

Oxley Highway to Kempsey

Upgrading the Pacific Highway

ROUTE OPTIONS DEVELOPMENT REPORT

OCTOBER 2005



Roads and Traffic Authority

**Pacific Highway Upgrade -
Oxley Highway to Kempsey**

Route Options Development Report

October 2005

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Executive Summary

1. Completing the Upgrade of the Pacific Highway

The identification of all remaining route options to upgrade the Pacific Highway between the F3 Freeway and Tweed Heads is a key step in moves to complete the upgrade of the highway. With the \$2.2 billion Pacific Highway Upgrade Program in place since 1996 almost 230 kilometres of the highway are now double-lane divided road. A further 225 kilometres of new highway have been approved for construction or have had a preferred upgrade route identified.

Five projects have been announced in October 2005:

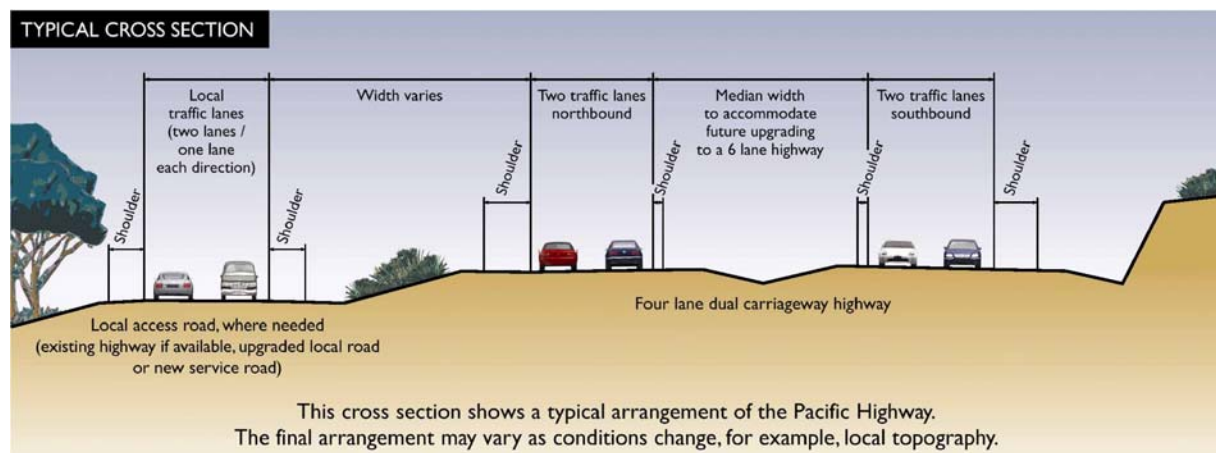
- ▶ F3 Freeway to Raymond Terrace;
- ▶ Oxley Highway to Kempsey;
- ▶ Woolgoolga to Wells Crossing;
- ▶ Wells Crossing to Iluka Road; and
- ▶ Tintenbar to Ewingsdale.

This is the final group of five projects, which are proceeding to the route selection phase in October 2005. These five projects, along with the sections Macksville to Urunga and Woodburn to Ballina will provide preferred routes for the final 230 kilometres of the highway. This will provide planning certainty for local communities and pave the way for a construction program to complete the upgrade of the Pacific Highway.

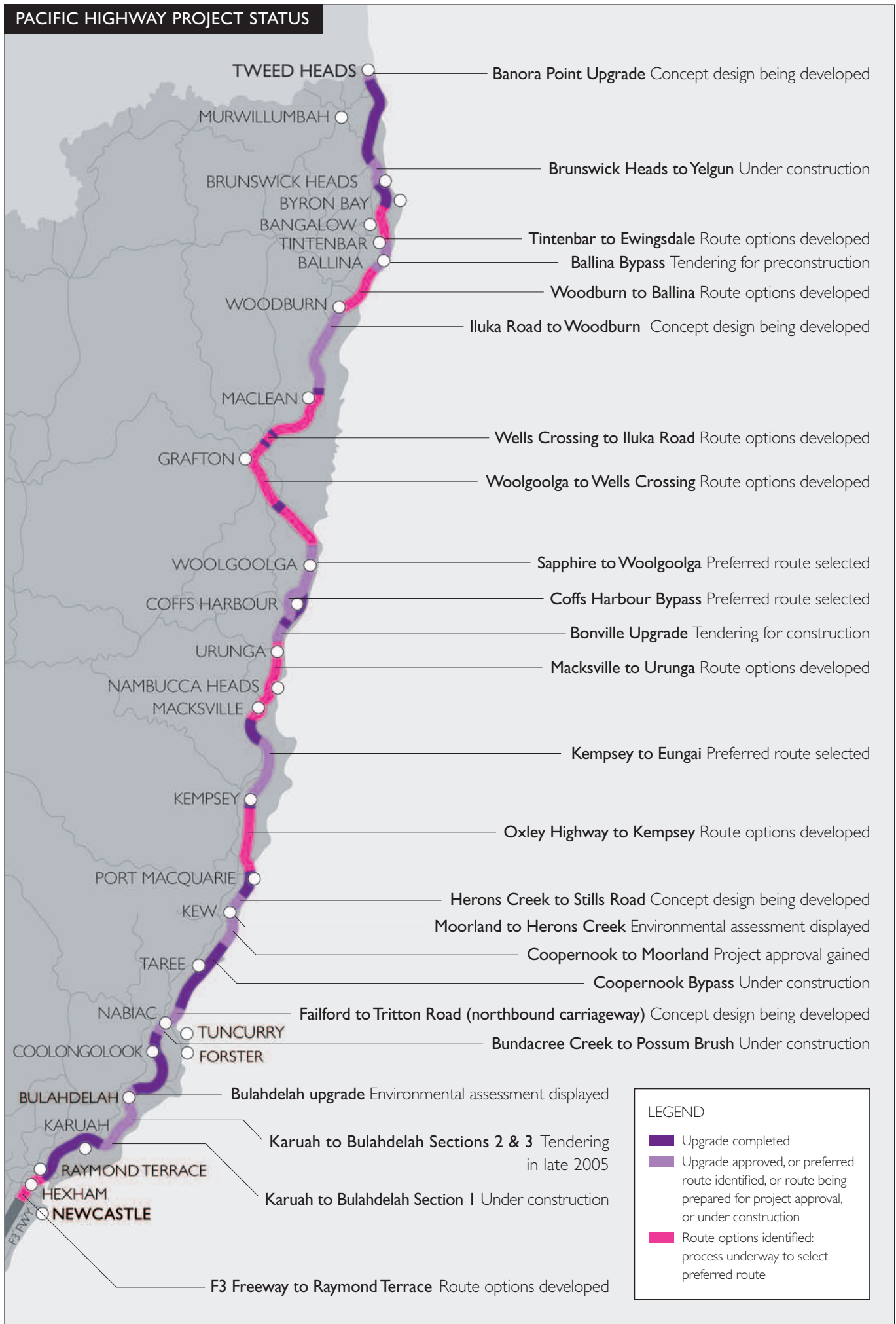
Beyond 2006

The RTA is planning for the long term by providing a high standard road, described as a motorway. A key feature involves being able to separate local traffic from through or long distance traffic.

This means roads that provide a lower speed alternative are located alongside the motorway that is designed for a speed of 110 km/h. Local traffic can get onto the motorway at regular grade separated interchanges.



PACIFIC HIGHWAY PROJECT STATUS



2. Oxley Highway to Kempsey

This project involves the proposed upgrade of approximately 37.6 km of the Pacific Highway on the mid north coast of NSW, 66 km north of Taree.

The project commences at the intersection of the highway and the Oxley Highway, near Port Macquarie. It extends for 37.6 km, over the Hastings and Wilson Rivers and Cooperabung Hill to the Maria River south of Kempsey.

The study area consists of a corridor, up to three kilometres wide, which generally surrounds the existing highway (as shown on Figure 1.2 in Section 1). In response to requests from sections of the Telegraph Point community, the study team has also investigated the feasibility of route options to the east of Telegraph Point. These options are located outside the November 2004 study area.

This report summarises the outcomes of the route options development phase of the project. It describes the four options that have been developed, and provides information on the process used and the factors considered in the assessment of the options.

3. Road Design and Upgrade Strategies

Design standards for the Pacific Highway Upgrade Program require two lanes in each direction, with consideration for the future addition of another lane each way, separated by a median of a desirable width of 12 metres. Traffic volume projections have been prepared for 20 years from 2016.

Two highway upgrade strategies are being considered as part of the project:

- ▶ Class A – two lanes in each direction, 100 km/h posted speed, limited access condition roadway with at grade intersections.
- ▶ Class M – two or three lanes in each direction, 110 km/h posted speed, controlled access condition roadway with grade separated interchange access.

The upgrade of the highway is expected to be completed in stages to meet traffic growth. Upgrade to Class A may be followed by a subsequent upgrade to Class M. Upgrading may also be completed on a staged basis.

The ultimate arrangement of grade separated interchanges and local access roads cannot be accurately determined prior to selection of the preferred route and the preferred upgrade strategy. This may result in further impacts and benefits beyond those considered in this report.

4. Route Option Development Process

The route option development process involved the following steps:

- ▶ Review of existing data;
- ▶ Site visits – road and aerial inspections of the study area;
- ▶ Preliminary ecological, heritage, traffic, geotechnical and other investigations;
- ▶ A variety of community involvement activities to identify community interests, issues and concerns;
- ▶ Opportunities and constraints workshops;
- ▶ Options workshop to consider possible options;

- ▶ Identification and refinement of the feasible route options; and
- ▶ Preparation of the route options development report.

The route options display provides the community an opportunity to comment on the route options.

5. Study Area Characteristics

A summary of the key characteristics of the study area is provided below. Further information is provided within Section 3 of this report.

Overview of the Local Area

The study area is located between the intersection with the Oxley Highway (to the south) and Kempsey (to the north). Port Macquarie is the closest major town. The study area is dominated by rural land and forest reserves, with scattered rural residential development and a number of small towns. The settlements of Telegraph Point and Kundabung are located within the study area. In 2001, the population of the study area and surrounds was approximately 3,800 people with higher population densities towards the south.

The study area is located within the Kempsey and Port Macquarie – Hastings Local Government Areas (LGA) as shown on Figure 1.2 in Section 1 of this report.

Traffic and Transport Issues

If the upgrading of the Oxley Highway to Kempsey section of the highway does not occur, it is projected that by 2016, there would be an average of 0.98 fatal crashes per annum and 10.8 serious injury crashes per annum, representing 29.35 crashes / 100 MVK per annum. By 2036 this would increase to an average of approximately 1.6 fatal crashes per annum and 17.8 serious injury crashes per annum, representing 29.45 crashes / 100 MVK per annum.

The results of the preliminary traffic investigations indicate that the Hastings River Drive to Telegraph Point section would require initial upgrading to Class A within the period 2007 to 2016 and upgrading to Class M standard prior to 2036 with an upgrade to six lanes by 2041.

Theoretically the number of crashes could be reduced from the current levels of 29.37 crashes / 100 MVK to 16.45 and as low as 13.51 crashes / 100 MVK for Class A and M upgrades respectively.

The highway at the time of opening (assumed for planning purposes to be 2016), based on the “do nothing” scenario would either start to experience, or would already exhibit, unstable traffic flow conditions resulting in a level of service (LoS) D or E respectively in certain sections within the study area. Twenty years after opening the highway would operate at LoS E. This means that the highway would experience queuing and delays, as traffic volumes would be over capacity.

All intersections (as at-grade facilities), with the exception of Blackmans Point Road / Pacific Highway, would operate unsatisfactorily at the design horizon (2036). As a result, intersection / interchange treatments should be considered. Interchange locations would depend on which option is selected and the integration with the existing interchange with the Oxley Highway to the south and the proposed interchange as part of the Kempsey to Eungai project to the north.

The Annual Average Daily Traffic¹ (AADT) on this section of the highway in 2004 ranges from 8,280 to 12,030 vehicles per day. The 85th percentile speed is 101 km/h and the average speed is 93 km/h.

Through traffic accounts for approximately 18% of northbound and 26% of southbound traffic volume. Heavy vehicles make up approximately 13% of the existing daytime (7am to 7pm) traffic volume and 43% of the existing night time (7pm to 7am) traffic volume.

Highway Road Reserve

Much of the existing road reserve is not of sufficient width and property acquisition would be required to achieve a 110 km/h design. Acquisition would be required if the upgrade involved duplication or realignment of the existing highway.

Carriageway Configuration

All lanes including overtaking lanes along the existing highway are 3.5 metres wide. Within the study area there are six lengths of overtaking lane northbound and seven southbound.

Horizontal and Vertical Alignment

The horizontal and vertical geometry of the carriageway contains lengths that do not comply with the 110 km/h design standards for the Pacific Highway Upgrade (RTA 2005). Approximately 26% of the existing alignment does not meet this design standard. The main areas where the design standards are not met are from Hastings River Drive to Moorside Drive and from Ravenswood Road to the Maria River.

Intersections

Of the 45 intersections within the project, 14 do not comply with the 100 km/h sight distance criteria. The majority of the non-compliant intersections are located adjacent to horizontal curves or crest curves that restrict visibility.

Structures

Design standards (RTA's *Upgrading the Pacific Highway, Upgrading Program beyond 2006: Design Standards March 2005*) suggest a minimum carriageway width of 10.5 metres for a four-lane facility with an SM1600 load standard. The assessment determined that none of the eight bridges, including the Dennis Bridge at Hastings River, meet these criteria, however compliance with SM1600 loading may be achieved on some bridges with strengthening works.

Drainage Infrastructure

Of the eight highway bridges within the study area, five have 1% Annual Exceedance Probability (AEP) immunity (one in 100 year flood level) based on preliminary analysis. The Maria River bridge (northbound) is five metres lower than the southbound bridge, and is lower than the 1% AEP flood level. The 1% AEP flood level for Smith's Creek bridge is 0.65 metres higher than the deck level.

The preliminary hydraulic assessment for the bridge structures indicates that they meet the design standard that one travel lane in each direction remain flood-free during a 1 in 100 year flood event.

¹ Annual Average Daily Traffic (AADT) – The number of vehicles crossing at a specific site per year and dividing this number by the number of days in the year (366 days in 2004).

Highway Accesses

There are a total of 76 accesses to the highway. In order to improve the safety and efficiency of the highway the project needs to consider providing access to the highway via local access roads, combining access points, controlled access points, intersections and / or interchanges.

Indigenous Heritage

The NSW Department of Environment and Conservation Aboriginal Heritage Information Management System Register has identified that 18 Aboriginal heritage sites are located within the study area. These include five isolated artefacts, twelve artefact scatters and a scarred tree.

A number of unregistered sites of cultural significance to the local Aboriginal community are also known to occur within or in close proximity to the study area. This has been confirmed by initial consultations with the Aboriginal community.

Non-Indigenous Heritage

There are two non-indigenous heritage items listed on the Register of the National Estate located in close proximity to the study area. These are lime kilns located at Piper's Creek and Kundabung.

Eleven non-indigenous heritage items, located within or near the study area, are listed in Part 3 of Schedule 4 (Other Heritage Items) of the *Hastings Local Environmental Plan 2001* and Section 2 of the NSW State Heritage Inventory (items listed by local government and State Government agencies). These include the butter factory, timber mill and cemetery at Telegraph Point in addition to the railway bridge over the Wilson River and the road bridge over the railway off the old Pacific Highway.

Visual Amenity

The study area is characterised by a variety of landscape settings, within a predominantly rural environment. The southern part of the study area is flat to gently undulating with a flat and forested landscape preceding open pastureland on the Hastings River floodplain.

Noise

The results of modelling indicate that 87, or approximately 14%, of the potential receivers experience daytime noise levels that exceed the Department of Environment and Conservation's 'Redeveloped Highway' criteria of 60 dB(A). The results also indicate that 170, or approximately 28%, of the potential receivers experience night time noise levels that exceed the Department of Environment and Conservation's 'Redeveloped Highway' criteria of 55 dB(A).

The majority of these receivers are located in Telegraph Point. Additional isolated receivers are distributed along the remainder of the highway.

Terrestrial Ecology

Threatened species records from a variety of sources indicated that nine threatened flora species and 49 threatened fauna species listed under the *Threatened Species Conservation Act 1995* have been recorded within 10 km of the existing highway. Of these, three threatened flora species and 27 threatened fauna species have been recorded within two kilometres of the existing highway. Additionally, 12 rare flora species have been recorded or have the potential to occur within two kilometres of the existing highway. Of these, one rare flora species has been recorded within two kilometres of the existing highway.

The Commonwealth Department of Environment and Heritage Protected Matters Search Tool identified five threatened fauna species and six migratory species listed under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* that have the potential to occur in the study area.

Two terrestrial endangered ecological communities listed under the *Threatened Species Conservation Act 1995* have the potential to occur within the study area. Additionally, seven wildlife corridors pass through the study area.

Aquatic Ecology

Database searches revealed that there are no records of threatened aquatic species within the study area. However, one endangered fish species listed under the *Fisheries Management Act 1994* and one rare flora species listed in the rare or threatened Australian plant (RoTAP) published list have the potential to occur. Five aquatic endangered ecological communities listed under the *Threatened Species Conservation Act 1995* are known to occur in the vicinity of the study area.

There are two wetlands listed by State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14) within the study area. These are located on Dalhunny Island in the Wilson River and on the northern bank of the Wilson River to the northeast of Dalhunny Island.

Topography

The study area comprises coastal floodplains, valleys and hills. Within the study area, the land rises from sea level to heights of approximately 166 metres. The topography in the south is characterised by undulating low hills and the coastal floodplains associated with the Hastings and Wilson Rivers. In the middle of the study area, north from the Wilson River to south of Kundabung, the coastal hills tend to be steeper and have the highest elevation within the study area. This area includes Allen Hill and Cooperabung Range and borders the broad low-lying coastal plain situated to the east. The northern portion of the study area traverses a number of watercourses and their associated valley flats.

Regional Geology

The underlying geology of the southern portion of the study area features Quaternary alluvial sand, silt, mud and gravel on the floodplains of the Hastings and Wilson Rivers. The low hills are made up of the Carboniferous Byabbara Beds and the Lower Permian Macleay Group that includes the Beechwood Beds and the Permian Thrumster Slate.

The underlying geology of the middle portion of the study area mainly comprises the Youdale, Kullatine, Majors Creek, Mingaletta and Cooperabung Formations around the Cooperabung Range, with lithic sandstone, mudstone, conglomerate, minor limestone and coal. In the northern portion of the study area, the underlying geology mainly comprises the Kempsey Beds with lithic sandstone, mudstone, pebbly sandstone and minor conglomerate.

Quaternary alluvial sand, silt, mud and gravel is located in the vicinity of Cooperabung Creek, Smiths Creek, Pipers Creek and Maria River.

Soil Issues

Preliminary subsurface investigations have revealed that the deep alluvial floodplains of the Hastings River and Wilson River include soft soils of up to 15 metres within the Hastings River floodplain and varying from two metres to eight metres within the Wilson River floodplain.

Geotechnical Issues

Geotechnical features of the study area were assessed using available information including known properties of geotechnical domains and the performance of embankments and rock cuttings along the existing highway. The southern portion of the study area (south from Wilson River), and the northern portion of the study area (north from Mingaletta Road) are characterised by numerous small scale slumps and wedge style failures. If the preferred option involves widening of the existing cutting north of the Wilson River, detailed geological assessment would be required to confirm cutting stability and develop appropriate design responses.

Based on observations, future rock cuttings in the Cooperabung Range would need to consider the fractured and steeply dipping nature of the rock units within this area for incorporation into cut batter design and establishment of appropriate maintenance protocols.

6. Route Options

Development of Route Options

The route options were initially developed with the assistance of the Infrastructure Corridor Analysis (INCA) modelling program, which is run in a geographical information system (GIS) environment. INCA was used as a tool to establish a range of possible alignments, based on weightings assigned to the constraints within the study area.

Four route options were identified which provide broad corridors within which it is considered feasible to build the new highway. The options follow a common corridor through some of the project sections. The corridors provide flexibility for refinement following further investigations and community consultation.

Description of the Options

A brief description of the four options is provided below. Further information is provided in Section 5 of this report. The preferred route may be a combination of the options presented below.

Blue Option

The Blue option starts 700 metres north of the Oxley Highway interchange, following the existing alignment until the left hand bend adjacent to Hastings River Drive where the curve is flattened. It continues north along the existing highway alignment crossing the Hastings River floodplain. This option retains the existing bridge as the southbound carriageway (although the bridge does not conform to new standard cross-section) with a new bridge alongside for the northbound carriageway. It then deviates to the western side of the existing highway, with the possibility of minor encroachment in Cairncross State Forest and Rawdon Creek Nature Reserve, prior to rejoining the existing highway approximately 1.5 km north of Blackmans Point Road. It again follows the existing highway alignment, crossing the Wilson River floodplain and the Wilson River immediately west of the existing bridge prior to running through Cooperabung Range, which includes Cooperabung Creek Nature Reserve and Ballengarra State Forest. The crossing of the Wilson River will use the existing bridge as the northbound carriageway (although the bridge does not conform to the new standard cross-section) with a new bridge alongside for the southbound carriageway. The vertical curve through Cooperabung Hill would require flattening. The section between the end of Kundabung straight and the end of the study area at Maria River (south of Kempsey) would be realigned using flatter curves.

For the majority of the route, this option involves the addition of one new carriageway with the existing highway being reconstructed as the second carriageway. Where new alignments are required (e.g. in the vicinity of Hastings River Drive, north of Blackmans Point Road and south of Maria River), two new carriageways would be provided.

Green Option

The Green option starts 700 metres north of the Oxley Highway interchange, following the existing alignment until Fernbank Creek where it deviates to the west before crossing the Hastings River floodplain. The crossing of the Hastings River would require the construction of two new bridges adjacent to and upstream of the existing bridge. It rejoins the existing highway alignment south of Blackmans Point Road. At Blackmans Point Road it deviates to the eastern side of the existing highway, with the possibility of minor encroachment in Cairncross State Forest and Rawdon Creek Nature Reserve, prior to rejoining the existing highway alignment approximately 1.5 km north of Blackmans Point Road. It again follows the existing highway alignment, crossing the Wilson River floodplain and Wilson River prior to running through Cooperabung Range that includes Cooperabung Creek Nature Reserve and Ballengarra State Forest. The crossing of the Wilson River will use the existing bridge as the northbound carriageway (although the bridge does not conform to new standard cross-section) with a new bridge alongside for the southbound carriageway. The vertical curve through Cooperabung Hill would require flattening. The section between the end of Kundabung straight and the end of the study area at Maria River (south of Kempsey) would be realigned using a straight horizontal alignment that encroaches on the Maria River State Forest.

For the majority of the route, this option involves the construction of one new carriageway with the existing highway being reconstructed as the second carriageway. Where new alignments are required (e.g. in the vicinity of Hastings River, north of Blackmans Point Road and south of Maria River), two new carriageways would be constructed.

Purple Option

The Purple option starts 700 metres north of the Oxley Highway interchange, following the existing alignment until the left hand bend adjacent to Hastings River Drive where the curve is flattened. It continues north along the existing highway alignment crossing the Hastings River floodplain up to Blackmans Point Road. The crossing of the Hastings River would require the construction of two new bridges adjacent to and upstream of the existing bridge. At Blackmans Point Road it then deviates to the eastern side of the existing highway, with the possibility of minor encroachment in Cairncross State Forest and Rawdon Creek Nature Reserve, prior to rejoining the existing highway alignment approximately 1.5 km north of Blackmans Point Road. It again follows the existing highway alignment to Moorside Drive where it diverts to the east. From Moorside Drive, the option follows a new alignment to the east of the ski park recreational facility. The alignment in this area lies outside the study area set for the project in November 2004. It then crosses the Wilson River, Dalhenty Island and SEPP 14 wetland. The crossing of the Wilson River would require the construction of two new bridges. It then rejoins the existing highway alignment north of Haydons Wharf Road, and runs through Cooperabung Range that includes Cooperabung Creek Nature Reserve and Ballengarra State Forest. The vertical curve through Cooperabung Hill would require flattening. The section between the end of Kundabung straight and the end of the study area at Maria River (south of Kempsey) would be realigned using a straight horizontal alignment that encroaches on the Maria River State Forest.

For the majority of the route, this option involves the addition of two new carriageways. However, either side of the Hastings River floodplain, one new carriageway would be provided.

Orange Option

The Orange option starts 700 metres north of the Oxley Highway interchange, following the existing alignment until approximately 400 metres south of Fernbank Creek where it deviates to the west before crossing the Hastings River floodplain. The crossing of the Hastings River would require the construction of two new bridges approximately 300 metres upstream (west) of the existing bridge. It then continues on a straight alignment to Blackmans Point Road where it deviates to the east across the Wilson River floodplain. The alignment in this area lies outside the study area set for the project in November 2004. The Orange option crosses the Wilson River at the eastern end of Dalhunny Island and SEPP 14 wetland and would require the construction of two new bridges. The Orange option then heads in a northerly direction, crossing Haydons Wharf Road in close proximity to the existing highway and then continues north through the Cooperabung Range along a relatively straight alignment to the east of the existing highway. The option rejoins the existing highway at Mingaletta Road. The section between the end of Kundabung straight and the end of the study area at Maria River (south of Kempsey) would be realigned using a straight horizontal alignment that encroaches on the Maria River State Forest.

For the majority of the route, this option involves the addition of two new carriageways. However, south of Fernbank Creek and along Kundabung straight, one new carriageway would be provided.

Project Cost Estimates

Strategic cost estimates have been prepared for each of the four route options and upgrade strategies. The estimates were based on plans and long-sections of each option as well as preliminary geotechnical investigations of the study area.

The estimate for this project is in the range of \$610 million to \$890 million (in 2005 dollars) depending upon the option and the upgrade strategy. These estimates included contingency factors of between 35% and 50% on all cost items. These estimates assume that the upgrade will be undertaken in one stage, however it is likely that the highway upgrade will be undertaken in stages, ultimately to a Class M facility.

Project Cost Estimates

Section	Cost (\$ Million)							
	Blue		Green		Purple		Orange	
	Class A	Class M	Class A	Class M	Class A	Class M	Class A	Class M
A ¹	235	280	270	260	270	280	250	260
B ¹	210	280	215	285	300	340	265	265
C ¹	50	75	50	75	50	75	75	75
D ¹	115	175	115	190	120	195	120	190
Total	610	810	650	810	740	890	710	790

Note: ¹ Total rounded to the nearest \$5 million.

7. Next Steps

The project is being developed in a way that is both ecologically sustainable and achieves the best overall outcome for the whole community. The RTA recognises the importance of addressing social, ecological, engineering and cost factors while continuing to provide for future transport needs. Most importantly, dual carriageway roads and fewer highway connections will result in a safer road environment.

A preferred route has not been selected at this stage.

A preferred route will be selected by considering:

- ▶ The community's issues and comments on the route options;
- ▶ Information on the physical impact of each of these routes, in relation to economic, ecological, engineering and community issues; and
- ▶ A value management process which will include a workshop. This workshop will be held with participants from the community, government and technical areas. The workshop will assess the performance of each of the route options against a range of agreed criteria.

Four feasible route options have been identified for further consideration and assessment (see figure over page).

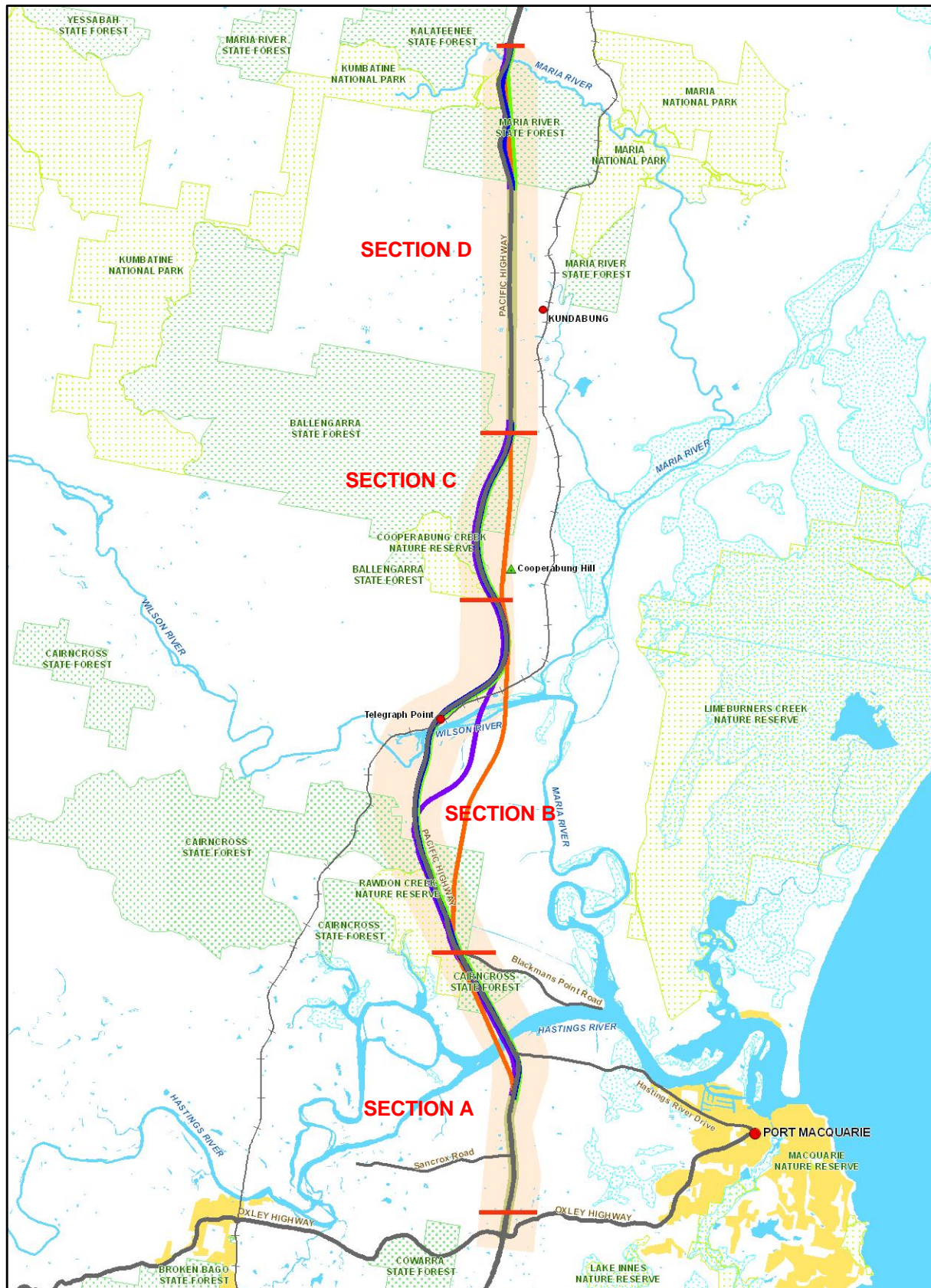
Community response to these feasible options is an important part of selecting a preferred route. The route options will be on display for approximately four weeks.

As the route options can be linked together in different ways, there are decisions to be made about a preferred route in the study area. The community is being invited to consider each of the route options and provide comments on the reply paid feedback form included with the community update (the feedback form is also available online). Community feedback will be integrated into the value management workshop.

Investigation of the four options will continue in preparation for the value management process.

A value management workshop will be held to consider the full range of issues and constraints to locating a highway route. Following refinement of the preferred route the concept design and environmental assessment phases would commence.

Community consultation will continue. A community liaison group, updates in the local media, newsletters, meetings with individuals and groups, and a project website will continue to keep the community informed and assist community input.



SCALE 1:175,000

1 0 1 2 3
Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geodetic Datum of Australia 1994
Grid: Map Grid of Australia, Zone 56



LEGEND

Blue Option	Study Area	Nat Park / Reserve	Highway; Main Rd
Green Option	Wetlands	State Forest	River / Creek
Purple Option			Locality
Orange Option			Hill/Mountain
Common corridor for all options			

Note: Coloured options represent a 250 metre wide corridor, which includes 4 lanes, ie 2 lanes each way, separated by a landscaped areas

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Spatial layers courtesy of Port Macquarie-Hastings Shire Council, Kempsey Shire Council, NSW Department of Lands, Geoscience Australia.