

## 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.

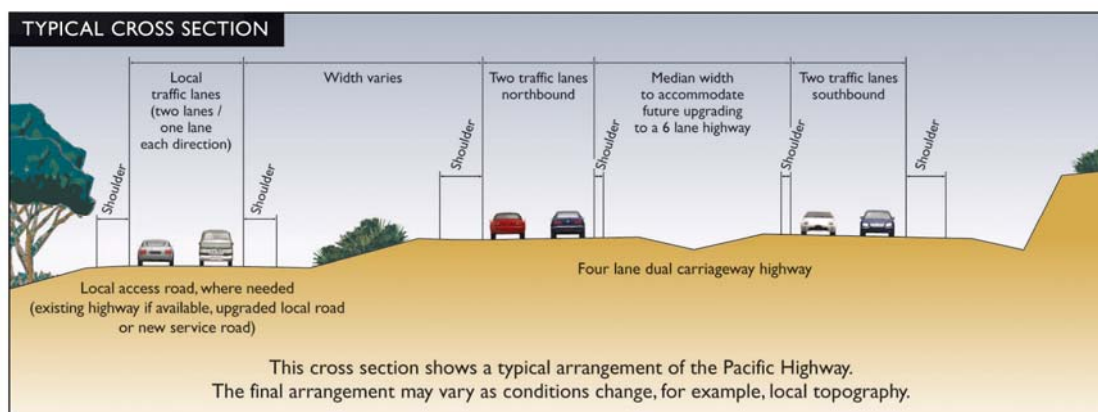
Five projects have been announced in October 2005:

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

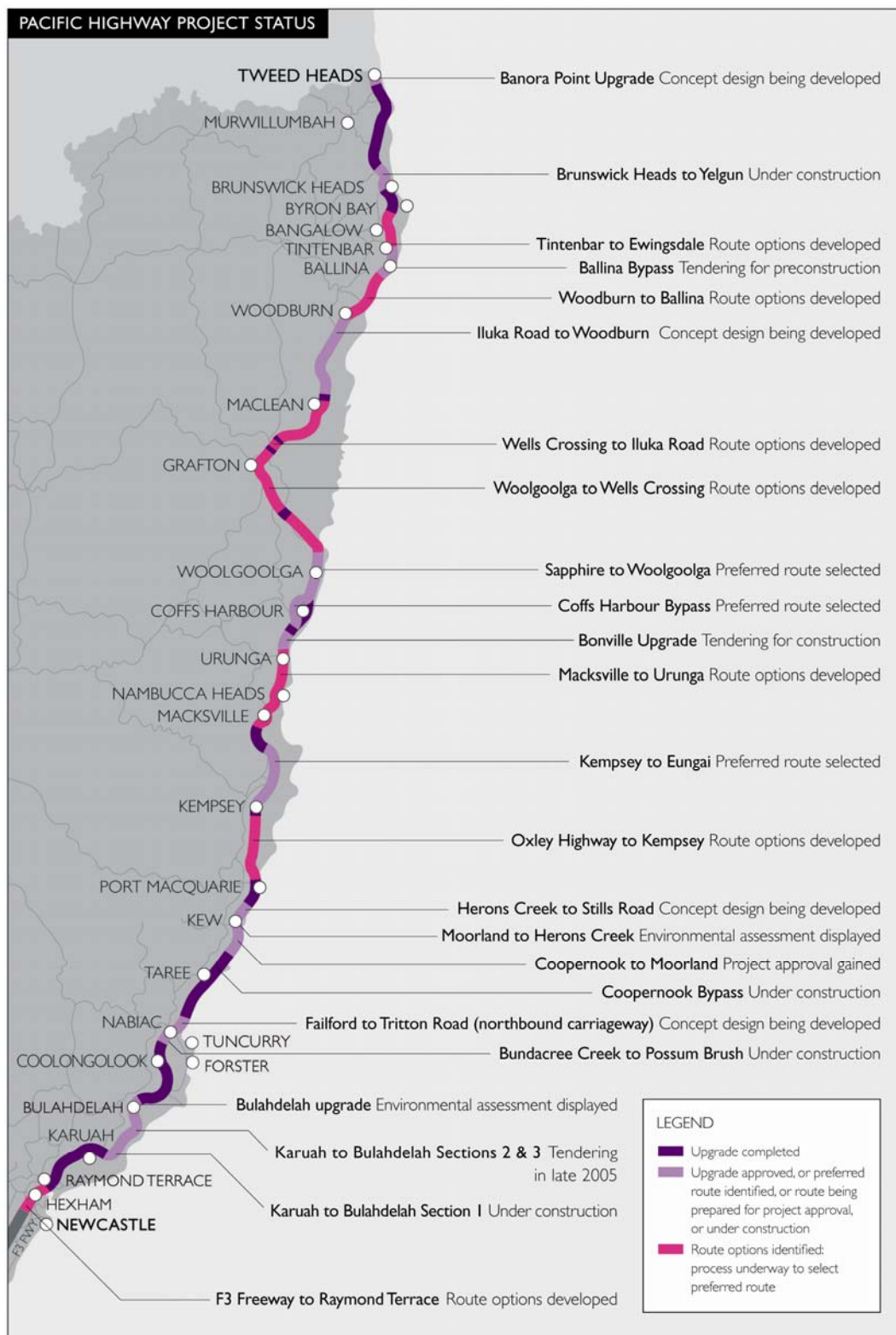
This is the final group of five projects which are proceeding to the route selection phase in October 2005. These five projects, along with the sections Macksville to Urunga and Woodburn to Ballina will provide preferred routes for the final 230 kilometres of the highway. This will provide planning certainty 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 110km/hr. Local traffic can get onto the motorway at regular grade separated interchanges.



**Figure A: The Pacific Highway Upgrade Program**



## **2. Wells Crossing to Iluka Road project**

The Wells Crossing to Iluka Road project consists of approximately 80 kilometres of the existing Pacific Highway, from Wells Crossing (about 30 kilometres south of Grafton) to the Iluka Road intersection (about 56 kilometres north of Grafton). The study area is roughly triangular in shape and covers an area of approximately 64,500 hectares, extending from Wells Crossing in the south to Iluka Road in the north, and from South Grafton in the west to Pillar Valley in the east. It is predominantly located to the east of the existing Pacific Highway alignment. As part of preliminary investigations for the project, the study area was reviewed and extended. The study area is illustrated in **Figure B**.

## **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 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.
- Preparation of the route options development report.

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

## **5. Community consultation**

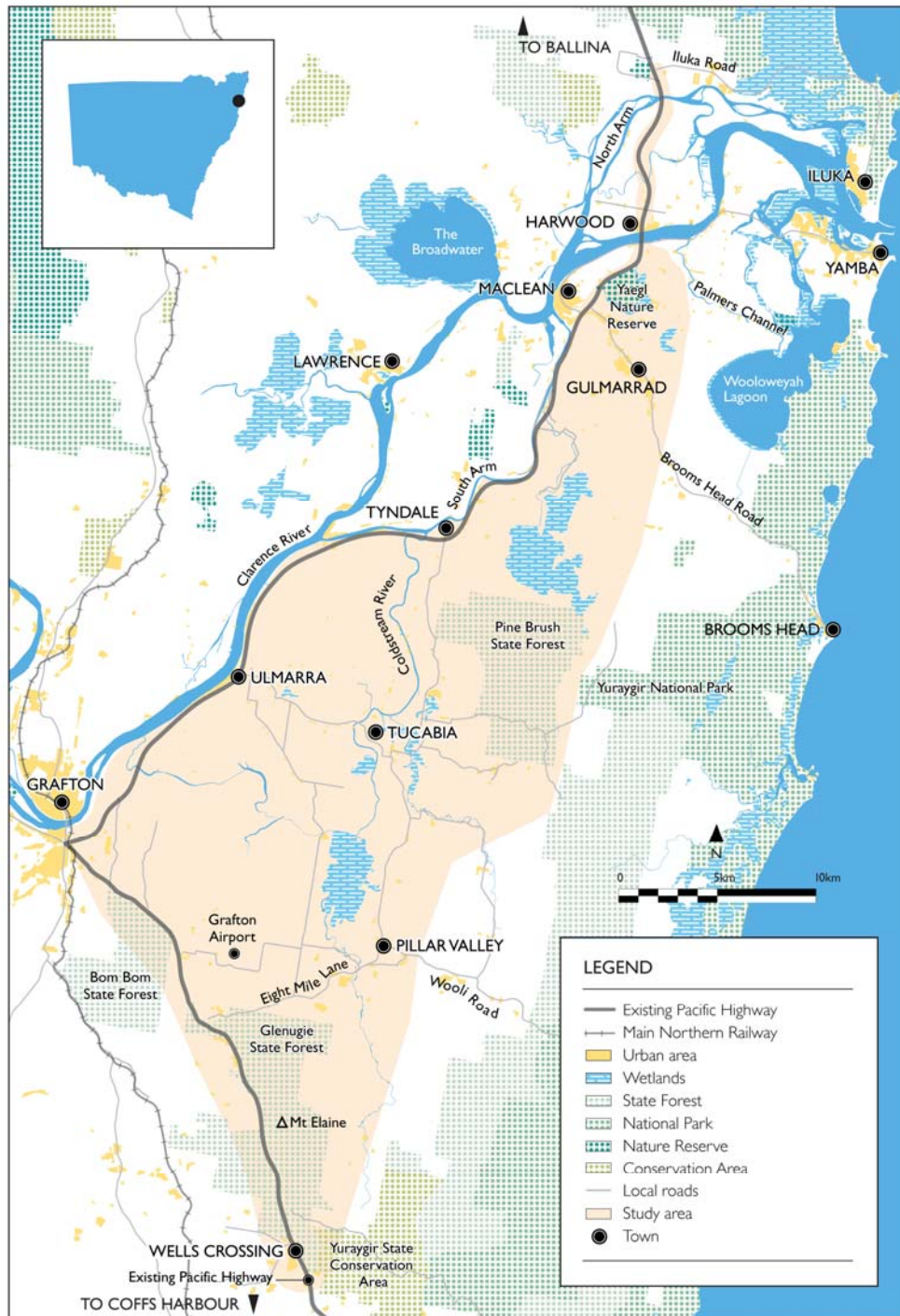
A wide range of community groups and individuals have been involved in the project to date through:

- Community Information Sessions held in Grafton and Maclean at the commencement of the study in December 2004.
- Distribution of Community Updates in November 2004 and October 2005.
- Formation and regular meetings of three Community Liaison Groups (CLGs) based in Maclean, Grafton and Tucabia.
- Public notice advertising and media coverage (print and electronic) informing the community of key aspects of the project and opportunities for involvement.
- Submissions and comments via letters, a free call community information line and e-mail.
- A project website to host project information, project updates and records of CLG meetings.
- Establishment of Special Interest Groups on Aboriginal cultural heritage and flooding issues.
- A survey focusing on the potential business impacts of the upgrade, distributed to a representative sample of the business community in the study area.
- A planning focus meeting with State Government agency and Clarence Valley Council representatives.
- Meetings/briefings to local council, business, special interest and industry groups.
- Meetings and site visits with individual residents and property owners.

## **6. Study area characteristics**

The study area is shown in **Figure B**.

Figure B: The study area



### **Traffic and transport issues**

The upgrade of the Pacific Highway between Wells Crossing and Iluka Road is needed to improve road safety and to reduce travel times. Upgrading of the Pacific Highway will reduce travel times, bringing benefits for all road users including local and long distance travellers, and freight transport operators.

Future travel demand in the corridor is unlikely to be served by rail transport. It is therefore important that the road system be upgraded to ensure capacity and safety are able to meet future demand.

The existing Pacific Highway through the study area is primarily a two-lane road with occasional overtaking lanes and some short sections of divided road. The alignments in most sections do not meet current design standards for the upgrading of the highway. The current crash rate on the Pacific Highway between Wells Crossing and Iluka Road, approximately 32 crashes per million vehicle kilometres travelled (MVKT), is high in relation to the RTA objective for the Pacific Highway Upgrade Program of 15 accidents per MVKT. The highway currently passes through numerous towns, villages and other settlements within the study area. Conflicts between highway traffic (in particular heavy vehicles) and the amenity of these settlements are expected to increase with the growth in vehicle volumes and the number of heavy vehicles. Characteristics of the existing highway are:

- A high proportion of long distance traffic, especially heavy vehicles, which have been increasing substantially over the past five years.
- Predominantly single carriageway with limited overtaking opportunities and potential for head-on collisions.
- Vehicles cannot travel at a consistent speed.
- Close proximity to residences, particularly where it passes through the townships of South Grafton, Swan Creek, Ulmarra, Tyndale and Harwood.
- Vehicles can enter or exit the highway at numerous access points, including local roads, lanes and business and residential driveways, which increases the potential for conflicts with high speed traffic.

There is a need to provide a higher and consistent standard of road to better serve existing and future road users. The upgrading of this section of the Highway forms an essential part of the overall upgrade of the highway between Hexham and the Queensland border.

## 7. Route options

### The development of route options

Route options were developed through a process that involved an assessment of the transport issues and the opportunities and constraints to new road development within the study area. Key environmental and land use constraints include:

- Areas of residential and rural residential development.
- Areas that have been designated for conservation purposes.
- Prime agricultural land.
- Ecologically sensitive areas.

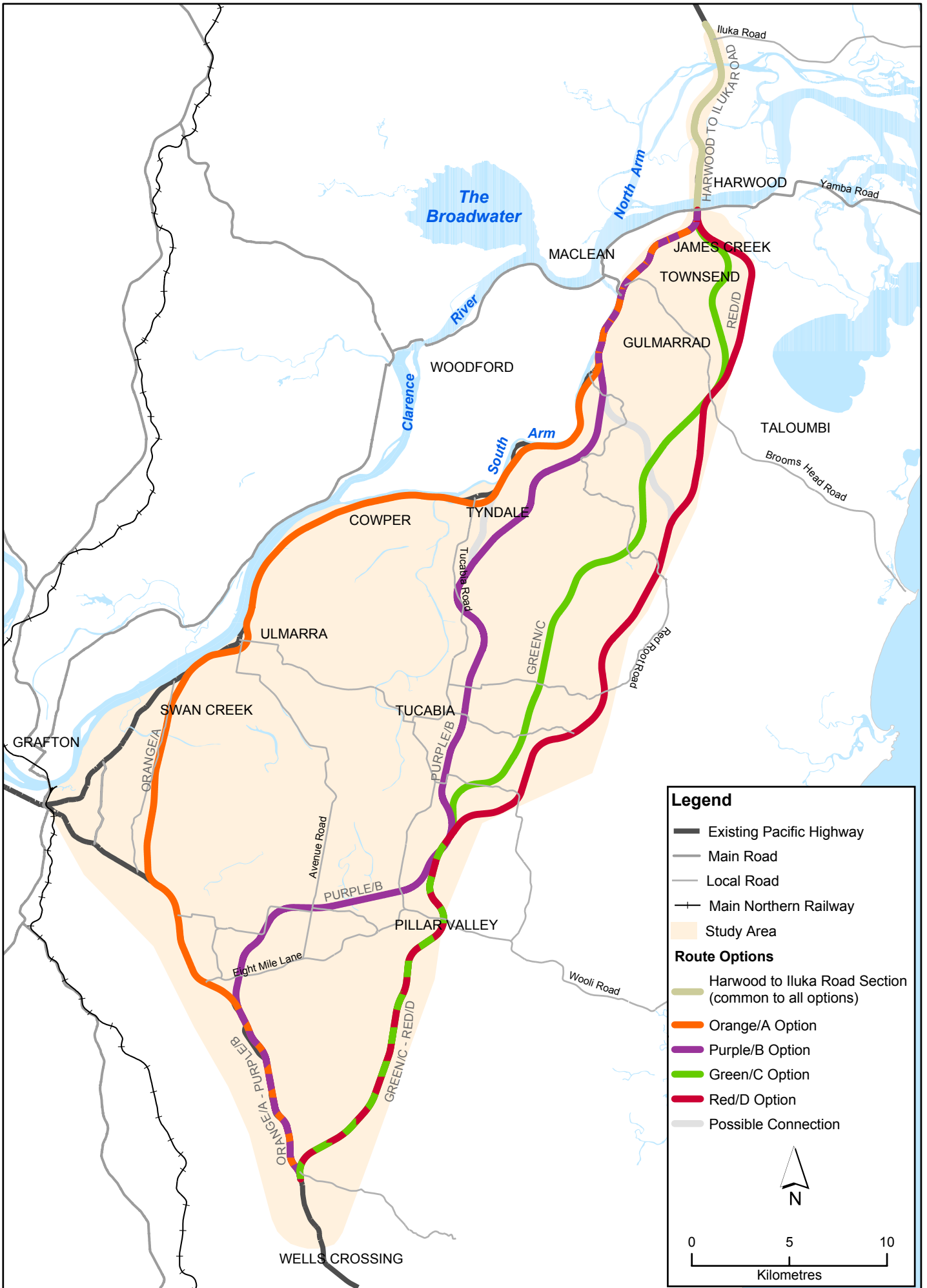
Because much of the study area is within the floodplain of the Clarence River, flooding and poor foundation conditions are key constraints. Another important issue is the need to link the project with other projects to the south (Woolgoolga to Wells Crossing) and north (Iluka Road to Woodburn). Those projects generally involve upgrading the route of the existing highway.

The identification and development of route options sought to avoid significant constraints while identifying feasible highway upgrade options that could be developed to meet the project objectives. Assessment criteria were defined as a basis for development and assessment of the route options. Based on these criteria, a long list of potential route options was developed, including new routes and the option of upgrading the existing Pacific Highway. Options suggested by several community submissions were also assessed.

More detailed fieldwork and desktop investigations were undertaken following generation of the long list of route options. The options were then assessed against the Pacific Highway Upgrade Program and project objectives, to determine a short list of feasible options. The short list of options is illustrated at **Figure C** and includes:

- The Orange/A option, which is a new road generally following the existing highway with deviations to avoid towns and villages including South Grafton, Swan Creek, Ulmarra and Tyndale.
- The Purple/B option which travels through the middle of the study area, between Tucabia and the Pine Brush State Forest, and connects to the Pacific Highway at Shark Creek.
- The Green/C option, which passes to the east of Pillar Valley and through Pine Brush State Forest, then east of Gulmarrad and James Creek.
- The Red/D option, which follows the Green/C option from Wells Crossing, and passes east of Pine Brush State Forest, Gulmarrad and James Creek before re-joining the other options at Harwood.
- Potential connections between the options near Tyndale and in the Shark Creek area.





**Figure C The route options**



- One option from Harwood to Iluka Road, involving a new dual carriageway road adjacent to the existing highway, with the existing highway to be used as an alternative route and for local access.

### **Assessment of the route options**

The short listed options were assessed against a wide range of factors, including physical constraints and social, economic and traffic and transport considerations. A preferred route has not been identified, and the assessment will be further refined after the public display period. Results of the investigations for each option are presented in the following sections.

### **The Orange/A option**

The Orange/A option is generally an upgrade of the existing highway alignment with bypasses located to the east of South Grafton, east of Ulmarra and east of Tyndale. Where the existing highway alignment is to be upgraded, this would be to Class M<sup>1</sup> standard and would require service roads (one or both sides) to be constructed to allow for local access, and an alternative route for local traffic for the entire length of this option. The longest of the options, at 69 kilometres long, it crosses 38 kilometres of floodplain, more than any other option. Bridges would be provided at Swan Creek, Coldstream River, Shark Creek and other minor creeks.

The Orange/A option would perform well in relation to the safety objectives of the project. It would have a minimal impact on the natural environment, consistent with objectives relating to ecologically sustainable development. However, it would not perform well in relation to social objectives or in terms of reducing travel times and transport costs.

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<sup>1</sup> Two design standards have been considered for the project: Class M standard refers to a road that dual carriageway and is of a motorway standard, with connections to the local road network only at grade separated interchanges with major roads (where traffic volumes demonstrate sufficient demand); Class A standard refers to a dual carriageway road with allowance for local roads to intersect with the highway at grade at limited locations, in addition to grade separated interchanges with major roads.

## Summary of the Orange/A option

Criteria	Assessment of the Orange/A option
Road safety	<ul style="list-style-type: none"> <li>■ Orange/A option is able to be designed to achieve the target crash rate of 15 crashes per 100 million vehicle kilometres travelled, halving the crash rate for traffic using the new road.</li> <li>■ Would provide safety benefits to local traffic as the majority of local traffic would use the Orange/A route in preference to the existing highway.</li> </ul>
Traffic, transport and access	<ul style="list-style-type: none"> <li>■ Would attract approximately 90% of traffic from the existing highway.</li> <li>■ Potential interchanges at Bom Bom and north of Swan Creek to provide access to Grafton.</li> <li>■ Potential interchange south of Harwood Bridge to access Maclean and Yamba.</li> <li>■ Approximately 75% of all heavy vehicles are semi-trailers or B-Doubles and the majority of these would use the Orange/A option rather than the existing highway.</li> <li>■ Approximate travel time saving of eight minutes from Wells Crossing to Harwood.</li> <li>■ Existing highway would be retained as an alternative route and to provide access to properties.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>■ Would meet required design standards including 110km/h design speed.</li> <li>■ Potential for staged construction due to proximity to existing highway.</li> <li>■ Cost estimate between \$1300-1400 million (in 2005 dollars).</li> </ul>
Topography, geology and soils	<ul style="list-style-type: none"> <li>■ Relatively flat terrain reduces earthworks volumes and ensures that gradients would meet design standards.</li> <li>■ More than half the route length is within the floodplain, in areas of soft soils, requiring pre-loading or specific foundation designs to prevent settlement of fill.</li> <li>■ High potential to encounter acid sulfate soils.</li> </ul>
Drainage and flooding	<ul style="list-style-type: none"> <li>■ Approximately 38 kilometres within the Clarence floodplain.</li> <li>■ Road embankments across the floodplain would be typically two to three metres high, but up to six metres high in some locations.</li> <li>■ Approximately 20-25 bridges would be required within the floodplain.</li> <li>■ Another ten bridges would be required across creeks outside the floodplain.</li> <li>■ Substantial quantities of fill material would need to be imported for embankment construction.</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>■ Water quality conditions at creek crossings generally within ANZECC/ARMCANZ (2000) guideline levels.</li> <li>■ Some creeks exhibit low dissolved oxygen and pH levels, and high concentrations of turbidity.</li> </ul>
Ecology	<ul style="list-style-type: none"> <li>■ Ecological impacts are relatively minor compared to other options, as the majority of the route passes through highly disturbed floodplain areas.</li> <li>■ Approximately one kilometre of the Orange/A option passes through high value habitat (around Yaegl Nature Reserve).</li> <li>■ Minor impacts on Yaegl Nature Reserve and SEPP 14 wetland would be mitigated by specific design measures to minimise the road footprint.</li> <li>■ Impacts on Glenugie State Forest are mainly edge effects associated with widening and minor re-alignment of the existing highway.</li> </ul>
Planning and land use	<ul style="list-style-type: none"> <li>■ Approximately 175 houses, mainly fronting the existing highway, would potentially be directly affected.</li> <li>■ Land use impacts mainly relate to widening of the existing highway - edge effects rather than severance of properties.</li> <li>■ Edge effects on cane farms would result in the north of this option.</li> <li>■ Severance of rural properties between Bom Bom and Swan Creek would impact on prime agricultural land.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>■ Potential direct impacts on three Aboriginal sites of high significance.</li> <li>■ Potential impacts on four non-indigenous heritage sites of high significance.</li> <li>■ Potential indirect impacts on three non-indigenous heritage sites of high significance.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>■ Approximately 225 residences potentially affected by night-time noise levels exceeding the DEC criteria for redeveloped roads, including approximately 175 houses potentially directly affected by the road corridor.</li> <li>■ Many noise affected residences may be within the road reserve and require direct acquisition.</li> </ul>

Criteria	Assessment of the Orange/A option
Visual	<ul style="list-style-type: none"> <li>■ Close to existing highway and major residential centres, which would mean that this option is visible to a high concentration of people and would impact on the most properties.</li> <li>■ Embankment severs the relationship of properties to south-east of alignment with river.</li> <li>■ Impacts are focused on existing area of disturbance, but would be substantially increased as a result of the scale of required road infrastructure to meet design requirements.</li> </ul>

### The Purple/B option

The Purple/B option would be 66 kilometres long, cross 13 kilometres of flood plain and involve duplication of approximately 19 kilometres of the existing highway, north of Wells Crossing and between Shark Creek and Harwood Bridge. Where the existing highway is to be upgraded, this would be to Class M standard and would require service roads to be constructed to allow for local access. New sections of the alignment would also be to Class M standard.

The Purple/B option would perform well against the Pacific Highway Upgrade Program objectives relating to ecological impacts. It would perform moderately well against social objectives. While it would meet the objectives in relation to safety and travel time savings for through traffic, it would provide minimal benefits for local traffic.

### Assessment summary for the Purple/B option

Criteria	Assessment of the Purple/B option
Road safety	<ul style="list-style-type: none"> <li>■ Purple/B option is able to be designed to achieve the target crash rate of 15 crashes per 100 million vehicle kilometres travelled, halving the crash rate for traffic using the new road.</li> <li>■ Some improvement in traffic safety for traffic using the existing highway from reductions in traffic volumes and heavy vehicle volumes on the existing highway.</li> </ul>
Traffic, transport and access	<ul style="list-style-type: none"> <li>■ Would attract only small volumes of local traffic from the existing highway.</li> <li>■ Approximately 30-35% of vehicles are through traffic and would use the Purple/B option.</li> <li>■ Approximately 50% of heavy vehicles are through traffic and would use the Purple/B option.</li> <li>■ Approximately 75% of heavy vehicles are semi-trailers or B-Doubles and approximately 60% of these are through traffic that would use the Purple/B option rather than the existing highway.</li> <li>■ Travel time saving for through traffic from Wells Crossing to Harwood would be approximately 10 minutes.</li> <li>■ Potential interchange locations include Glenugie and south of Harwood Bridge.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>■ Would be designed to achieve the road design standards for the Pacific Highway Upgrade project, including 110km/h design speed.</li> <li>■ Some opportunities for staged construction from Wells Crossing to Glenugie and from Shark Creek to Harwood Bridge.</li> <li>■ Cost estimate of between \$950-1050 million (in 2005 dollars).</li> </ul>
Topography, geology and soils	<ul style="list-style-type: none"> <li>■ Generally undulating terrain outside the floodplain for the majority of this option would provide good conditions for road construction.</li> <li>■ Sections of this route within the floodplain and affected by soft soils, requiring pre-loading or specific foundation designs to prevent settlement of fill.</li> <li>■ Areas of large earthworks volumes would be limited to Bondi Hill, around Tyndale.</li> </ul>
Drainage and flooding	<ul style="list-style-type: none"> <li>■ Approximately 13 kilometres of this option would be within the floodplain.</li> <li>■ Significant fill volumes would be required to provide the required flood immunity in some sections between Tyndale and Shark Creek.</li> <li>■ Embankments would be typically 1.5 to 2.5 metres high within the floodplain, and up to five metres high between Tyndale and Shark Creek.</li> <li>■ Approximately six to eight bridges would be required within the floodplain.</li> <li>■ Approximately 20 bridges would be required to cross creeks outside the floodplain.</li> </ul>

Criteria	Assessment of the Purple/B option
Water quality	<ul style="list-style-type: none"> <li>Water quality of creeks where crossings would be required is generally good, with the exception of low dissolved oxygen at some sites.</li> </ul>
Ecology	<ul style="list-style-type: none"> <li>Ecological impacts would be moderate.</li> <li>Minor impacts on Yaegl Nature Reserve and SEPP 14 wetland would be mitigated by specific design measures to minimise the road footprint.</li> <li>Impacts on Glenugie State Forest include edge effects and severance of the north-western area of the forest.</li> <li>Impacts on endangered ecological communities would occur in the floodplain areas around Coldstream River and Pillar Valley Creek.</li> <li>Some severance of areas of high habitat value to the east of Tucabia and around Bondi Hill and Shark Creek (approximately ten kilometres in total).</li> <li>Impacts on important habitat corridors would be limited.</li> </ul>
Planning and land use	<ul style="list-style-type: none"> <li>Approximately 35 houses would be potentially directly affected.</li> <li>Potential impacts on urban areas would be limited to indirect impacts through Townsend associated with duplication of the existing alignment.</li> <li>Approximately 265 ha of prime agricultural land would be affected, including grazing land around the Coldstream River and sugar cane farms around Shark Creek.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>Overall heritage impacts would be low, relative to other options.</li> <li>Two Aboriginal sites of low significance would be potentially directly impacted.</li> <li>Two non-indigenous sites of high significance would be potentially indirectly affected.</li> <li>One Aboriginal site of moderate significance and one site of low significance would be potentially indirectly affected.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>Approximately 90 dwellings would be affected by night time noise levels exceeding DEC criteria for new roads, including approximately 35 houses potentially directly affected by the road reserve.</li> </ul>
Visual	<ul style="list-style-type: none"> <li>Provides a diverse and varied visual experience for road users.</li> <li>Utilises existing highway alignment at its southern and northern limits, however, visual impacts on the local area would be greater than currently resulting from the existing road due to the scale of the infrastructure required to meet design standards.</li> <li>Generally follows the edges of land use units, thereby integrating with the surroundings.</li> </ul>

### The Green/C option

The Green/C option would be approximately 60 kilometres long of which five kilometres would cross the Clarence River floodplain, in the north of this option. It would be an entirely new road, intersecting with the existing Pacific Highway near Bald Knob Road, Wells Crossing and south of Harwood Bridge. It would be constructed entirely as a Class M standard road.

The Green/C option would perform well against the Pacific Highway Upgrade Program objectives in relation to benefits for through traffic (travel time and cost, and safety). It would provide little benefit for local traffic. The Green/C option performs generally well against the social objectives of the project, except around Gulmarrad and James Creek where indirect impacts on rural residential areas would be high. The ecological impacts of the Green/C option would be high.

### Assessment summary for the Green/C option

Criteria	Assessment of the Green/C option
Road safety	<ul style="list-style-type: none"> <li>■ Can be designed to achieve the target crash rate of 15 crashes per 100 million vehicle kilometres travelled, halving the crash rate for traffic using the new road.</li> <li>■ Some improvement in traffic safety for traffic using the existing highway from reductions in traffic volumes and heavy vehicle volumes on the existing highway.</li> </ul>
Traffic and transport	<ul style="list-style-type: none"> <li>■ The Green/C option is the shortest of the route options.</li> <li>■ Would attract very little local traffic from the existing highway.</li> <li>■ Approximately 30-35% of vehicles would be through traffic and would use the Green/C option.</li> <li>■ Approximately 50% of heavy vehicles are through traffic would use the Green/C option.</li> <li>■ Approximately 75% of heavy vehicles are semi-trailers or B-Doubles and approximately 60% of these are through traffic that would use the Green/C option rather than the existing highway.</li> <li>■ The travel time saving for through traffic between Wells Crossing and Harwood Bridge would be approximately 13 minutes.</li> <li>■ Potential interchange locations include Bald Knob Road and south of Harwood Bridge.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>■ Would be designed to achieve the standards required for the Pacific Highway Upgrade Program, including 110km/h design speed.</li> <li>■ No opportunities for staged construction.</li> <li>■ Cost estimate of between \$700-800 million (in 2005 dollars).</li> </ul>
Topography, geology and soils	<ul style="list-style-type: none"> <li>■ Generally topography and soils present minimal constraint to the Green/C option.</li> <li>■ Floodplain soils would be traversed for relatively short distances around Shark Creek and north of Brooms Head Road - some potential to encounter soft soils and acid sulfate soils.</li> <li>■ Earthworks volumes would be significant, but cut and fill volumes would be balanced.</li> </ul>
Drainage and flooding	<ul style="list-style-type: none"> <li>■ Approximately five kilometres of this option would be within the floodplain, around Shark Creek and north of Brooms Head Road.</li> <li>■ Embankments would be typically two to three metres high, and up to six metres high in some locations in the floodplain.</li> <li>■ Two bridges would be required within the floodplain, and a further 20 bridges across creeks outside the floodplain.</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>■ Water quality of creeks along this route option is relatively good, with the exception of low dissolved oxygen and pH levels in Shark Creek.</li> </ul>
Ecology	<ul style="list-style-type: none"> <li>■ Ecological impacts of this option would be high.</li> <li>■ High potential for impacts on high value fauna habitat and fauna corridors for approximately 25 kilometres of this option, in particular around Pillar Valley, Shark Creek, and Brooms Head Road.</li> <li>■ Direct impacts on the Shark Creek SEPP 14 wetland.</li> <li>■ Impacts on remnant endangered floodplain vegetation communities in the Shark Creek and Gulmarrad areas.</li> <li>■ Impacts on identified habitat links between high ecological value areas within the Pine Brush State Forest.</li> </ul>
Planning and land use	<ul style="list-style-type: none"> <li>■ Approximately five houses would be potentially directly affected.</li> <li>■ Impacts on approximately 115 ha of prime agricultural land, mainly north of Brooms Head Road.</li> <li>■ High impacts on productive areas of Pine Brush State Forest.</li> <li>■ Potential impacts on rural communities around Pillar Valley, Bostock Road, Gulmarrad and James Creek Road.</li> <li>■ Impacts on the SEPP 14 wetland could require separate development approval.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>■ Overall heritage impacts would be moderate to high.</li> <li>■ Potential direct impacts on one site each of high and moderate non-indigenous significance, and five Aboriginal sites of low significance.</li> <li>■ Potential indirect impacts on two non-indigenous sites of high significance and one Aboriginal site of moderate significance.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>■ Approximately 35 dwellings would be affected by noise levels in excess of the DEC criteria for night time noise, for new roads, including approximately five houses potentially directly affected by the road corridor.</li> </ul>

Criteria	Assessment of the Green/C option
Visual	<ul style="list-style-type: none"> <li>■ Visual impacts through bushland and rural areas would be relatively high as a result of major new road infrastructure in areas that are currently characterised by a lack of development and human modification. However, low population density would reduce the severity of these impacts.</li> <li>■ Some areas would require large cuts and fills which have the potential to be visually prominent.</li> <li>■ Impacts in bushland areas would be mitigated to a degree by topography and shielding by vegetation.</li> <li>■ Would not provide a variety of visual experience for road users.</li> <li>■ Sections of the Green/C option around Gulmarrad and James Creek are relatively close to rural residential development and therefore would have moderate to high visual impacts.</li> </ul>

### The Red/D option

The Red/D option would be approximately 60 kilometres long and cross nine kilometres of floodplain. It would be an entirely new route, intersecting with the Pacific Highway at Bald Knob Road, Wells Crossing and south of the Harwood Bridge. It would be constructed entirely as a Class M standard road.

The Red/D option performs well against the Pacific Highway Upgrade Program objectives in relation to benefits for through traffic (travel time and cost, and safety). However, it would provide little benefit for local traffic. It would perform well against the social objectives of the project as it generally avoids areas of high population density. The Red/D option would not perform well in relation to the ecological objectives of the project due to high impacts on remnant bushland and areas of high habitat value.

### Assessment summary for the Red/D option

Criteria	Assessment of the Red/D option
Road safety	<ul style="list-style-type: none"> <li>■ Can be designed to achieve the target crash rate of 15 crashes per 100 million vehicle kilometres travelled, halving the crash rate for traffic using the new road.</li> <li>■ Some improvement in traffic safety for traffic using the existing highway from reductions in traffic volumes and heavy vehicle volumes on the existing highway.</li> </ul>
Traffic, transport and access	<ul style="list-style-type: none"> <li>■ Would attract minimal volumes of local traffic from the existing highway.</li> <li>■ Approximately 30-35% of vehicles are through traffic and would use the Red/D option.</li> <li>■ Approximately 50% of heavy vehicles are through traffic and would use the Red/D option.</li> <li>■ Approximately 75% of heavy vehicles are semi-trailers or B-Doubles and approximately 60% of these are through traffic that would use the Red/D option rather than the existing highway.</li> <li>■ The travel time saving for through traffic between Wells Crossing and Harwood Bridge would be approximately 13 minutes.</li> <li>■ Potential interchange locations include Bald Knob Road and south of Harwood Bridge.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>■ Would be designed to achieve the standards required for the Pacific Highway Upgrade Program, including 110km/h design speed.</li> <li>■ No opportunities for staged construction.</li> <li>■ Cost estimate of between \$700-800 million (in 2005 dollars).</li> </ul>
Topography, geology and soils	<ul style="list-style-type: none"> <li>■ Generally topography and soils present minimal constraints.</li> <li>■ Areas of floodplain soils would be traversed around Red Root Road and north of Brooms Head Road - some potential to encounter soft soils and acid sulfate soils.</li> <li>■ Earthworks volumes would be significant, but cut and fill volumes would be balanced.</li> </ul>

Criteria	Assessment of the Red/D option
Drainage and flooding	<ul style="list-style-type: none"> <li>■ Approximately nine kilometres of this option would be within the floodplain, around Red Root Road and north of Brooms Head Road.</li> <li>■ High flood flow velocities exist in floodplain areas around Red Root Road.</li> <li>■ Embankments would be typically two to three metres high, and up to four metres high in some sections of the floodplain.</li> <li>■ Between six and eight floodplain bridges would be required, plus another 25 to 30 bridges across creeks outside the floodplain.</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>■ Water quality is generally good in the vicinity of this option, with the exception of low dissolved oxygen and high turbidity in some locations.</li> </ul>
Ecology	<ul style="list-style-type: none"> <li>■ Ecological impacts of this option would be high.</li> <li>■ High potential for impacts on high value fauna habitat and fauna corridors for approximately 22 kilometres of this option, in particular around Pillar Valley, east of Pine Brush State Forest, and around Brooms Head Road.</li> <li>■ Impacts on identified habitat links between high ecological value areas within the Pine Brush State Forest.</li> </ul>
Planning and land use	<ul style="list-style-type: none"> <li>■ Approximately 10 houses would be potentially directly affected.</li> <li>■ Impacts on approximately 220 ha of prime agricultural land, mainly north of Brooms Head Road and around Red Root Road.</li> <li>■ Potential impacts on rural communities around Pillar Valley, Bostock Road and James Creek Road.</li> <li>■ Minor impacts on Glenugie State Forest and grazing land in the south of this option.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>■ Overall heritage impacts would be low.</li> <li>■ Potential direct impacts on three Aboriginal sites of low significance.</li> <li>■ Potential indirect impacts on two Aboriginal sites of high significance and one Aboriginal site of moderate significance.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>■ Approximately 40 dwellings would be affected by noise levels in excess of the DEC criteria for night-time noise, for new roads, including approximately 10 houses potentially directly affected by the road corridor.</li> </ul>
Visual	<ul style="list-style-type: none"> <li>■ Southern and middle sections traverse forested terrain free from development and therefore have low visual impact.</li> <li>■ Alignment does not provide a variety of experience for road users.</li> <li>■ Approach to Clarence River crossing traverses sugar cane growing region and would result in visual fragmentation of this strong landscape unit.</li> </ul>

### Potential connections between options

Two potential connections between options were assessed to provide flexibility in the selection of a preferred route. These connections create potential opportunities to combine sections of the various route options to maximise transport benefits and address environmental and social impacts.

The main impacts of the potential connection between the Purple/B and Orange/A options at Tyndale include:

- Potential direct impacts on residences and the service station and caravan park at Tyndale.
- Minor ecological impacts associated with severance of remnant bushland.

The potential connection between the Red/D or Green/C options and the Purple/B option, in the Shark Creek area, is up to 9.5 kilometres long (depending on which options are connected). The main potential impacts include:

- Potential severance of vegetation and habitat links in the area north of the Shark Creek SEPP 14 wetland.



- Impacts on prime agricultural land containing cane farms in the Shark Creek area.

### Harwood to Iluka Road section

The Harwood to Iluka Road section of the project is approximately 10.5 kilometres long. This section may initially involve duplication of the existing highway to create a Class A<sup>2</sup> standard road and retain local access. Some modifications to the existing highway alignment would also be needed to achieve required design standards. A new bridge would be constructed across the Clarence River next to the existing Harwood Bridge. A full interchange would be constructed at the Iluka Road intersection.

Provision would be made to enable this section to be upgraded to Class M in the future, and this would involve use of the existing highway as a local service road, with two new carriageways for the upgraded highway. An upgrade to Class M standard would require two bridges over the Clarence River at Harwood. Preliminary assessment of options in this section of the project included consideration of the potential to upgrade the road either to the east or the west of the existing highway.

### Assessment summary for project between Harwood Bridge and Iluka Road

Criteria	Assessment of the upgrade between Harwood Bridge and Iluka Road
Road safety	<ul style="list-style-type: none"> <li>■ Would be designed to achieve the target crash rate of 15 crashes per 100 million vehicle kilometres travelled, halving the crash rate for traffic using the new road.</li> <li>■ Substantial improvement in traffic safety for traffic using the existing highway.</li> </ul>
Traffic, transport and access	<ul style="list-style-type: none"> <li>■ Would be utilised by the majority of local and through traffic.</li> <li>■ Travel time saving would be small.</li> <li>■ Full interchange would be provided at Iluka Road, with other interchanges subject to traffic demand.</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>■ Would be designed to achieve the standards required for the Pacific Highway Upgrade Program, including 110km/h design speed.</li> <li>■ Potential for staged construction initially to Class A, with full upgrade to Class M should demand require it.</li> <li>■ Preliminary cost estimate is \$400-450 million (in 2005 dollars).</li> </ul>
Topography, geology and soils	<ul style="list-style-type: none"> <li>■ Mostly located in compressible floodplain soils across Harwood and Chatsworth Islands.</li> <li>■ High potential to encounter soft soils and acid sulfate soils.</li> <li>■ Earthworks volumes would be significant, with large volumes of fill.</li> </ul>
Drainage and flooding	<ul style="list-style-type: none"> <li>■ Approximately 10 kilometres of this section of the project would be within the floodplain across Harwood Island and Chatsworth Island.</li> <li>■ Embankments would typically be two to three metres high, but up to 4.5 metres high in some locations in the floodplain.</li> <li>■ Between six and eight floodplain bridges would be required, plus another three bridges across creeks outside the floodplain.</li> </ul>
Water quality	<ul style="list-style-type: none"> <li>■ Water quality is generally good in the Clarence River and North Arm.</li> </ul>

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<sup>2</sup> Class A refers to a road that provides high standard conditions for traffic, but retains local access via limited at grade intersections, in addition to interchanges at major roads where traffic volumes are sufficient to justify the construction cost of the interchange.

Criteria	Assessment of the upgrade between Harwood Bridge and Iluka Road
Ecology	<ul style="list-style-type: none"> <li>■ Ecological impacts of this option would be low.</li> <li>■ Some potential for impacts on remnant mangrove and saltmarsh communities and aquatic habitats at river and creek crossings.</li> </ul>
Planning and land use	<ul style="list-style-type: none"> <li>■ Approximately 21 houses would be potentially directly affected by an upgrade to the east of the existing highway, or 23 houses by upgrading to the west of the highway.</li> <li>■ Impacts on approximately 95 ha of prime agricultural land, mainly edge effects on cane farms.</li> <li>■ Potential impacts on Harwood village, which would be greater for the upgrade to the west of the existing highway.</li> </ul>
Heritage	<ul style="list-style-type: none"> <li>■ Overall heritage impacts would be low.</li> <li>■ Potential indirect impacts on the heritage values of sites within Harwood village including Harwood Island School and a house.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>■ Based on upgrading to the east of the existing highway, approximately 35 dwellings would be affected by noise levels in excess of the DEC criteria for night-time noise, for new roads, including approximately 21 houses potentially directly affected by the road corridor.</li> <li>■ Based on upgrading to the west of the existing highway, approximately 60 dwellings would be affected by noise levels in excess of the DEC criteria for night-time noise, for new roads, including approximately 23 houses potentially directly affected by the road corridor.</li> </ul>
Visual	<ul style="list-style-type: none"> <li>■ Through Harwood Island and Chatsworth Island the project traverses cane farms and would result in visual fragmentation of this strong landscape unit.</li> </ul>

## 8. 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.
- 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 C**).

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 options

and combinations and provide comments on the reply paid feedback form included with the community update (the feedback form is also available on-line). Community feedback will be integrated into the value management workshop.

Investigation of the short-listed 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. Community Liaison Groups, 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.