landscape character of the region, sensitive locations, catchments and key view points.
- Assessment of urban design, landscape and visual impact issues to demonstrate how the project meets the urban design objectives of the *RTA Pacific Highway urban design framework* and the *DoPI North Coast Urban Design Guidelines.* This would include the provision for consistency and variety over a regional scale while respecting the existing character of localities.
- Assessment of potential impacts on sensitive visual catchments, towns and cultural landscapes.
- Identification of appropriate management and mitigation measures.

## 4.9 Land use and property

### *4.9.1 Overview*

The *Mid North Coast Regional Strategy 2006-31* (DoP 2006) and the *Far North Coast Regional Strategy 2006-31* (DoP 2006a) establish guiding principles for the planning and management of the future sustainable growth of land near the project. They recognise the

Pacific Highway as the primary north-south corridor for inter-state and inter/intra-regional movements.

The project spans across five local government areas (LGAs), the Clarence Valley, Richmond Valley, Lismore, Ballina and Coffs Harbour. Land uses are diverse including rural, semi-rural, agricultural, urban residential, commercial development, national parks and state forests. There are numerous towns and urban and rural communities including at Coffs Harbour, Woolgoolga, Grafton, Ulmarra, Maclean, Gulmarrad, Harwood, Lismore, Woodburn, Broadwater, Wardell and Ballina. Coastal towns include Yamba, Iluka and Evans Head. Private properties range from urban and commercial sized blocks of land to large and medium sized rural properties and include residential buildings, business and agricultural infrastructure.

Future development is planned or is currently underway at a number of locations including to provide for population growth. These include urban release areas at Junction Hill Grafton, South Grafton, Clarenza, Gulmarrad, West Yamba and Evans Head.

Agriculture is a dominant land use and includes sugar cane, grazing, continuous crop rotation and fruit and vegetable production. Other dominant land uses include forestry and conservation lands. Prime agricultural land as identified under the *Northern Rivers Farmland Protection Project (DOP 2005)* and the *Mid North Coast Farmland Mapping Project (DPI 2007)* is present and is currently used for activities such as sugar cane, cropping, livestock grazing and horticulture.

Other key land uses include for forestry (timber), sugar cane, cattle, blueberry farming, banana plantations, aquaculture (for example oyster farming) and fishing. Aquaculture and fishing is found on waterways including the Richmond River, the Clarence River and the Tasman Sea.

### *4.9.2 Summary of issues*

*Operation*

- Full or partial acquisition of property would impact the following land uses:
    - Broadwater National Park (partial i.e. strip acquisition).
    - Yaegl Nature Reserve (partial i.e. strip acquisition).
    - State forests including areas of special management zones (partial i.e. strip acquisition).
    - Local Aboriginal Land Council land (partial i.e. strip acquisition).
    - Agricultural land including cane land and regionally significant farmland (varies from full to partial).
    - Residences (varies from full to partial).
    - Businesses (varies from full to partial).
- Land may be sterilised or fragmented and property access including internal and external farm access arrangements may change, potentially reducing the viability of existing or future uses of land.
- Future development potential of property.
- Potential impacts and relationship with future growth areas.

*Construction*

- During construction there may be change to property access including to internal and external farm access arrangements.

### *4.9.3 Proposed further assessment*

- Identify land acquisition required, existing land uses and future growth areas.

- Assess the potential impacts of land acquisition on existing land uses including impact on land use viability and future development including consideration of sterilisation, severance, fragmentation and change to access.
- Identify appropriate management and mitigation measures.

## 4.10 Socio-economic

### *4.10.1 Overview*

The NSW North Coast has a range of natural assets which contribute to the regional economy. These include prime agricultural land, timber resources, estuaries, floodplains, national parks, nature reserves and beaches. Like many coastal areas, the north coast is subject to competing needs of urban development, business, tourism, recreation, conservation and provision of infrastructure. The area is characterised by agricultural land with scattered rural residences interspersed by forested land, towns and villages.

The towns, villages and locales in the vicinity of the project include:

- Woolgoolga.
- Corindi Beach.
- Corindi.
- Wells Crossing.
- Glenugie.
- Grafton.
- South Grafton.
- Shark Creek.
- Tyndale.
- Halfway Creek.
- Pillar Valley.
- Wardell.
- Coraki.
- Tucabia.
- Gulmarrad.
- Maclean.
- Harwood.
- Yamba.
- Iluka.
- Evans Head.
- Woodburn.
- Goat Island.
- New Italy.
- Ballina.
- Red Rock.
- Brushgrove/Cowper.
- Brooms Head.
- Alstonville.
- Ulmarra.

Businesses and community facilities are generally concentrated in and at the approaches to the towns and villages. These include facilities such as petrol stations, motels, food and beverage outlets, shops, post offices, schools, community halls, rural fire brigades, visitor information centres, parks and places of worship. Some businesses would mostly service local residents, whilst others also obtain or rely on trade from passing traffic and out-of-area customers.

Tourism is an important industry on the NSW North Coast. The region's aesthetic and recreational values along with an agreeable climate contribute to the success of tourist orientated activities. Tourist destinations include the towns of Woolgoolga, Grafton, Ulmarra, Maclean, Harwood, New Italy and coastal towns including Ballina, Red Rock, Corindi Beach, Wooli, Minnie Water, Iluka, Yamba and Evans Head. Yuraygir, Bundjalung and Broadwater National Parks and Yaegl Nature Reserve are popular for bushwalking and camping activities.

The Clarence and Richmond Rivers and coastal areas are used for recreational, commercial and tourist activities including fishing, boating and surfing.

Community values identified through consultation were common throughout the study area and placed a strong emphasis on the:

- Quality of the natural environment and landscapes, and protection of the environment from degradation.
- Region's rural character and built and natural heritage, with these identified as key contributors to lifestyle and local amenity.
- Importance of rural industries such as agriculture, forestry and fishing, as well as regional tourism.
- Need for good access to regional centres.
- Need for safe, healthy and vibrant communities.

### *4.10.2 Summary of issues*

*Operation*

- New bypasses of Grafton, South Grafton, Ulmarra, Tyndale, Woodburn, Broadwater and Wardell. Potential impacts associated with bypasses include:
    - Reduced local amenity along the new bypass.
    - Potential impact on viability, productivity and profitability of businesses in bypassed areas.
    - Potential positive benefits for businesses and the local community include increased amenity and local character in bypassed areas which can stimulate new business functions, such as for tourism.
- Widening of the Pacific Highway may increase community severance or segregation and reduce local amenity and character at some locations eg Maclean, Townsend and Harwood.
- Amenity of local residents and motorists, particularly air quality, noise and visual impacts at sensitive receivers.
- Changing traffic patterns including on local roads may impact the economies of smaller towns and villages.
- Changed access to and from the Pacific Highway including intersection/interchange locations may reduce accessibility or increase some travel times, potentially impacting on:
    - Farming activities and management and use of national parks and state forests.
    - Access for residents.
    - Visits to businesses and tourist areas.
    - Use of community services.

*Construction*

- Amenity of local residents and motorists, particularly air quality and construction noise.
- Changed access and traffic delays during construction may impact:
    - Farming activities and management and use of National Parks and State Forests.
    - Access for residents.
    - Visits to businesses and tourist areas.
    - Use of community services.

- Construction would likely bring short term economic benefits to local communities providing employment and service industry opportunities.

### *4.10.3 Proposed further assessment*

- Identification of the local and regional economy including businesses, industries and agricultural undertakings. Identification of existing community services, access and amenity.
- Assessment of the socio-economic impacts taking into account the objectives of the *Mid North Coast Regional Strategy* and the *Far North Coast Regional Strategy*. This would include assessment of impacts including on businesses, tourism, agriculture and forestry and impacts on amenity resulting from town bypasses, widening and realignment of the highway and change to traffic patterns including on local roads and access.
- Consultation with stakeholders including councils.
- Identification of appropriate management and mitigation measures.

# 5 Other environmental issues

## 5.1 Overview

The broad range of information already available including from specialist environmental studies and from consultation with the community and stakeholders indicate the following environmental issues are of lesser consequence and could be managed effectively with the implementation of standard and best practice management and mitigation measures. It is considered unlikely that these would be key issues for the project however further assessment would be undertaken as part of any future environmental impact statement for the project. Any measures required to minimise, manage and mitigate impacts would be documented as part of the environmental impact statement. The other environmental issues identified are:

- Non-Aboriginal heritage.
- Contaminated land.
- Air quality.
- Resource use and waste management.
- Greenhouse gas and climate change.

## 5.2 Non-Aboriginal heritage

### *5.2.1 Overview*

Exploration of the north coast of NSW was primarily driven by timber getters and from 1839 cedar cutters were operating along the Macleay and Clarence rivers. Agriculture and pastoralism followed and sugar cane was being grown at Lismore in 1861 and on the Lower Richmond by 1866. Development of the region was supported by drainage works, including construction of the Tuckombil Canal in 1895 to relieve flooding, and road works. Many of the original road alignments used by selectors are still in use today including along the alignment of the existing Pacific Highway. In August 1928 the road between Hexham to Tweed Heads was named the North Coast Highway. In May 1931 the highway was renamed the Pacific Highway and was extended south from Hexham to North Sydney. The Harwood Bridge and the Maclean bypass were opened in August 1966, replacing the Harwood punt which was the last ferry on the NSW State Highway system.

Migrant contributions to the community include the settlement at New Italy, which was probably the first Italian farming community in Australia. The historical significance of the New Italy settlement is recognised by a listing on the State Heritage Register. Following the cessation of convict transportation in the 1840's, an influx of Chinese migrants arrived, taking up work as indentured labourers including shepherds and irrigation experts. There were at least six Chinese settlements in the region, referred to as Chinatowns.

Based on heritage database searches and the historical context of settlement it is predicted that the non-Aboriginal historical and archaeological sites present may be associated with:

- Exploration eg survey markers, blazed trees.
- Cedar getting eg camp sites, huts, saw pits and mills, sawn logs, trees marked with holes for spring boards, and Big Scrub remnants.

- Farming and pastoral eg homesteads, sheds, machinery, stock routes, stock yards, fences and sugar mills.
- Drainage infrastructure eg canals, channels, wells, levies.
- Mining and quarrying eg diggings, spoil heaps, alluvial traces, quarries (often now used as dams), kilns.
- Aboriginal sites eg contact sites, reserves, cemeteries, building remains.
- Migrant influence eg domestic artefact scatters, house remains, wells, fences, gardens, plantings, agricultural contours, Chinese temples, irrigation ditches, bamboo, hearths, ovens, graves.
- Road and river transport eg early roads, culverts, coach routes, timber or stone jetties and wharves, dry docks, cane derricks and tramways.
- Towns and villages eg churches, schools, memorials, residential properties.

Thirty three non-Aboriginal heritage items are currently identified within or near the project, of which two are listed on the State Heritage Register (refer to Table 5.1 below) and 12 are listed on Local Environmental Plans. A further 19 unlisted heritage items have been identified within or near the project.

Table 5.1: State Heritage Register listed items present

| Item name | Type of item | Group/collection | Category | Primary location/s |
|---|---|---|---|---|
| New Italy settlement | Complex/group | Landscape/cultural | Historic landscape | New Italy Road, Moonem Road, Swan Bay - New Italy Road, New Italy. |
| High conservation value old growth forest | Landscape | Forestry and timber industry | Forest reserve | Ballina, Lismore, Clarence, Richmond and Coffs Harbour LGAs. |

The State Heritage Register listing for the New Italy settlement acknowledges that the item is part of a much larger New Italy landscape which contains wells, fruit plantings and archaeological evidence of churches, domestic buildings and artefacts, shops and cellars. It also recommends that the curtilage of the item should extend to include other areas of the landscape.

A study by Richmond Valley Council in 2002 proposed that a New Italy settlement heritage conservation area be included on the draft Richmond Valley Local Environmental Plan (currently not gazetted). This proposed conservation area covers around 1350 hectares, mainly to the west of the project, however it bounds both sides of the existing Pacific Highway south of the museum complex.

The 12 items within or near the project that are listed under Local Environmental Plans are:

- Three residences, each listed separately.
- Tyndale shed and cane barracks.
- Maclean punt and former Ashbury ferry.
- Harwood conservation area.
- Harwood School
- Harwood School residence
- Harwood old Pacific Highway tram tracks.
- Harwood Water Brigade Hall.
- Harwood War memorial.
- Woodburn slaughterhouse.

The 19 unlisted heritage items are:

- Stockyards and sheds south of Corindi River.
- Houses, sheds and stockyards near Milleara.
- Tree stump with spring board cuts
- Schoolhouse, halfway Creek.
- Stockyards northwest of Lemon Tree Road.
- Bridge and culvert, halfway Creek.
- Service station, Halfway Creek.
- Survey mark, Halfway Creek
- Bridge at Wells Crossing.
- Former 1940's house site.
- Harwood Bridge.
- Residence in Harwood.
- Farming property with historic sheds.
- Property with farm site and local brickworks.
- Merschaum Vale brickworks.
- Stonehenge property.
- Large stand of bamboo, potential archaeological site.
- Former house site.
- Well (Roders well) and a portion of a group of mango trees associated with the New Italy settlement.

### *5.2.2 Potential impacts*

There would be indirect impacts on one State Heritage Register listed item and direct impacts on two items listed under Local Environmental Plans, being impacts to the curtilages only. Five unlisted heritage items would be directly impacted and ten listed and unlisted heritage items would be indirectly impacted. No high or moderate non-Aboriginal heritage impacts have been identified.

There would be indirect impact to the Museum complex of the State Heritage Register listed New Italy settlement. This would be as a result of changed access to the site, change to the visual catchment and potential vibration impacts during construction. A well (Roders well) and a portion of a group of mango trees are currently unlisted but are within the proposed New Italy settlement conservation area. These items would be directly impacted.

There would be potential direct or indirect impact to seven items listed under Local Environmental Plans as summarised below:

- Direct impact on the curtilage of the Harwood Conservation Area listed under the draft *Clarence Valley LEP 2010*.
- Direct impact on the curtilage of the Woodburn slaughterhouse listed under the draft *Richmond Valley Local Environmental Plan 2010* (potential impact to edge of property only, not to structures).
- Indirect impact to the Maclean punt and former Ashby ferry listed under the *Maclean LEP 2001* and the draft *Clarence Valley LEP 2010* (visual impact).
- Indirect impact to a residence, 'Highfield' listed under the draft *Clarence Valley LEP 2010* (visual impact).
- Indirect impact to Harwood School residence listed under the draft *Clarence Valley LEP 2010* (visual impact, change to access and change in use).
- Indirect impact to Harwood School listed under the draft *Clarence Valley LEP 2010* (visual impact, change to access and change in use).

- Indirect impact to Harwood tram tracks listed under the draft *Clarence Valley LEP 2010* (visual impact, change to access and change in use).

There would be potential direct or indirect impact to 10 unlisted items as summarised below:

- Direct impact on a Well (Roders well) and a portion of a group of mango trees associated with the New Italy settlement.
- Direct impact on service station, Halfway Creek.
- Direct impact on residence at Harwood.
- Direct impact on curtilage of a shed and barn.
- Direct impact on curtilage of property with farm site and local brickworks.
- Indirect impact on house, sheds and stockyards near Milleara (visual impact).
- Indirect impact on Tyndale residence (visual impact).
- Indirect impact on Harwood bridge (visual impact).
- Indirect impact on Meerschaum Vale brickworks (visual impact).
- Indirect impact on Stonehenge property (land acquisition outside of curtilage).

### *5.2.3 Proposed further assessment*

- The potential for additional non-Aboriginal heritage items to occur would be further investigated.
- Targeted surveys to identify curtilages of heritage items.
- Assess the significance of heritage items that would be potentially impacted in accordance with the Burra Charter and the NSW Heritage Office, *Assessing Heritage Significance, NSW Heritage Manual 2, 2001* and *Statements of Heritage Impact, 1991* including cumulative impacts and cultural landscape impacts.
- Where required undertake archaeological investigations.
- Consultation with stakeholders such as the Office of Environment and Heritage (including for the proposed New Italy settlement conservation area) and with councils would be conducted.
- Identify appropriate management and mitigation measures.

### *5.2.4 Management and mitigation measures*

Implementation of standard approaches is expected to mitigate and manage the potential non-Aboriginal heritage impacts identified. Standard management and safeguard measures would be detailed in the environmental impact statement for the project. These would include:

- Where direct impact cannot be avoided, photographic archival recording would be undertaken in accordance with the Heritage Council of NSW guidelines (Heritage Council of NSW 1998 and 2006).
- Avoidance of impacts during construction through implementing no-go zones and informing workers of management and mitigation measures.
- Implementation of an unexpected finds procedure for unidentified relics or sites encountered during construction.

- Monitoring of indirect impacts during construction such as vibration in the vicinity of heritage items.

## 5.3 Contaminated land

### *5.3.1 Overview*

There are 69 areas of potential environmental concern (i.e. potential contaminated land) within or near the project. These are mainly associated with past land uses, including agricultural practices and services for vehicles using the Pacific Highway. Potential contaminated sites present include:

- Cattle dips.
- Sugar cane and tea tree plantations.
- Mechanical workshops.
- Dips/stockyards.
- Banana plantations.
- Sawmill.
- Service stations.
- Quarries.
- Dumps and land fill.

### *5.3.2 Potential impacts*

- Exposure or disturbance of contaminated land which may result in spread of contamination.

### *5.3.3 Proposed further assessment*

- Further assessment of areas of potential environmental concern that may be impacted by the project in accordance with Office of Environment and Heritage's relevant guidelines and *RTA's Contaminated Land Management Guideline* (RTA 2006).
- Identification of appropriate management and mitigation measures.

### *5.3.4 Management and mitigation measures*

Contaminated land management issues are commonly encountered on road projects and can be managed and mitigated through implementation of standard approaches. Standard management and safeguard measures would be detailed in the environmental impact statement for the project. These would include:

- If required to address contaminated areas, a remedial action plan or appropriate environmental management plan would be prepared in accordance with the relevant Office of Environment and Heritage guideline/s.

## 5.4 Air quality

### *5.4.1 Overview*

There is limited information about air quality in the region. 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 (conversation areas, agricultural land and scattered towns), air quality in the region is generally considered to be moderate to good.

From October 2005 to January 2007, short-term air quality monitoring was undertaken at an urban area in Korora about 100 kilometres south of the project. The annual average daily traffic

(AADT) at Korora was about 19, 700 over the monitoring period, which is greater than the AADTs on the Pacific Highway between Woolgoolga to Ballina. The key outcome 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 OEH. Carbon monoxide concentrations measured close to the Pacific Highway were well below the relevant OEH eight hour criteria of nine parts per million. The findings from Korora and the lower traffic volumes, indicate that air quality would meet the OEH guidelines.

### *5.4.2 Potential impacts*

*Operation*

- Increased vehicle emissions eg hydrocarbons, carbon monoxide, nitrous oxide and particulate matter, in locations with existing low traffic volumes.
- Where the project would follow the existing alignment, improved traffic efficiencies would improve local air quality.
- Carbon monoxide concentrations would be within the OEH guidelines and would further diminish with distance from the highway resulting in negligible operational impacts.

*Construction*

- Temporary increase in dust during clearing, earthworks and construction activities.
- Temporary air quality impacts from emissions, such as exhaust fumes, generated by the operation of machinery and other construction vehicles. The impact of these emissions would be limited to the construction phase.

### *5.4.3 Proposed further assessment*

- Identification of sensitive receivers for air quality.
- Identification of activities and weather conditions potentially impacting air quality.
- Assessment of air quality impacts at sensitive receivers during construction and operation.
- Identification of best practice management measures (particularly dust suppression measures) to be implemented during construction of the project.

### *5.4.4 Management and mitigation measures*

Air quality issues are commonly encountered on road projects and can be managed and mitigated through implementation of standard approaches. Standard management and safeguard measures would be detailed in the environmental impact statement for the project. These would include:

- Monitoring air quality near sensitive receivers during construction, visually and/or using instrumentation, to verify the effectiveness of air quality management measures and to identify the need for any additional measures.
- Covering of all materials transported to and from the project.
- Suppressing dust generation by covering or spraying water on stockpiles and exposed soils during weather conditions conductive to generating dust, establishing temporary vegetation on stockpiles, or other suitable practices.
- Imposing speed limits for vehicles travelling on unsealed surfaces.
- Locating stockpiles as far from residences as possible.

- Minimising the extent of disturbed areas at any one time as far as possible.
- Rehabilitation of disturbed surfaces as quickly as possible.
- Modifying or stopping dust generating activities during very windy conditions.
- Operating and maintaining vehicles and equipment in accordance with the manufacturer's specifications.
- Not leaving vehicles and equipment idling when not in use.

## 5.5 Resource use and waste management

### *5.5.1 Overview*

The project traverses a variety of topographies including hills, foothills, floodplains and waterway crossings. Material such as hard rock, select fill, general fill could be partially sourced from cuttings (including rock cuttings), graded benches and other excavations required in hilly and steep areas and would be needed to construct embankments, particularly on floodplains and at waterway crossings.

There are numerous quarries in the vicinity of the project including for gravel, sand, aggregate, hard rock and road base. These include quarries that are currently operational and quarries that are no longer in operation or that appear to have been abandoned. The licences for most of the operational quarries prescribe an allowable extraction amount per year. Other works in the area may have surplus material that could be used for the project.

Cement manufacturers are located at Newcastle and Brisbane, with haulage routes available by rail and road. Large prefabricated concrete units, for example bridge components, could be made at precast manufacturing yards including at Newcastle, Charmhaven (north of Sydney), Macksville, Coffs Harbour or Brisbane. Smaller concrete components could be made at some local council facilities, and manufacturing operations including at Macksville, Coffs Harbour, Kempsey, Tamworth and Sydney. A number of commercial concrete suppliers are located in the region. Large commercial asphalt plants are located at Alstonville, Lismore and Coffs Harbour. Bitumen could be sourced from Sydney and Brisbane.

Water sources include rivers, streams and groundwater. There are also numerous farm dams from which water may be sourced. Higher quality water for some construction activities may need to be sourced from local drinking water supplies.

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

### *5.5.2 Potential impacts*

- Construction would require large quantities of materials. Extraction of general fill and select material would be required from quarries or areas from within, adjacent or outside of the project.
- Potential for a short-term reduction of resource availability in the region.
- Potential contribution to depletion of resources that are already in short supply in the region such as hard rock and potential for sterilisation of quarries located near to or along the project.
- Asphalt and concrete batching plants are likely to be required.

- Water required would range from high quality water to meet construction quality criteria, for example for mixing concrete and low quality water recycled from sediment basins on site or extracted from local rivers, streams and groundwater.

Generation of waste during operation and construction of the project, including:

- Demolition wastes from existing structures, pipe work and pavement that require removal.
- Excavation wastes that are unable to be reused within the project may be produced.
- Vegetation waste from the removal of trees, shrubs and groundcovers that are unable to be mulched and reused within the project.
- Packaging materials such as crates, pallets, cartons, plastics and wrapping materials.
- Site compound waste such as liquid wastes from cleaning, repairing and maintenance, waste from spillages, fuel or oil waste, sewage waste from site amenities and general office wastes.

### *5.5.3 Proposed further assessment*

- Identification of the approximate resource requirements for the project including estimation of the material and water requirements taking into account the cut and fill balance.
- Identification of specific waste impacts of the project and the waste management approach.
- Identification of available materials in the region and in the locality including from quarries, potential material suppliers, other projects in the area and re-use of materials such as pavement.
- Identification of available water supplies in the region and the locality (including recycled water).
- Identification of the management and mitigation measures for resource use and waste including across the project.

### *5.5.4 Management and safeguard measures*

Resource use and waste management impacts are commonly encountered on road projects and can be managed and mitigated through implementation of standard approaches. Standard management and safeguard measures would be detailed in the environmental impact statement for the project. These would include:

- Where not obtained from the alignment, material would be sourced from suitably approved and licensed quarries.
- Where possible, materials obtained from the site would be processed and re-used on site.
- A resource management strategy would be developed and would include:
    - Identification of viable resource suppliers (including water) in the locality and region.
    - Identification of water sources for construction.
    - Proposed sustainable practices for the use of resources (such as use of recycled materials or use of waste water).
    - A process for co-ordination of use and re-use of resources across the project.
- 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 would be accomplished 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.
- Recycled content construction materials would be investigated and considered where available.
- Secondary waste products would be investigated and considered where available such as using as fly ash, slag and silica within concrete mixes.

## 5.6 Greenhouse gas and climate change

### *5.6.1 Overview*

The principal greenhouse gases are water vapour, carbon dioxide, methane, nitrous oxide and ozone. Greenhouse gases are increasing in the atmosphere, primarily due to burning of fossil fuels. The build up of greenhouse gases affects the balance between incoming and outgoing solar energy from the earth and atmosphere. Solar radiation warms the earth and the atmosphere. Some of the radiation is reflected by the earth, but an increasing amount is trapped by the build up of atmospheric greenhouse gases. This is known as the greenhouse effect, causing climates to change on earth.

In 2010 the then DECCW released the *NSW Climate Impact Profile*, including projected climate change impacts for each region in NSW. The main projections for the north coast region are:

- By 2050 the climate is virtually certain to be hotter, with rainfall increasing in summer and decreasing in winter.
- Run-off and stream flow are likely to increase in summer and autumn and decrease in spring and winter.
- Sea level is virtually certain to keep rising.
- Soil erosion is likely to increase on steeper slopes in upper catchments potentially causing sedimentation on the floodplains. Gully erosion is likely to ease.
- Increases in brief heavy rainfalls are expected to increase flooding along urban streams.
- Sea level rise and increased temperature is expected to impact on terrestrial and freshwater ecosystems including saline wetlands, low-lying coastal ecosystems and fragmented forests and woodlands in the hinterland.

### *5.6.2 Potential impacts*

*Operation*

- Emissions from vehicles using the road would decrease where traffic efficiencies increase eg as a result of improved road grades, curves and congestion.
- Emissions from electricity use such as for road lighting and use of equipment, machinery and materials to maintain the road.
- Emissions from embodied energy from materials used to construct the project such as concrete, bitumen and steel.
- Changes in rainfall intensity may result in the following impacts:
    - Increased potential for localised flooding.
    - Drainage and stormwater impacts.
    - Changes to pest and weed species and distribution, and alterations to ecosystem services.
    - Erosion impacts, resulting in sediment loss from the site.
    - Watercourse impacts, including changes to channel structure and other characteristics resulting from changed hydrological conditions.

*Construction*

- Emissions from transport of materials, operation of plant and equipment, vegetation clearing, quarrying and use of electricity. Some components manufactured offsite may be transported from as far away as Sydney, Newcastle and Brisbane.
- Loss of carbon stored in vegetation and associated sequestration capacity due to clearing of vegetation.

### *5.6.3 Proposed further assessment*

- Identify ways to improve efficiency and provide resilience against the impacts of climate change through design of the project.
- Quantify operational greenhouse gas emissions, including embodied emissions and would be compared against existing scenarios.
- Quantify construction greenhouse gas emissions.
- Identify measures to avoid and reduce emissions from both operation and construction of the project.

### *5.6.4 Management and mitigation measures*

Greenhouse gas and climate change issues are commonly encountered on road projects and can be managed and mitigated through implementation of standard approaches. Standard management and safeguard measures would be detailed in the environmental impact statement for the project. These would include:

- Minimising vegetation clearance wherever possible.
- Minimising waste.
- Reducing construction transport requirements through use of local staff, resources, suppliers, landfills wherever possible.
- Re-using materials wherever possible.
- Using recycled materials wherever possible.

- Selecting fuel efficient construction equipment wherever possible.
- Using biofuels (biodiesel, ethanol, or blends such as E10 or B80) during construction wherever possible.
- Identifying and promoting energy efficient work practices.
- Using electrical energy derived from a renewable energy source accredited by the National Green Power Accreditation Steering Group (or equivalent) for the supply of a proportion of the on-site electrical energy required during construction.

Refer to Section 4.3 (hydrology and flooding) for further consideration of the impact of climate change on operation of the project.

# 6 Conclusion

The NSW Roads and Traffic Authority (RTA) is seeking approval to upgrade around 155 kilometres of the Pacific Highway from Woolgoolga to Ballina to a class M (motorway) upgrade standard. The project would be delivered in stages.

The project is critical State significant infrastructure and is being assessed under Part 5.1 of the EP&A Act. Approval from the Minister for Planning and Infrastructure would be required for the project.

The proposed key environmental issues are:

- Traffic and transport.
- Hydrology and flooding.
- Water quality.
- Ecology.
- Aboriginal cultural heritage.
- Noise and vibration.
- Urban design and landscape character.
- Land use and property.
- Socio-economic.

The environmental impact statement will include the following:

- A detailed description of the project including its components, construction activities and potential staging.
- A comprehensive assessment of the potential impacts on the key issues including a description of the existing environment, assessment of potential direct and indirect and construction, operation and staging impacts.
- Description of measures to be implemented to avoid, minimise, managed, mitigate, offset and/or monitor the potential impacts.
- Identify and address issues raised by stakeholders.

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# Attachment A
# Requirements of the *Environmental Planning and Assessment Regulation 2000*

Clause 192 of the *Environmental Planning and Assessment Regulation 2000* requires that an application for approval of the Minister to carry out State significant infrastructure must include:

(a) details of any approval that would, but for section 115ZG of the Act, be required for the carrying out of the State significant infrastructure, and
(b) details of any authorisations that must be given under section 115ZH of the Act if the application is approved, and
(c) a statement as to the basis on which the proposed infrastructure is State significant infrastructure, including, if relevant, the capital investment value of the proposed infrastructure.

This clause is addressed below.

## (a) Approvals that would otherwise apply

Approvals that may be required to carry out the State significant infrastructure, if not for section 115ZG of the EP&A Act, include:

- A concurrence under Part 3 of the *Coastal Protection Act, 1979* of the Minister administering that part of the Act.
- A permit under section 201, 205 or 219 of the *Fisheries Management Act 1994*.
- An approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977*.
- An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974.*
- An authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act repealed by that Act) to clear native vegetation or State protected land.
- A water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.

## (b) Authorisations if the application is approved

Authorisations that may be required for the project under section 115ZH of the EP&A Act include:

- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act)

## (c) State significant infrastructure statement

The Pacific Highway Projects are declared to be critical State significant infrastructure under section 115V of the *Environmental Planning and Assessment Act, 1979* (EP&A Act), by virtue of clause 16 and Schedule 5, clause 1 of *State Environmental Planning Policy (State and Regional Development) 2011*.

In accordance with clause 16 of *State Environmental Planning Policy (State and Regional Development) 2011* the Pacific Highway Projects is also State significant infrastructure under section 115U of the EP&A Act and would be permissible without development consent under Part 4 of the EP&A Act.

The Woolgoolga to Ballina upgrade is part of the Pacific Highway Projects and is therefore to be assessed under Part 5.1 of the EP&A Act and would require consent from the Minister for Planning and Infrastructure.

# Attachment B
# Issues raised during identification of the preferred route and concept design

Table 2.1: Summary of issues raised during identification of the preferred route and concept design

| Issue category | Issues raised |
|---|---|
| Traffic and transport | • Road safety including at interchanges and at Wardell Road.<br>• Speed limits including at Harwood Bridge.<br>• Access to villages and locales via local roads.<br>• Access for forestry activities, national parks and the New Italy area.<br>• Increased traffic volumes on local roads.<br>• Interchange locations and arrangement impacts including increased travel distances and access to the highway for northbound traffic at Woodburn and consideration of future land use and traffic demand.<br>• Interchange performance.<br>• Overpass locations.<br>• Induced traffic.<br>• Impacts of staged construction works on regional traffic.<br>• Access for emergency services.<br>• Access to the driver reviver area at New Italy.<br>• Impact on transport such as buses. |
| Hydrology and flooding | • Change to intensity of flood flows, level of flooding, duration of flooding, time of inundation and the potential impacts on sugar cane.<br>• Flood impact on and near the Richmond River floodplain.<br>• Flood immunity, including during extreme floods on bridges and culverts and with consideration to climate change.<br>• Flooding impacts on private property.<br>• Catchments for surface water sources used for irrigation.<br>• Recent flood studies to be considered eg in the Clarence Valley LGA.<br>• Groundwater.<br>• Climate change management needs to be adaptive and risk based. |
| Water quality | • Erosion and sedimentation<br>• Exposure of acid sulfate soils.<br>• Fish kills from works on the Richmond River floodplain.<br>• Pollution of sensitive waterways as a result of construction.<br>• The Solitary Island Marine Park and adjacent wetlands.<br>• Run-off from the project including from bridges. |
| Ecology | • Fragmentation of habitat. |

| Issue category | Issues raised |
|---|---|
| | • Connectivity to and between habitats and strategic corridors.<br>• Seasonal fauna movements (local and regional).<br>• Loss of sensitive vegetation.<br>• Threatened species, populations and habitats including bird species.<br>• The endangered coastal emu population.<br>• Threatened fish species including Oxleyan Pygmy Perch.<br>• Wetlands including SEPP 14 coastal wetlands including impacts on water quality.<br>• Groundwater dependent ecosystems.<br>• Mitigation could include rehabilitation of suitable habitat and other areas.<br>• Design of fauna crossings needs to consider the amount of fill needed. |
| Aboriginal cultural heritage | • Areas of significance to the Aboriginal community including archaeology, scarred trees, burial sites and cultural sites.<br>• Native Title claims.<br>• Cumulative and landscape scale impacts. |
| Noise and vibration | • Construction and operational noise impacts including on private property, rural properties and other sensitive receivers such as schools and places of worship.<br>• Operational noise at Harwood from the bridge.<br>• Operational noise from rest areas.<br>• Out of hours works.<br>• Blasting in rural areas. |
| Urban design and landscape character | • Visual impact of the project particularly in greenfield areas and due to cuttings.<br>• Visual impact on the landscape and rural residential properties.<br>• Change to rural views.<br>• Rest area locations could be chosen to provide views/lookouts. |
| Resource use | • Quantities of materials required/resource demand.<br>• Capability of local areas and quarries to provide resources.<br>• Water resource needs.<br>• Consideration of re use of resources in the project such as treated effluent.<br>• Resources should be obtained from balancing cut and fill eg flattening batters to obtain fill wherever possible, with consideration to ecological, economic and social impacts. |
| Land use and property | • Loss of prime agricultural land including high value cane growing land.<br>• Relationship of the project with future growth areas.<br>• Property acquisition. |

| Issue category | Issues raised |
|---|---|
| Socio-economic impacts | • Changing traffic patterns and impacts on the economies of smaller towns and villages.<br>• Relationship of the project with future growth areas.<br>• Economic impacts including on tourism, businesses, loss of productive agricultural land and reduction in property values.<br>• Opportunity for business growth.<br>• Property access including for residences and for farming activities such as moving livestock and sugar cane.<br>• Access to existing quarries.<br>• Access for state forests.<br>• Property severance.<br>• Impact on Corindi sewage treatment works.<br>• The viability of the sugar cane industry, individual cane arms and Harwood Mill.<br>• The viability of the cattle industry and individual cattle farms as a result of impact on prime agricultural land.<br>• Prime sugar cane growing land.<br>• Impact of haulage on local access including for sugar cane and other agricultural land.<br>• Amenity (eg noise) and associated impacts on property value.<br>• Amenity impacts during construction.<br>• Amenity at Maclean, Tyndale and Woodburn.<br>• Connectivity between Maclean and Townsend.<br>• Rainwater quality for rainwater tanks. |
| Non-Aboriginal heritage | • The heritage value of the New Italy area, including visual impacts.<br>• Items including heritage farmhouses and farms.<br>• Small historical communities such as the Harwood historical landscape. |
| Land management | • Contaminated land including cattle dip sites, banana plantations, cane growing land, stockyards, old service stations and asbestos. |
| Air quality | • Increased diesel emissions and air pollution during operation and potential impacts on health. |
| Greenhouse gases and climate change | • Global warming |

# Attachment C
# Issues raised during the planning focus meeting

Table 2.2: Issues raised at the Planning Focus Meeting for the project held on 9 August 2011

| Stakeholder | Issues raised |
|---|---|
| Richmond Valley Council | • Flooding on the Richmond River floodplain. |
| | • Council has a Richmond River floodplain model available. |
| | • Quarries- consider approval requirements. |
| Clarence Valley Council | • Involve the Aboriginal community, especially during construction. |
| | • Note new Native title claim – 'Yaegl #2 people'. |
| | • Council have a Biodiversity Management Strategy identifying priority concerns and wildlife corridors. There is also a Clarence Estuary Management Plan. |
| | • Locations for Highway service centres in Clarence Valley eg at Harwood, Maclean? |
| Coffs Harbour City Council | • Impact on irrigation areas and disposal site for the Corindi Sewage Treatment Plant. |
| | • Access to Corindi from the highway. |
| | • Council has an Estuary Management Plan for the Corindi River. |
| | • Heritage items listed on the Coffs Harbour LEP 2000 have been updated recently. |
| | • Acid sulfate soils. |
| | • Cut at Dirty Creek - consider visual impact and the construction footprint needed. |
| | • Define and assess a realistic construction footprint including storage areas. |
| | • Flooding of the Corindi River and Blackadder Creek. |
| NSW Maritime | • Richmond River- Consider clearance heights for watercraft. |
| | • Harwood Bridge - Will the bridges proposed at Harwood be opening bridges? What height? Consider cost, construction, amenity, visual, socio-economic- tourism/access on river. Bridge pylons need protection from boating. |
| Office of Environment and Heritage | • Population dynamics of threatened species including direct and indirect impacts. |
| | • Consider how population dynamics and impacts are associated with/impacted by change to connectivity, fragmentation, genetic drift, isolating resources. |
| | • Access all existing information, OEH can assist eg. There is information available on koalas south of Broadwater and Maclean, Bettongs- Corindi to Glenugie, Black-legged storks. |
| | • Sheet flow management should mimic existing situation re. cross-drainage needs to be adequate to protect riparian, wetlands habitat etc (eg. Identify and consider sensitive areas for sheet flow). |

| Stakeholder | Issues raised |
|---|---|
| | • Early assessment of ancillary facilities: include utilities, truck rest areas, borrow pits. |
| | • Landscape features such as the Clarence River have Aboriginal cultural association (dreamtime) as does any fig tree. |
| | • Consider fill heights when assessing connectivity. |
| | • Consider how works will be staged to minimise impacts. |
| | • Consider quarries, licensed capacity. |
| | • Consider need for borrow pits. |
| | • Resource use - potential key issue. |
| | • Consider haulage impacts on local roads. |
| | • Ospreys at Harwood have been successfully managed by RTA and relocated from the bridge - Consider how they would continue to be managed. |
| | • Any construction early works should be clarified, defined and assessed. |
| | • Contamination- ensure dip sites are identified. |
| | • Spoil management- where will spoil stockpile sites be, what will be stored there and how with the stockpiles be managed? |
| | • Laying batters to get fill – consider ecologically sustainable development principles eg sourcing fill vs impacts such as vegetation clearing etc. |
| | • Consider to what road design standard fauna crossing structures will be designed to. |
| | • Connectivity for arboreal species - Consider existing monitoring from other projects. Review current proposed crossing structures eg poles, rope overpasses. Consider retaining vegetation, widening medians. |
| | • Wetland encroachment has occurred due to wet weather. Validate vegetation mapping and potential distribution of aquatic species, birds and frogs. |
| | • Giant Barred Frog- this cryptic species occurs in sub-optimal habitat such as dams. |
| | • Vegetation mapping- local council mapping is more accurate than CRAFTI, more accurate mapping should be done earlier. |
| | • Flooding - Council has Lower Richmond River and Lower Clarence River models. |
| | • Flood impacts on agriculture and property (dwellings). |
| | • See Ballina bypass modelling - used Council models. |
| | • Flood immunity of the highway including connectivity to other roads. |
| | • Assess operational noise impacts in accordance with the new OEH NSW Road Noise Policy and include predicted noise levels at all potentially affected receivers. Consider construction and operational impacts on all potentially affected sensitive receivers. |

| Stakeholder | Issues raised |
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| | • Assess the requirement for, and feasibility of, implementing operational stage noise mitigation measures prior to commencement of construction to provide a construction stage benefit. |
| | • Identify and assess potential impacts on all receiving waterways (i.e. identifying all stream orders) (including water quality, sedimentation, flow regimes, structural, physical, geomorphic and biological characteristics). OEH recommends the EA addresses baseline data/assessment of receiving waterways (surface and groundwater) and address the requirements of surface and groundwater monitoring programs which include background assessment of at least up to 18 months prior to construction commencing. |
| | • OEH recommends water quality assessment considers all potential sources of pollution (not just TSS, pH) relevant to the characteristics of the existing environment (also previous land uses) and receiving environment. This may include consideration of naturally occurring or existing elements and the risk of those elements increasing during construction and thus triggering thresholds. |
| Department of Trade and Investment, Regional Infrastructure and Services (Fisheries) | • Water quality management - Water quality must be in the low pH range (6.5-8) for Oxleyan Pygmy Perch (OPP) and those ecosystems. |
| | • Consider lessons learnt about OPP from the Devils Pulpit project. |
| | • OPP- there are timing constraints regarding construction of waterway crossings. |
| | • Field surveys are likely to find OPP in areas above the pH range. |
| | • OPP have a short life cycle (four years) therefore need to maintain breeding grounds during construction. |
| | • Erosion and sediment control/water quality management- include consideration of stringent temporary and permanent fish passages (Class 1). |
| | • OPP use floods to re-distribute so field surveys will only identify their current distribution. Therefore potential distribution needs to be considered and managed/assessed accordingly. |
| | • Bridge construction method considerations: Clarence river- prawn/ fishing industry (rock platforms affect prawn trawling), aquaculture and recreation- all need to be consulted. |
| | • Good lessons from Glenugie upgrade project eg use of mulch and batters etc. |
| Department of Trade and Investment, Regional Infrastructure and Services (Agriculture) | • Loss of potential agricultural production. |
| | • Severance of agricultural land. |
| | • Effect of change to hydrology on agricultural land (eg. at Coldstream), existing hydrological regime should be maintained. |
| | • Impact on prime agricultural land. |
| Rous Water | • Woodburn bore fields are directly impacted. |
| | • Impact on the Rous Water treatment facility. |
| | • How will embankments alter recharge rates for the bore fields? |

| Stakeholder | Issues raised |
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| | • Spillages and runoff from the highway- where would it be diverted to? Further assessment of risks on water quality is needed. |
| | • Consider the potential for a vegetated butter strip between the highway and the bore fields to protect water quality. |
| Marine Parks Authority | • Need to maintain good water quality in the Corindi River. Consider erosion and sediment control, acid sulfate soils, pollutants and tannins. |
| | • Operational water quality- road runoff and accidental spills. |
| Department of Lands | • Crown reserves are impacted and have been reserved for a variety of public uses. Some are managed by trusts. |
| | • Need to identify current uses and assess impact of upgrade (i.e. loss of public use). |
| | • Consult with trusts. |
| | • Consider the need for offsets. |
| | • Where crown lands adjoin the upgrade, consider use for ancillary facilities and to source material. |