F3 Freeway to Raymond Terrace

Upgrading the Pacific Highway

PREFERRED ROUTE REPORT
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Executive summary

1. Completing the upgrade of the Pacific Highway

In January 1996 the NSW and Australian governments announced their joint commitment to a 10 year program to upgrade the Pacific Highway between Hexham and the Queensland border. As of the end of July 2006, a total 233 kilometres are now double-lane divided road. A further 380 kilometres of highway are under construction, have been approved for construction or have had a preferred route identified. This leaves only 103 kilometres of existing highway with a preferred route still to be identified.

The Pacific Highway is an AusLink National Network road. For the 10 years to June 2006, some $2.3 billion has been invested by the NSW and Australian governments. Over the past 10 years, the NSW Government has committed $1.66 billion and the Australian Government $660 million.

In December 2005, the NSW and Australian governments announced a jointly funded program of $960 million for the three years to 2009. In May 2006, the Federal Budget announced an additional $160 million, matched by NSW, for the period to the end of 2009, thereby increasing the total value of the new joint investment program from $960 million to $1.3 billion.

Both governments are jointly examining how the entire length of the highway can be upgraded to dual carriageway in the next 10 years.

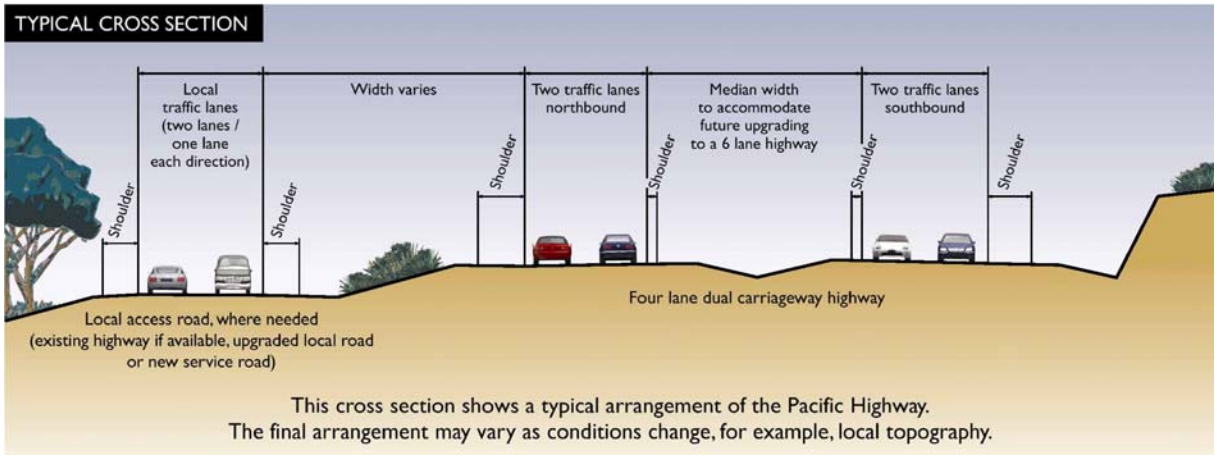
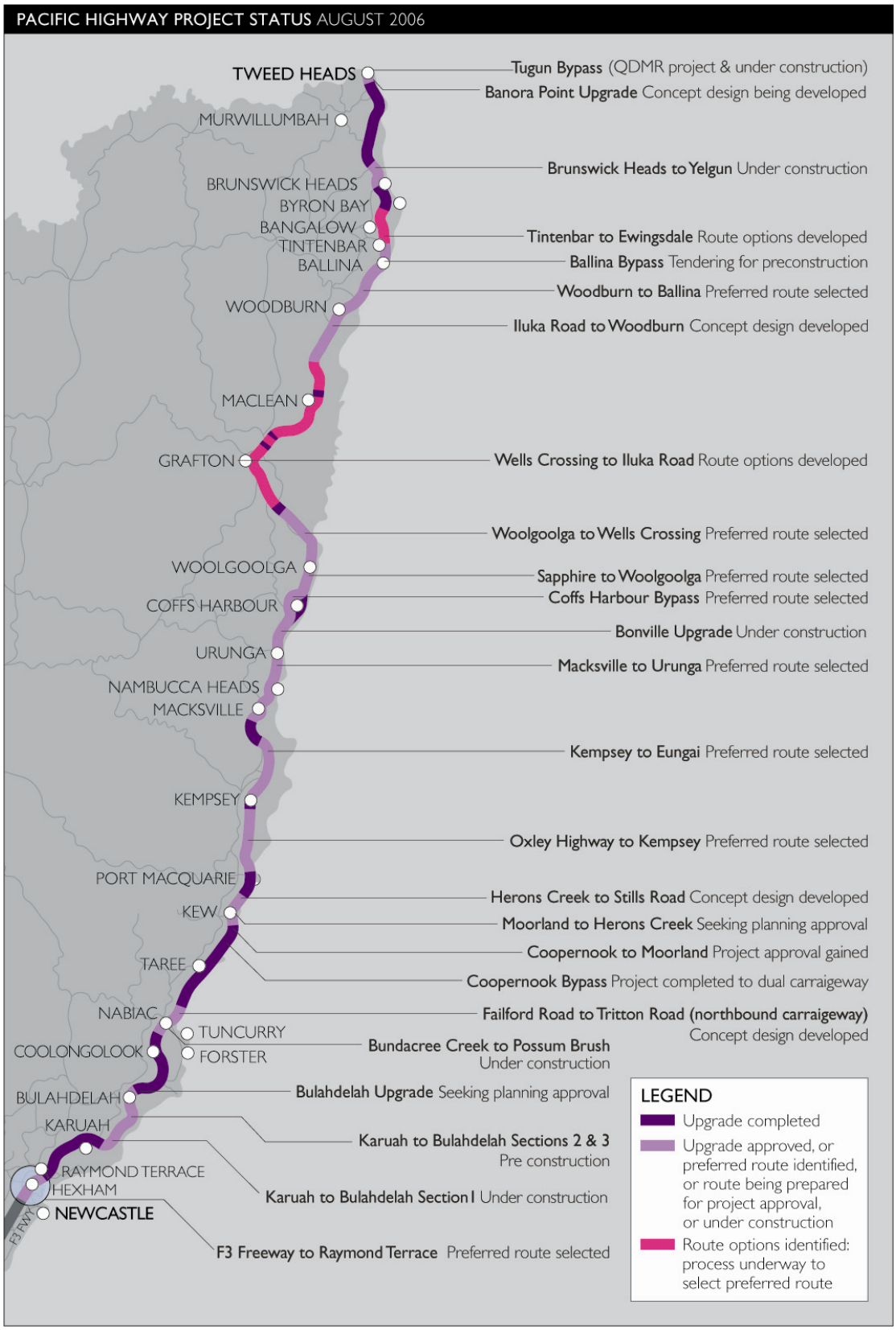


Figure ES1.1: Pacific Highway project status August 2006



F3 to Raymond Terrace

This project involves the proposed upgrade of approximately 14.5 km of the Pacific Highway in the Hunter region of NSW.

The project extends from the F3 Freeway south of the John Renshaw Drive roundabout to the existing section of dual highway carriageway (the Raymond Terrace Bypass) to the east of Heatherbrae.

The study area covers a total area of 2166 hectares and comprises land from the three Local Government Areas of Newcastle, Maitland and Port Stephens. Key urban areas situated within the study area include Heatherbrae and part of Black Hill. The settlements of Beresfield and Tarro are located immediately to the north of the study area. The Hexham and Tomago industrial areas are located immediately to the south of the study area.

This report summarises the outcomes of the route options development and preferred route selection phases of the project.

It describes the two options that have been developed, Options A and B, (split into three sections, western, central and eastern), and provides information on the process used and the factors considered in the assessment of the options.

2. Short and long term planning for the NSW Hunter and north coast regions

The Hunter and north coast regions are two of the fastest growing areas in NSW. The volume of traffic using the highway varies from area to area. The highway design may change to meet the needs of each area and to achieve an appropriate level of safety and accessibility.

For this project the preferred route is to be a motorway style roadway, and will provide dual carriageways with two traffic lanes in each direction with a provision to upgrade to three lanes in the future. The third lane would be constructed in the central median.

Providing a motorway style highway provides motorists with a choice of:

- Being able to use a local traffic route for slower speeds and local access**.**
- Using the motorway for longer distance travel at higher speeds.

The speed limit will be posted at 110km/hr and access to the motorway will be controlled by:

- Interchanges with ramps to access the highway for frequently used areas**.**
- Local roads crossing above or below the highway.

3. Route option development and preferred route selection process

The route option development process involved the following steps:

- Review of existing data.
- Site visits – field and aerial inspections of the study area.
- 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 development process concluded with the public display of the route options and the release of the Route Options Development Report. The public display of the route options provided the community with an opportunity to review and make comment on the route options.

The selection of the preferred route involved the following steps:

- Public display of the route options and receipt of submissions from the community.
- Review of submissions from the community.
- The value management workshop.
- Additional investigations, including those resulting from the community submissions and the value management workshop.
- A route selection workshop which considered the outputs of the value management workshop, the community submissions and the results of additional investigations.
- Preparation of the Preferred Route Report.

4. The study area characteristics

A summary of the key characteristics of the study area which have influenced the location and design of route options is provided below. Further information is provided within Chapter 2 of this report.

- The urban areas of Black Hill and Heatherbrae.
- Major infrastructure such as the Chichester Trunk Gravity Water Main (CTGWM), the New England Highway and overhead power transmission lines.
- The Hunter River, associated tributaries and extensive areas of floodplain.
- The Hunter Region Botanic Gardens.
- Areas of wetland protected by State Environmental Planning Policy No.14 (SEPP 14 wetlands) in the northern parts of Hexham Swamp and along the eastern and western banks of the Hunter River.
- Areas of native vegetation listed as Endangered Ecological Communities under the Threatened Species Conservation Act 1995 at Black Hill, across the floodplain and on the Tomago Sand Beds.
- Areas of potential and core Koala habitat protected by State Environment Planning Policy No.44 (SEPP 44 Koala habitat).
- The Tomago Groundwater Management Area situated to the east of Heatherbrae.
- The existing Weathertex factory and associated infrastructure.

Overview of the local area

The study area comprises land from the three Local Government Areas of Newcastle, Maitland and Port Stephens.

Key urban areas situated within the study area include Heatherbrae and part of Black Hill. Black Hill is a rural residential area. Within Heatherbrae are residential dwellings, motels, caravan parks, service stations, fast food outlets, recreational parks, community/tourist facilities and light commercial/industrial premises.

The settlements of Beresfield and Tarro are located immediately to the north of the study area. The Hexham and Tomago industrial areas are located immediately to the south of the study area.

Traffic and transport issues

Between the F3 Freeway and Raymond Terrace bypass, the existing traffic route follows John Renshaw Drive and the New England Highway before joining the Pacific Highway at the Hexham Bridge over the Hunter River. The New England Highway is an important connection between Newcastle and Brisbane for the carriage of interstate and regional road freight. The New England Highway is a connector between the towns in the New England region, as a route for inland communities, including those in the far north-west of the state, to access the facilities located in Newcastle.

Horizontal and vertical alignment

The RTA requirement for flood immunity on the Pacific Highway is, as a minimum, that one carriageway of the project must provide immunity against a five per cent annual exceedance probability (AEP) flood event. This requirement sets the minimum design elevation for the project.

Other issues impacting upon the vertical alignment are:

- Balancing the fill deficit in earthworks arising from construction across floodplain**.**
- The provision of appropriate clearances above the Hunter River, the Main Northern Railway line and existing roads.

The significant factors impacting the horizontal alignment are:

- Between Black Hill and the Hunter River the horizontal alignment within this area is driven primarily by avoidance of the northern extents of Hexham Swamp, existing dwellings, isolated areas of SEPP 14 wetlands, the approach to cross the Hunter River in desirable locations and the high voltage overhead transmission lines.
- The location of the river crossing to minimise the length through adjacent wetland, the length of construction over water, and hydrological and environmental considerations.
- South of Motto Farm and Heatherbrae, the Hunter Region Botanic Gardens, freshwater wetlands and Koala habitat are key considerations.
- The Weathertex Factory at Heatherbrae.

Intersections/Highway access points

Interchanges are proposed at the following locations:

- F3 Freeway, Black Hill**.**
- Heatherbrae.
- Connections to the existing highway to provide access to and from Newcastle and Maitland.
- Provision has also been made for a possible interchange at Tomago Road.

Structures

New bridges and culverts would be required to cross the Hunter River and flood plain to enable the passage of flood waters without adversely affecting water levels upstream.

The major structures would be a bridge approximately 1200 metres in length over the Main Northern Railway, New England Highway and Hunter River, and a structure approximately 700 metres in length to elevate at least one carriageway above the 1 in 20 year flood level across SEPP 14 wetland no. 830, located on the eastern side of the Hunter River.

Bridges are also required at the interchanges and for crossing local roads and Windeyers Creek.

Culverts would be required in the freshwater wetland area located adjacent to Black Hill and in the floodplain west of the Hunter River, to provide for passage of floodwaters. These culverts could also act as fauna underpasses.

Heavy vehicle rest stops

Heatherbrae has a developed highway servicing role with three service stations and other highway related businesses (i.e. take-away food outlets, motor vehicle servicing facilities, restaurants, overnight accommodation). Service facilities are also provided at Beresfield.

Heavy vehicle rest stops are not proposed for the upgrade, but interchanges will be provided to allow access to Heatherbrae and Beresfield.

Indigenous heritage

The study area traverses three physiographic regions. The archaelogical significance of each of the three regions is described below:

- The Black Hill precinct is an area of high archaeological significance and cultural sensitivity.
- The Hunter Floodplain is classified as having a low archaeological potential and cultural sensitivity.
- The Tomago Sand Beds are classified as having a moderate to high archaeological potential and cultural sensitivity.

Land within the study area is not subject to any current native title claims.

Non-indigenous heritage

A search of existing heritage listings, review of historic maps and consultation with local councils and the Raymond Terrace and District Historical Society has been undertaken, identifying a number of items of historical interest within the study area.

The location of these listed sites has been taken into consideration during development of route options and the selection of a preferred route.

Visual amenity

The crossing of the Hunter River and flood plain will be highly visible and will require careful consideration.

During route selection, it was recognised that, for a route through Heatherbrae, significant urban design investigation would be required to ensure that a visually acceptable design could be achieved for the community and road users.

For the preferred route, the landscape design will incorporate an appropriate native vegetation schedule to assist in the integration of the project into the local visual setting.

Noise

A number of sensitive receivers are present within the study area and along the existing highway route. These include:

- Residential dwellings.
- Hunter River High School.
- The Hunter Region Botanic Gardens.
- Caravan Parks.

During route selection it was identified that:

- Many of the above receivers are subjected to road traffic noise generated from lower speed environments through the townships of Motto Farm and Heatherbrae.
- Residential dwellings in Tarro, adjacent to the New England Highway and northern study area boundary experience road traffic noise from vehicles travelling along this stretch of road.
- The application of compression or exhaust brakes by heavy vehicles on approach and within the 80 km/h zone at the end of the F3 Freeway have been raised as a significant traffic noise issue by Black Hill residents.

Terrestrial ecology

The study area is generally characterised by areas of native vegetation at Black Hill and Tomago Sand Beds, with cleared farmland across the floodplain areas interspersed with some small fragmented patches of native vegetation.

Areas identified as being of high conservation value are:

- The Hunter Estuary Wetlands.
- Hexham Swamp Nature Reserve.
- Core and potential Koala habitat.
- SEPP 14 wetlands.
- Endangered Ecological Communities (EECs).
- The Hunter River and smaller tributaries.
- Undisturbed native vegetation areas situated in the west and south-west of the study area near Lenaghans Drive and John Renshaw Drive at Black Hill.
- Areas of native vegetation east of the Hunter River, extending from the Tomago Industrial area to the south of Heatherbrae on the Tomago Sand Beds.

Aquatic ecology

The study area crosses a number of freshwater and estuarine habitats, including the Hunter River, Purgatory Creek, an unnamed creek in the central section and Windeyers Creek in the eastern section.

The Hunter River is habitat for the green sawfish and black cod, which are listed as a Threatened and Protected Species under Part 7A of the Fisheries Management Act 1994 (FM Act).

There are two threatened aquatic ecological communities (listed under the Threatened Species Conservation Act) within the study area:

- Coastal saltmarsh (EEC).
- Freshwater wetland complex (EEC).

The Hunter River Estuary is an important commercial fishery and supports species including; Mullet, Eastern King and School Prawns and Whiting (Hunter Valley Research Foundation, 2003).

Topography

Landform across the study area is dominated by the Hunter River floodplain which covers approximately 1406 hectares (65 per cent) of the study area.

The F3 Freeway, near the offtake point for the project, has been constructed with only minor alteration to natural ground levels. East of the F3 Freeway, natural ground levels rise, forming a series of undulating ridges and hill crests before descending to the low lying Hunter River floodplain.

East of the Pacific Highway, ground levels gently rise to approximately 12 metres AHD within the densely vegetated aeolian deposits of the Tomago Sand Beds.

Regional geology

The study area is part of the Newcastle Bight embayment, located on the northern edge of the Sydney Basin. On a regional level, it is bounded by Carbonaceous Volcanics to the north and Permian bedrock hills to the south and west. At the southern end of the embayment the Hunter River has deposited estuarine and fluvial-deltaic sediments, consisting of gravels, sand, clay and silt from the Quaternary age. Holocene estuarine sedimentation over time, has developed fluvial river and floodplain depositions. The consistency and depth of the sediments is highly variable as a result of various in filled paleochannels.

The western end of the study area is underlain by the Tomago Coal Measures. Available information indicates that three significant coal seams are present within the Tomago Coal measures. These three seams have been subject to both underground mining and open cut commercial coal mining activities, though no known underground mining has been undertaken within the Preferred Route corridor.

Soil issues

The main soil issues within the study area are:

- Limitations in the western section of the study area include high foundation hazard, water erosion hazard, seasonal waterlogging and high run-off on localised lower slopes.
- Limitations in the central section of the study area include flood hazard, permanently high water tables, seasonal waterlogging, foundation hazard, and low wet bearing strength soils.
- Between the Hunter River and Tomago Road, a section of the Hexham Swamp is characterised by deep soft soils, with a high flood and foundation hazard and a high potential for acid sulfate soils. Waterlogging is present.
- Around the major watercourses such as the Hunter River, Purgatory Creek and Windeyers Creek, Acid Sulfate Soils (ASS) are likely to be encountered within one metre of the ground surface.
- Acid Sulfate Rock (ASR) has been encountered adjacent to the study area at Grahamstown Dam and also on the Karuah Bypass.

Geotechnical issues

To provide an appropriate level of flood immunity, a length of any alignment constructed across the low lying Hunter River floodplain would require elevating. Normally this is achieved through construction of an earth embankment which, when constructed on the deep and soft alluvial deposits of the floodplain, could lead to a number of key engineering issues such as excessive settlements or stability issues during construction. These are described in Chapter 2.7.1.

Hydrology and flooding

The study area is located within the Hunter-Central Rivers Catchment. The Hunter River is the principal watercourse in the study area. All creeks and land drains in the study area are tributaries of the Hunter River. There are four minor watercourses that flow within the

study area including the Hunter River, Purgatory Creek, an unnamed creek in the central section and Windeyers Creek in the eastern section.

A significant proportion of the study area is within a very high hazard zone for flooding. The remaining proportion of the study area within the floodplain is categorised as high hazard (Patterson Britton and Partners, 1996).

5. Route options

Development of route options

Since planning of the project commenced, a number of route options have been generated through a series of Project Team workshops and a Community Liaison Group (clg) workshop. The route options from these workshops were augmented, resulting in 14 geometrically viable route options. Several of these routes passed outside the study area and were subsequently further reviewed. The study area was officially expanded in April 2005.

Further information from specialist investigations together with ongoing discussions and site visits with key stakeholders and government agencies were integrated into an initial Multi Criteria Analysis to coarsely sieve the 14 options developed. Three options were short listed, one of which was later ruled out on the length of bridging required for flood management, the amount of imported fill material required the high cost of construction over extensive lengths of floodplain and severance of property.

Options A and B were determined as the only feasible options and were placed on public display between Friday 21 October and Friday 2 December 2005.

Options A and B were split into three sections (western, central and eastern) to enable a combination of options to be considered for the recommendation of a preferred route. A summary of the options is provided in the table below.

Summary of route options placed on public display

Option	Description
A1	Section A1 commences with a full interchange at the F3 Freeway south of John Renshaw Drive roundabout before crossing through an area of native vegetation at Black Hill. This section passes close to the CTGWM and the Glenrowan homestead.
B1	Section B1 commences with a full interchange at the F3 Freeway south of John Renshaw Drive roundabout before crossing through an area of native vegetation at Black Hill. Initially, the route passes under a set of 330 kV overhead transmission lines before turning eastwards and paralleling the transmission lines for a short distance. It avoids the Glenrowan Homestead and Hexham Swamp, however, it does cross some freshwater wetlands.
A2	Section A2 requires a long bridge structure to cross Woodlands Close, the New England Highway and the Main Northern Railway line. This section would cross some small areas of SEPP 14 wetland (i.e. SEPP 14 wetland Nos. 832 and 826a). Section A2 crosses a large area of the Hunter River floodplain and parallels a set of 330 kV overhead transmission lines. Flood management and soft soil issues would need to be addressed. Culverts would be required for Purgatory Creek and a long bridge structure would be constructed over the Hunter River.
B2	Section B2 deviates in a south-easterly direction under the 330 kV transmission lines and passes through some communities of Swamp Oak Floodplain Forest. This section of Option B requires a long bridge structure to cross Woodlands Close, the Main Northern Railway line, New England Highway and the Hunter River. It crosses floodplain which is subject to flood management and soft soil issues. East of the Hunter River, this section parallels the existing Pacific Highway and crosses SEPP 14 wetland No. 830.
A3	Section A3 follows the alignment of the existing Pacific Highway, passing through the centre of Motto Farm and Heatherbrae. The upgrade would be built to motorway standard with no direct access for vehicles or pedestrians. Service roads parallel to the motorway would connect to an interchange at Masonite Road. Section A3 would be constructed under traffic and construction traffic delays would be expected. A full interchange would be provided at Masonite Road.
B3	Section B3 crosses the existing Pacific Highway north-west of the Hunter Region Botanic Gardens and continues across the western edge of Tomago Sand Beds. It passes through an area of native vegetation east of Motto Farm and Heatherbrae, avoiding designated areas of 'core' and 'potential' Koala habitat. Section B3 also passes across land proposed for future industrial development. This section could be constructed independently of the existing road network, reducing the potential for traffic delays. partial interchanges would be provided south of Heatherbrae and north of Windeyers Creek.

Route options (insert diagram here)

6. Outcomes of the public display

The F3 to Raymond Terrace route options were on public display from Friday 21 October to Friday 2 December 2005. A number of consultation activities took place during the display period to publicise the display, inform the community and other stakeholders about the options under consideration and invite feedback on the options. The public display of route options was one input into the process for determining the preferred option for the project.

A number of issues, comments and concerns were raised, and these are discussed in Chapter 3.5 of this document. The critical issues considered most important by the community when deciding the preferred route were:

- Social and business effects**.**
- Noise and vibration**.**
- Property/local access.
- Land/ property acquisition.
- Terrestrial ecology/flora and fauna**.**
- Hydrology and flooding**.**
- Safety**.**
- Visual and urban design**.**

The public submissions contributed to the assessment criteria and performance measures that have provided the framework to assess the options and establish the need for further investigations and potential route modifications.

7. Value management workshop – assessment of route options

A two-day value management workshop was held in December 2006 following the public display of the route options. A value management workshop was seen as an appropriate tool to bring together a wide range of stakeholder interests and expertise to review the investigations undertaken to date, and on the balance of issues, to assess the options against agreed assessment criteria and recommend a preferred direction to progress the project.

The key outcomes from the value management workshop were:

- Option A1 be investigated further, including consideration of a realignment closer to John Renshaw Drive.
- Option B2 be investigated further.
- Option A3 be investigated further, subject to further consideration of environmental issues on Option B3 and social and community issues on Option A3.

8. Project team route selection workshop – assessment of route options

A route selection workshop was held in February 2006 to assess the route options A and B within Sections 1, 2 and 3, against the assessment criteria.

The assessment criteria used in the route selection workshop was developed specifically to address the Pacific Highway Upgrade Program objectives as well as the specific project objectives. The route selection workshop was seen as an appropriate tool to bring together the relevant technical team members of the project team and RTA representatives to:

- Review the route options placed on public display.
- Review the outcomes of investigations undertaken to date.

- Review the details of submissions received in response to the public display of route options.
- Review the outcomes of the value management workshop.
- Assess all options against the assessment criteria.
- On balance of the assessment and taking into consideration the submissions received during the public display and the outcomes of the value management workshop, recommend a preferred route.
- Each of the agreed criteria was placed within one of three groups as follows**:**
  - Social.
  - Environmental.
  - Technical.

For each group of criteria, a paired analysis was undertaken in place of the more simplified approach adopted for the value management workshop. The paired analysis procedure establishes a relative weighting of evaluation criteria within each group by comparing each criterion, one at a time, against all other remaining criteria.

The key outcomes from the route selection workshop were:

- In Section 1, Option A1 was determined to be the preferred alignment.
- In Section 2, Option B2 was determined to be the preferred alignment.
- In Section 3, Option B3 was determined to be the preferred alignment.

9. Preferred route

In June 2006, the preferred route was selected after consideration of the following:

- Issues raised in community submissions from the public display of route options which took place between Friday 21 October and Friday 2 December 2005.
- Recommendations from the Value Management Workshop held in December 2005.
- The findings of further technical studies undertaken following the Value Management Workshop**.**
- Recommendations from the Project Team Route Selection Workshop held in February 2006.

The Project Team Route Selection Workshop considered that Option A1 in Section 1 and Option B2 in Section 2 be selected for the preferred route. This recommendation was in agreement with the Value Management Workshop and Project Team workshop outcomes. The workshop considered all available information, including the additional investigations and design development that had been undertaken since the Value Management Workshop.

In Section 3 the Project Team Route Selection workshop selected Option B3 as the preferred route. This decision, which differs from the recommendation of the Value Management Workshop, was made after considering the Value Management Workshop, the outcomes of the Project Team's preferred route workshop, the results of further studies undertaken since the Value Management Workshop and community input. Chapter 4 describes how the preferred route was selected and describes the social, engineering and cost advantages of B3 over A3.

Refinement of the Preferred Route

The Weathertex factory owner and management staff have indicated that their operations are reliant on a number of key items within their property. The preferred route corridor

east of Masonite Road incorporates the outcomes of the Project Team and the RTA's discussions with Weathertex and is reflective of this ongoing development.

Consideration of environmental impacts, including koala habitat, fragmentation of native vegetation and minimisation of potential impacts on the Tomago GMA, has also led to refinement of the preferred route west of Masonite Road.

Preferred route

The preferred route is shown in Figure ES.1.3. The route is shown as a 150 metre corridor to allow for fine tuning of the alignment and to accommodate surface water treatment ponds, construction compounds, stock pile areas, batching plant facilities and access roads. The corridor is wider in some areas to provide for interchanges. The final formation will be less than 60 metres wide in most locations.

Functional elements of the preferred route

The preferred route would be constructed to provide dual carriageways with two traffic lanes in each direction with a provision to upgrade to three lanes in the future. The third lane would be constructed in the central median.

New bridges and culverts would be required to cross existing infrastructure and enable the passage of flood waters without adversely affecting water levels upstream. The total length of structures for the provision of floodwaters would be approximately 2500 metres. The following key structures would be required:

- New major structure over Woodlands Close, the Main Northern Railway, New England Highway and Hunter River approximately 1200 metres in length.
- Structure to provide for passage of floodwaters and elevate at least one carriageway above SEPP 14 wetland no. 830, located on the eastern side of the Hunter River approximately 700 metres in length.
- New bridges over Masonite Road and Windeyers Creek.
- New bridges at grade separated interchanges and to provide connections to the existing Pacific Highway.
- Culverts in the freshwater wetland area located adjacent to Black Hill and in the floodplain west of the Hunter River. These will provide for the passage of floodwaters and fauna.
- Interchanges are proposed at the following locations:
  - F3 Freeway, Black Hill - a full interchange would be provided to the south of the John Renshaw Drive roundabout.
  - Heatherbrae - partial interchanges to the west and east of Heatherbrae providing access from the motorway to Heatherbrae township and vice versa.
  - Connections to the existing highway to provide access to and from Newcastle and Maitland.
  - Provision has also been made for a possible interchange at Tomago Road.

Preferred route figure

11. Next steps

The proposed next steps for the F3 to Raymond Terrace project are to:

- Refine the alignment and prepare the concept design for the preferred route.
- Submit the proposal to the Department of Planning for approval under Part 3A of the Environmental Planning and Assessment Act 1979. The proposal would be the subject of an environmental impact assessment, which would examine in more detail the potential impacts of the preferred route. The environmental impact assessment may include a statement of commitments in respect of environmental management and mitigation measures proposed to be undertaken if the project is approved.
- When completed, the environmental impact assessment would be publicly exhibited and submissions sought. The RTA may be asked to prepare a report on the submissions, consider modifications to the project to minimise environmental impacts and revise its statement of commitments**.**
- The Department of Planning would consider the environmental impact assessment, the public submissions and any report requested from the RTA in recommending to the Minister for Planning whether the project should be approved.

1 Introduction

1.1 Preamble

In January 1996, the NSW State and Commonwealth Governments announced their joint commitment to the Pacific Highway Upgrading Program, a $2.2 billion, ten year program to improve the condition of the highway, reduce road accidents and injuries and improve transport efficiency. The NSW government committed $1.6 billion to the program and the Commonwealth $600 million. The NSW Roads and Traffic Authority (RTA) is implementing the program.

In June 2004, the Federal Government released AusLink as its new national transport plan. The Pacific Highway between Newcastle and Brisbane forms part of the Australian Government's AusLink National Network. The AusLink National Network is based on national, regional and urban transport corridors, links to ports and airports, and intermodal connections between road and rail. Through AusLink, the Federal Government has committed to continued joint funding for the Pacific Highway that involves an increased contribution of $160 million/year for three additional years following the completion of the original ten-year upgrade program, to match the State Government's commitment.

As part of the Pacific Highway Upgrading Program, the RTA is undertaking the route options investigation phase for the upgrade of 13 km section of the Pacific Highway between the F3 Freeway and Raymond Terrace ('the project'). The project study area is shown on **Figure 1.1**.

Planning for this upgrade of the Pacific Highway began in October 2004. A wide range of route options were investigated, including options proposed by the community both within and outside the initial study area.

A preferred route has now been identified and is presented in this report.

1.2 The need for the project

The F3 Freeway to Raymond Terrace is a key link in the overall framework of the Pacific Highway Upgrade Program.

Between the F3 Freeway at Woods Gully and Raymond Terrace bypass, the existing traffic route follows John Renshaw Drive and the New England Highway before joining the Pacific Highway at Hexham Bridge over the Hunter River. The existing Pacific Highway crosses the Hunter River, proceeding past Tomago and continues through the settlement of Heatherbrae before connecting to the completed Raymond Terrace Bypass, east of the Masonite Road roundabout.

Crash statistics indicate 194 crashes have occurred along this route between 2001 and 2003, of which 3 were fatal.

As future development occurs in the Lower Hunter Region including Thornton and Raymond Terrace, traffic flows on the existing road network are expected to increase. The RTA traffic volume forecasts for the Hunter Region (2004) indicate a 57 per cent increase in traffic volumes from 2004 to 2029, between John Renshaw Drive, New England Highway (at Hexham Bridge) and the Pacific Highway (north of Hexham Bridge).

The upgrading of this section of the Pacific Highway would provide the missing link between the F3 Freeway and the Raymond Terrace Bypass, forming an essential part of the overall upgrade of the Pacific Highway.

1.3 Objectives

1.3.1 Pacific Highway Upgrading Program objectives

The objectives of the Pacific Highway Upgrade are to:

- Significantly reduce road accidents and injuries.
- 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 (ESD) principles.
- Provide the best value for money.

1.3.2 F3 to Raymond Terrace Project objectives

As well as contributing to the objectives of the Pacific Highway Upgrading Program, specific objectives of the Project are to:

- Develop a dual carriageway road with potential to reduce crash rates to 15 crashes per 100 MVK over the project length.
- Develop a concept design that meets or exceeds B-Double requirements, including at intersections, where required.
- Maximise use of the existing road reserve, where possible.
- Integrate input from local communities into development of the project through the implementation of a comprehensive program of community involvement.
- Satisfy the technical and procedural requirements of the RTA with respect to design of the project.
- Provide transport developments that complement existing landuse patterns.
- Allow for all connections, modifications and improvements necessary to upgrade the existing highway where it is retained as part of the project.
- Consider delay management strategies to minimise disruption to local and through traffic and maintain access to affected properties and land during construction.
- Provide flood immunity on at least one carriageway for a minimum of at least a five per cent Annual Exceedence Probability (AEP) flood level and a target of one per cent AEP flood level.
- Provide intersections designed to provide at least Level of Service C, 20 years after opening for the 100th Highest Hourly Volume.
- Develop solutions that address community expectations for access to the new highway.
- Retain or replace existing rest areas within the study area.
- Develop a concept design that generally meets the criteria for a 110 km/h design speed for the vertical alignment and horizontal alignment.
- Ensure the project outcomes achieve value for money.
- Provide a strategy for future upgrades to be easily integrated into the project from both engineering and environmental perspectives.

- Optimise the route option and concept design to minimise the need for modifications during the Environmental Assessment process and subsequent project phases.

1.4 Study area

The study area selected for the investigation and development of route options is shown in **Figure 1.1**. It covers a total area of 2166 hectares and extends from the F3 Freeway south of the John Renshaw Drive roundabout to the existing section of dual highway carriageway (the Raymond Terrace Bypass) to the east of Heatherbrae, at Masonite Road.

The study area comprises land from the three Local Government Areas (LGA) of Newcastle, Maitland and Port Stephens.

Key urban areas situated within the study area include Heatherbrae and part of Black Hill. Within these areas are residential dwellings, motels, caravan parks, service stations, fast food outlets, recreational parks, community/tourist facilities and light commercial/industrial premises.

The settlements of Beresfield and Tarro are located immediately to the north of the study area. The Hexham and Tomago industrial areas are located immediately to the south of the study area.

Terrain within the study area is characterised by gentle to moderate undulating ground at the western and south eastern extents. Broad, low lying floodplain areas of the Hunter River dominate the central sections, linking the residual landforms at Black Hill and the Tomago Sand Beds which define the western and eastern sections of the study area.

Since the commencement of the project in October 2004, the study area has been expanded in the vicinity of Hexham to facilitate a crossing of the Hunter River upstream of the existing Hexham bridges and the utilisation of the existing Pacific Highway east of the river.

The full extent of the study area is depicted in **Figure 1.1.**

Figure 1.1: Study area

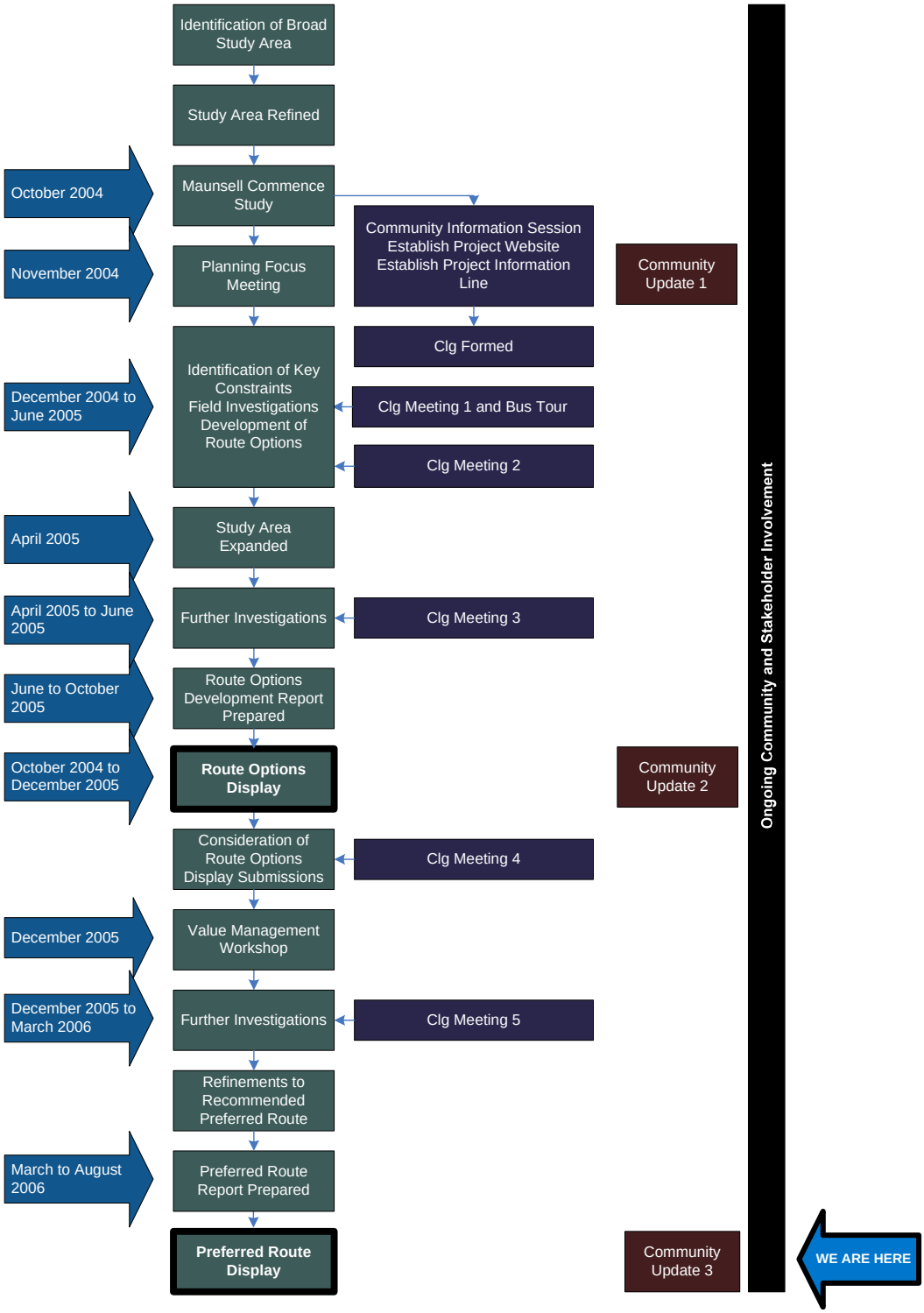
1.5 Project development process

Planning for the project began in October 2004. Ongoing stakeholder and community consultation, specialist studies and design development have been undertaken during the development and subsequent recommendation of a preferred route.

The community consultation program is summarised below and discussed in detail in **Chapter 3.** The route options development process is discussed in detail in **Chapter 4.**

The project development process in shown in **Figure 1.2** Milestones are shown in bold.

Figure 1.2: Project development process



1.6 Stakeholder and community involvement

An ongoing and extensive consultation and community involvement program has been implemented since the commencement of the project. A wide range of community consultation methods have been utilised to effectively target a range of stakeholders including property owners, residents, business and relevant Government Agencies.

Consultation activities undertaken to date include the following:

- Establishment a regular updating of a project website: www.rta.nsw.gov.au/pacific
- Establishment of a 1800 (toll free) project information line.
- Ongoing use of an Interested Persons database enabling interested parties to register and receive updates at key project milestones.
- One planning focus meeting.
- One community information session.
- Three community updates.
- Five advertisements have been placed in local and regional newspapers.
- Establishment of a community liaison group (clg).
- Six clg meetings including a study area tour and route options workshop
- Meetings with local councils, local interest groups, Local Aboriginal Land Council representatives and Government agencies.
- Interviews conducted with businesses in Heatherbrae.
- Public display of the route options.
- Individual meetings with potentially affected land and business owners.

Consultation activities have been undertaken in accordance with the *F3 to Raymond Terrace EIS - Community Involvement Plan* (Maunsell, 2004). A further discussion of consultation activities undertaken for the project and feedback received by the study team is presented in **Section 3** of this report.

1.7 Purpose of this report

The purpose of this report is to document the route options development process to the preferred route stage.

The report is structured as follows:

- **Chapter 1** provides an introduction to the project, including the objectives of the project, study area characteristics, consultation program and the project development process.
- **Chapter 2** details the characteristics of the study area which have influenced the development of feasible route options including planning and land use, social and cultural features and issues, environmental and engineering issues.
- **Chapter 3** summarises community consultation and involvement and community issues and concerns arising.
- **Chapter 4** provides a detailed review of the route options development and evaluation process, including the Value Management Workshop, further investigations and the Project Team workshop.

- **Chapter 5** describes the preferred route in terms of the potential impacts and implications for development, in relation to physical, social and economic factors.
- **Chapter 6** describes the statutory approvals process, and requirements for further detailed environmental assessment.

Reference should be made to the Route Options Development Report, F3 to Raymond Terrace (Maunsell, October 2005) for a more detailed review of the constraints associated with the development of route options. Both this Preferred Route Report and the Route Options Development Report may be downloaded from the RTA web site, visit www.rta.nsw.gov.au (see Project Reports under the F3 to Raymond Terrace Upgrade section for the Pacific Highway Upgrade).

2 Study area characteristics and issues for option development

Design related matters pertinent to the project are also outlined in this chapter, including design criteria which must be adhered to and existing infrastructure features that would influence design of the project.

2.1 Previous studies

As an integral part of the route options development phase, a number of specialist environmental investigations were undertaken in order to provide a thorough understanding of the physical, social and economic aspects of the study area. Specialist studies included:

- Traffic, transport and road safety.
- Socio-economic.
- Planning and land use.
- Cultural heritage (indigenous and non-indigenous).
- Noise and vibration.
- Urban design landscape and visual amenity.
- Topography, geology and soils.
- Hydrology, hydraulics and water quality.
- Flora and fauna (terrestrial and aquatic).
- Climate and meteorology.
- Geotechnical.
- Public utilities and services.

The specialist investigations comprised a review of existing background data, fieldwork and analysis. The results of the investigations have been used to identify constraints and opportunities within or immediately adjacent to the study area and have formed an integral component of the development and selection of feasible and ultimately, the preferred route option. Key project constraints are shown in **Figure 2.1, Figure 2.2** and **Figure 2.3.**

2.2 Overview of the study area

Key attributes of the study area which have influenced the location and design of route options include:

- The urban areas of Black Hill and Heatherbrae.
- Major infrastructure such as the Chichester Trunk Gravity Water Main (CTGWM), the Main Northern Rail Line, the New England Highway and overhead transmission lines.
- The Hunter River, associated tributaries and extensive areas of floodplain.
- The Hunter Region Botanic Gardens.
- Extensive areas of wetland protected by State Environmental Planning Policy No.14 (SEPP 14 wetlands) in the northern parts of Hexham Swamp and along the eastern and western banks of the Hunter River.

- Areas of native vegetation listed as Endangered Ecological Communities (EECs) under the Threatened Species Conservation Act 1995 at Black Hill, across the floodplain and on the Tomago Sand Beds.
- Areas of potential and core Koala habitat protected by State Environment Planning Policy No.44 (SEPP 44 Koala habitat).
- The Tomago Groundwater Management Area (GMA) situated to the southeast of Heatherbrae.

Key project constraints are shown in **Figure 2.1, Figure 2.2** and **Figure 2.3.**

Figure 2.1: Key constraints – flooding

Figure 2.2: Key constraints – ecological

Figure 2.3: Key constraints – Tomago Special Area

2.3 Traffic and transportation issues

Between the F3 Freeway and Raymond Terrace bypass, the existing traffic route follows John Renshaw Drive and the New England Highway before joining the Pacific Highway at the Hexham Bridge over the Hunter River. The length of the Pacific Highway between the Hexham Bridges and the roundabout at Heatherbrae is approximately 7.5 km. The New England Highway which forms part of the National Highway is an important connection between Newcastle and Brisbane for the carriage of interstate and regional road freight. The National Highway is a connector between the towns in the New England region, as a route for inland communities, including those in the far north-west of the state, to access the facilities located in Newcastle.

The existing road network is shown in **Figure 2.2**.

2.3.1 Study area traffic movements

Within the study area there are currently two roundabouts located on the existing traffic route. These are located at the intersection of the F3 Freeway and John Renshaw Drive and at the intersection of the Pacific Highway, Masonite Road and Adelaide Street at Heatherbrae.

The intersection of the New England Highway and John Renshaw Drive is grade separated. The major traffic movement is north / south from John Renshaw Drive to the New England Highway. Traffic travelling east / west must merge with the main traffic flow to continue along the New England Highway.

There is also one signalised intersection located outside, but adjacent to the study area on the western side of Hexham Bridge, where the Pacific Highway intersects with the New England Highway.

The intersection of the Pacific Highway and Tomago Road is currently unsignalised (give way) and a right turn lane is provided on the Pacific Highway.

The existing speed limit of the highway varies significantly as follows:

- 110 km/h F3 Freeway (80 km/h on final approach to the at-grade roundabout junction with John Renshaw Drive).
- 60 km/h John Renshaw Drive roundabout approaches.
- 80 km/h John Renshaw Drive to New England Highway.
- 90 km/h New England Highway to 0.5 km from the Hexham Bridge crossing.
- 80 km/h New England Highway for 0.5 km in approach to Hexham Bridge.
- 60 km/h Pacific Highway southbound over Hexham Bridge and approaches.
- 90 km/h Pacific Highway southbound to one km north of Tomago Road.
- 100 km/h Pacific Highway northbound between the Hexham Bridge and the Hunter Region Botanic Gardens.
- 80 km/h Hunter Region Botanic Gardens to Kingston Motel.
- 70 km/h Kingston Motel to the Masonite Road roundabout.
- 100 km/h Raymond Terrace Bypass.

The existing highway route passes along the southern limits of Beresfield and Tarro, and through the settlement of Heatherbrae. Heatherbrae has developed a highway servicing role with three service stations and other highway related businesses (i.e. take-away food outlets, motor vehicle servicing facilities, restaurants, overnight accommodation). Additionally this section of the Pacific Highway provides an important thoroughfare for a number of key transport movements including local access, intra-regional, and inter-regional travel.

2.3.2 Existing traffic volumes and patterns

This route performs an important function for freight transport from Sydney to Brisbane. Long distance through traffic shares the route with a large volume of local traffic making trips between Maitland, Port Stephens and Newcastle.

Dependence on private cars is high within the Hunter Region. In addition, a scattered pattern of development and urban expansion, particularly residential, will further increase demand on the road network in the future.

Existing traffic volumes

Traffic counts conducted in December 2004 recorded traffic flows at locations within the study area. Using these counts, peak mid block flows were estimated on each of the key links within the area. These are summarised in **Table 2.1.**

Table 2.1: December 2004 traffic volumes

Location	December 2004 peak hour flow	
	Northbound	Southbound
John Renshaw Drive	850	600
New England Highway (near Hexham Bridge)	2650	2000
Existing Pacific Highway (north of Hexham Bridge)	1500	1450

Source: Maunsell survey (December 2004)

The highest traffic volumes were observed on the New England Highway between John Renshaw Drive and the Hexham Bridges.

Daily variations

There are six permanent RTA count stations in the area that provide traffic data relevant to the study area. The data from these can be analysed to investigate daily, weekly and annual profiles of general traffic.

At all count stations in the study area the morning peak in traffic level occurred between 08:00 and 09:00 hours. In the evening the peak either occurred between 15:00 and 16:00 hours or 16:00 and 17:00 hours. The early evening peak hour may indicate heavy school and university car trips. At the weekend, the peak hour varied but was most commonly between 11:00 and 12:00 hours.

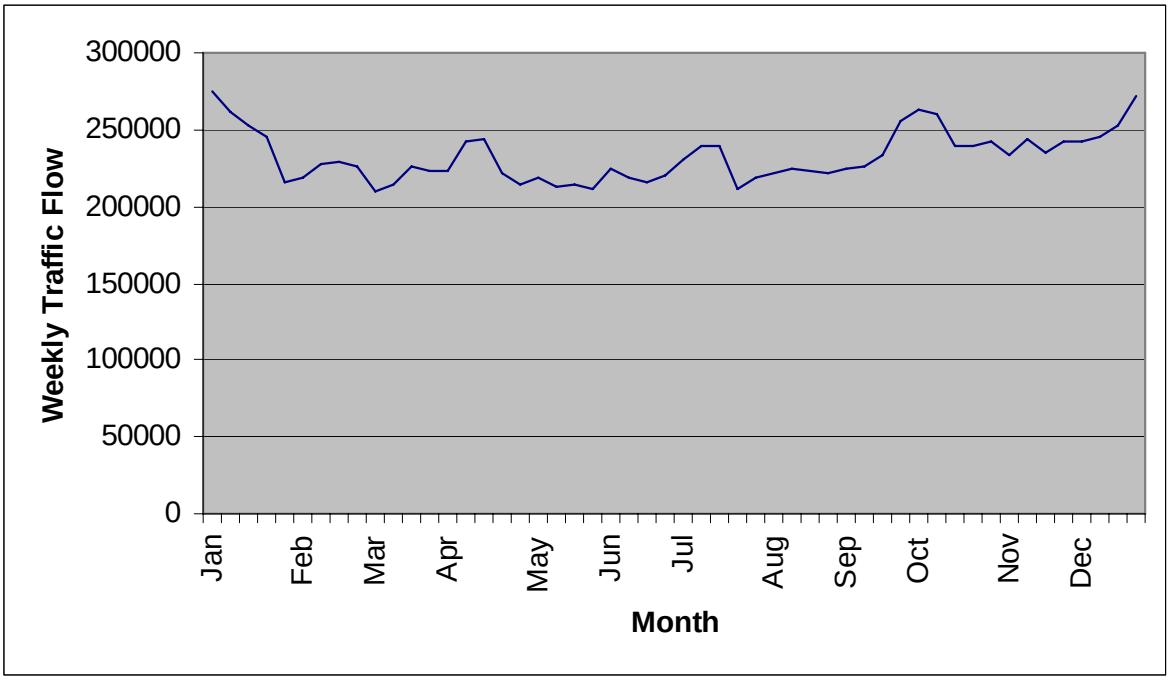
Analysis of available data collected during one week in August 2001 shows that Fridays experience the highest recorded traffic levels.

Seasonal variations

The highest flows (in the 2001 available data) occurred during school holiday periods at Christmas, Easter and in October.

On the Pacific Highway, north of Hexham Bridge, flows during Christmas week accounted for 2.3 per cent of yearly flows, that is, 17 per cent above the average weekly flow proportion.

Figure 2.4: Seasonal variations in traffic flow, Pacific Highway north of Hexham Bridge



Source: RTA Traffic Volume Data for Hunter Region (2001)

Existing travel patterns

Based on the Origin-Destination (OD) survey undertaken in December 2004, the heaviest movement through the study area is between the F3 Freeway and Weakleys Drive.

After these short trips between the F3 Freeway and Weakleys Drive, the survey indicates the next heaviest through movements are from Beresfield to Newcastle and vice versa.

The majority of trips originating within the study area were observed leaving via Maitland Road towards Newcastle. Most trips originating externally and ending their trips within the study area were recorded entering from the New England Highway at the junction with John Renshaw Drive.

2.3.3 Crash analysis

The crash data from the last three available years (2001-2003) shows that 194 crashes have been recorded between the F3 Freeway at Woods Gully and the Pacific Highway/Masonite Road roundabout north at Heatherbrae. Three of these 194 crashes were fatal. Crash data was also available for part of 2004 and shows that between January and June, 29 crashes occurred on the existing highway route, of which one was fatal.

The most significant category of crashes were those involving vehicles travelling in the same direction (37 per cent). Of these, the majority are rear end crashes with about 33 per cent occurring at intersections. This data would suggest that a high proportion of crashes occur within queuing traffic. T-junctions on the Pacific Highway were the location of 27 crashes (14 per cent) and 13 crashes (four per cent) were recorded at the John Renshaw Drive roundabout.

2.3.4 Heavy vehicle movements

In 2002 the Pacific Highway was opened to B-double access for its full length between Newcastle and the Queensland border following the opening of the Yelgun-Chinderah Freeway. The opening of this upgrade has also reduced journey times and therefore the road user cost of the

Pacific Highway in comparison with other inter-regional inter-state routes such as the New England Highway. Further upgrades are expected to increase the attractiveness of the Pacific Highway for freight transport.

Within the Hunter Region, significant freight routes occur between Newcastle Port, industrial areas of Tomago and the mining industry of the Upper Hunter. Heavy vehicles constitute a significant proportion of the general traffic flow in the region and this is expected to continue with the planned expansion of Newcastle Port and Newcastle Airport.

A classified intersection count conducted in December 2004 found that the proportion of heavy vehicles was between 15 and 31 per cent of trips in the two hour morning period and between six and 20 per cent in the afternoon period within the study area. The proportions varied on each of the sections of the route as displayed in **Table 2.2**.

Table 2.2: Heavy vehicle percentages by route section

Route section	Heavy vehicle percentage			
	Morning 0730 – 0930		Afternoon 1530 – 1730	
	Northbound	Southbound	Northbound	Southbound
John Renshaw Drive	15%	31%	20%	14%
New England Highway (at Hexham Bridge)	16%	16%	13%	6%
Pacific Highway (north of Hexham Bridge)	16%	20%	13%	9%

Source: Maunsell survey (December 2004)

2.3.5 Existing levels of service

Level of Service (LOS) analysis is a measure to determine the operational efficiency of a roadway or intersection. The analysis is essential in planning and design of the transport network and can influence the number of lanes provided or the arrangement of a traffic control system under study.

LOS can be measured mid-block or at intersections. At intersections LOS is directly related to average delay for each vehicle whilst a mid block measure is a qualitative measure describing the operational conditions and their perception by a driver. **Table 2.3** shows the operational conditions that related to each mid block LOS, and the maximum free flow capacity of a two lane highway with a design speed of 110 km/h. During mid block LOS analysis, the free flow capacity is amended to reflect other factors that may reduce capacity, for example, the proportion of heavy vehicles, the shoulder width or the road alignment.

Table 2.3: Level of service parameters

Level of Service	Conditions	Maximum Service Flow (two lanes)*
A	A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.	1400
B	In the zone of stable flow and drivers still have the reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with LOS A.	2200
C	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.	2800
D	Close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.	3500
E	Occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause break-down.	4000
F	In the zone of forced flow. Within it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow break-down occurs, and queuing and delays result.	variable

Source: Austroads Guide to Traffic Engineering Practice: Part 2: Roadway Capacity

Notes: * under ideal conditions at design speed 110 km/h. For example, the value would vary with differing heavy vehicle proportions.

Estimates of mid block performance indicate that most of the existing traffic route (i.e. F3 Freeway to Raymond Terrace bypass) performs at LOS C or better during typical peak periods, based on the Austroads methodology for the calculation. A LOS lower than C indicates that operational conditions are poor and even a minor disturbance could cause delays and queuing.

The New England Highway section, however, operates at a lower LOS D in the morning peak near Hexham Bridge in the southbound direction. A LOS C is reached closer to the John Renshaw Drive intersection in the morning peak, reflecting the impact of Newcastle bound traffic joining the route from the Beresfield and Tarro access points or interchanges.

A major congestion point on the existing traffic route through the study area is the Hexham Bridge precinct, especially from the New England Highway approach. This is exacerbated when the bridge is opened to allow maritime traffic to pass.

Average travel speeds through the full route are currently estimated to be 60 km/h.

2.3.6 Forecast traffic volumes

To assess route options, unconstrained traffic flows in the nominal project opening year of 2009 and 20 years after opening in 2029 have been forecast. Traffic volumes are expected to increase by 233 per cent when compared with 2004 levels. The following proposed network and land use changes have been considered in the development of the forecasts:

- National Highway F3 Freeway to Branxton Link, completed by 2009.
- A new interchange is planned at the Weakleys Drive / New England Highway interchange.
- Employment developments: Heatherbrae industrial estates (1500 jobs), Tomago Gas Fired Power Station, Weakleys Drive industrial estate (1050 jobs).
- Residential developments: Raymond Terrace and Thornton North (10,000 lots).
- Removal of the heavy railway line from Broadmeadow to Newcastle City Centre.
- Strategic bus routes: from Cessnock, Maitland and Hexham Bridge to Newcastle. The improvement of these routes may include bus priority measures on the New England Highway.
- Proposed expansion to operations at Newcastle Airport and Newcastle Port.

The most significant change to the operation of the road network in the Lower Hunter Region will be the F3 Freeway to Branxton link.

Trip generation resulting from proposed employment and residential developments in and around the study area was incorporated in the forecast traffic volumes according to expected release rates.

Unconstrained traffic forecasts have been compiled for the nominal opening year 2009 and forecast year 2029. As a base, growth factors were extracted from the F3 Freeway to Branxton Link report (National Highway F3 Freeway to Branxton Link – Traffic and Transport Study, *Parsons Brinkerhoff, 2004*). The study involved construction of a strategic model to forecast flows of both local and regional trips for the years 2006, 2016 and 2026. Light and heavy vehicles were considered separately.

The medium forecast flows from the F3 Freeway to Branxton Link report were converted to annual growth rates from 2004 to 2009 and 2029. An appropriate growth rate was selected for each origin-destination movement according to assumptions of the type of trip, regional or local. By applying the growth rates, matrices were created that forecast the levels of traffic that could be expected to use the new highway route and the existing network under the two route options placed on public display and a base case. **Table 2.4** summarises the forecast flows for significant links within the study area assuming no upgrade occurs and traffic growth is unconstrained.

Table 2.4: Existing and forecast (2009, 2029) traffic volumes

Link	Two - way AADT		
	2004	2009	2029
John Renshaw Drive	28,020	35,000	65,000
New England Highway (at Hexham Bridge)	48,880	60,000	115,000
Pacific Highway (north of Hexham Bridge)	37,780	45,000	90,000

Source: RTA Traffic Volume Data for Hunter Region (2004)

2.4 Economic issues

A highway upgrade project which results in the bypassing of urban areas or townships where some businesses have a high reliance on trade generated from highway traffic, can have a significant impact on businesses and, in the worst case, may result in business closures. Existing businesses in Heatherbrae with direct access to the existing Pacific Highway may experience changes in trade levels if the upgraded highway is upgraded to freeway standard and/or is relocated to another alignment or if access arrangements on the existing Highway are changed substantially. The extent of these impacts is likely to vary in response to factors such as:

- The nature of the business.
- Its reliance on highway-related trade.
- Its ability to develop new/different markets.
- Ameliorative measures incorporated in the design and implementation of the upgrade such as access arrangements and systems to provide advance information to highway users.

Heatherbrae contains a range of service related businesses (i.e. fast food outlets, service stations, etc) as well as destination based trade such as car and boat dealers. Of the business surveys received by Maunsell, the most common business types indicated were retail (41 per cent of responses), car/boat/machinery (24 per cent of respondents) and services (17 per cent of respondents).

2.5 Planning and land use

2.5.1 Statutory planning

The study area comprises land from three LGAs, Newcastle City Council, Maitland City Council and Port Stephens Shire Council. Relevant Local Environmental Plans (LEPs) within these LGAs include:

- Newcastle Local Environmental Plan 2003 (NLEP 2003).
- Maitland Local Environmental Plan 1993 (MLEP 1993).
- Port Stephens Local Environmental Plan 2000 (PSLEP 2000).

LGA boundaries and relevant LEP zonings are illustrated in **Figure 4.4.**

The key statutory considerations identified as potentially requiring consideration are listed below in **Table 2.5**.

Table 2.5: Summary of relevant statutory requirements

Legislation (approval authority)	Relevant provisions	Approval/licence
Commonwealth Legislation		
Environment Protection & Biodiversity Conservation Act 1999 *(Department of Environment and Heritage)*	This Act governs the Commonwealth Environmental Impact Assessment (EIA) process, and ensures actions likely to have a significant impact on matters of National Environmental Significance (NES) or other listings, are subject to a rigorous assessment and approvals process.	Items listed under the EPBC Act and potentially in the vicinity of the study area include *Litoria aurea* (Green & Golden Bell Frog) and various migratory bird species. If a protected item is likely to be significantly impacted, a referral under Section 68 is required to determine whether approval under the Act is necessary.
NSW State Legislation		
Environmental Planning & Assessment Act, 1979 *and the* ***Environmental Planning & Assessment Regulation 2000*** *(Department of Planning / Department of Natural Resources)*	The EP&A Act provides the basis for development and environmental assessment in NSW. Assessment of most of the RTA's major infrastructure projects will now be conducted under the new Part 3A of the EP&A Act. Part 3A applies to all infrastructure projects that would have otherwise have required an environmental impact statement under Part 5 of the EP&A Act, most development previously classified as State significant, and other projects and plans or programs of works as declared by the Minister for Planning.	An environmental assessment 'EA' would be prepared for a 'major project' and lodged with a Project Approval application to the Minister for Planning for determination under Part 3A.

Other statutory approvals may be required to construct and operate the project such as (refer to **Table 2.6**.

Table 2.6: Summary of other potentially relevant statutory requirements

Legislation (approval authority)	Relevant provisions	Approval/licence
Other NSW State Legislation		
National Parks and Wildlife Act 1974 *(Department of Environment and Conservation)*	This Act is the primary piece of legislation regulating the protection of Aboriginal heritage. Part 6 of the Act provides protection for Aboriginal objects and Aboriginal places. A section 87 permit is required to disturb, move or take possession of an Aboriginal object or disturb land for the purpose of discovering an Aboriginal object. A permit under section 90 is required to destroy, damage or deface an Aboriginal object or place. Although these permits are not required for a project approved under the new Part 3A of the EP&A Act, they are being sought for works to be undertaken prior to issue of any Part 3A approvals.	As part of this project, a section 87 permit is being sought in order to undertake subsurface testing within the Black Hill and Tomago Sand Beds which would result in disturbance of land. Additional Aboriginal consultation would be undertaken with the Aboriginal communities as part of preparation of an application for a consent and permit under Part 6 of the NPW Act.
Protection of the Environment Operations Act 1997 *(Department of Environment and Conservation)*	The principal aim of this the *Protection of the Environment Operations Act* (POEA Act) is to protect, restore and enhance the environment in the context of ESD guiding principles by regulating specific activities and development that have the potential to pollute air, water and land. It provides a single piece of legislation that integrates the approach to pollution control.	Activities listed under Schedule 1 of the Act, may require an Environment Protection License (EPL) for the following construction activities: • Bitumen pre-mix and hot-mix works. • Concrete works. • Any crushing, grinding or separating works. Other non-scheduled activities which may require licensing under the POEO Act include: • Discharge of pollutants into water from temporary sediment basins. • Temporary on-site batching plants (if they are not attached to a construction site and are in operation for more than 12 months).

Legislation (approval authority)	Relevant provisions	Approval/licence
Roads Act 1993 *(Roads and Traffic Authority / Local Council)*	The primary purpose of this Act is to regulate the carrying out of various activities on public roads, including procedures for the opening and closing of such roads. This Act also establishes a classification of roads, i.e. 'classified' or 'unclassified' roads and their respective authorisation.	• Approvals and licenses under Section 138 of the Roads Act 1993.

The intent of all relevant legislation has been considered in the development of route options and the selection of a preferred route and will be further considered during concept design.

The following State Environmental Planning Policies (SEPP's), their intent and provisions have also been considered in the development of route options:

- State Environmental Planning Policy No. 4 - Development Without Consent (SEPP 4).
- State Environmental Planning Policy No. 14 - Coastal Wetlands (SEPP 14).
- State Environmental Planning Policy No. 44 - Koala Habitat Protection (SEPP 44).
- State Environmental Planning Policy No. 55 - Remediation of Land (SEPP 55).
- State Environmental Planning Policy No. 71 - Coastal Protection (SEPP 71).
- State Environmental Planning Policy No. 74 - Newcastle Ports and Employment Lands (SEPP 74).

A description of SEPP No. 14 and SEPP No. 44 in relation to the project is provided in **Chapter 5.**

2.5.2 Land use

Land use within the study area is characterised by a mix of bushland, rural land, urban settlements, semi-rural holdings, light industrial and commercial premises, tourism operations, transport corridors and utility infrastructure. In a broader context the Lower Hunter Region comprises a range of industries and commercial activities including coal mining and handling, port activities, agriculture and tourism.

Key commercial centres in the region are Newcastle, Maitland and Cessnock with new employment areas / zones emerging at Thornton Industrial Estate and the Freeway Business Park at Beresfield. The key commercial centre within the study area is Heatherbrae, with Beresfield, Tarro, Hexham, Tomago and Raymond Terrace in the immediate surrounds.

Agriculture and fisheries

Rural land uses such as grazing and stock rearing for beef and dairy cattle are practiced throughout the study area. The majority of land within the study area is situated on river flats, which form part of the Hunter River floodplain.

A small proportion of land within the study area is used for cropping. Agricultural land capability (based upon soil conservation information) within the study area has been mapped using DoP / DNR data. Land is classified as follows:

- The majority of the western section of the study area is classified as 'suitable for grazing with occasional cultivation' with small pockets which are deemed unsuitable for cultivation.

- The central section, and a section of the eastern end of the study area, is classified as being 'suitable for regular cultivation'.
- The remainder of the study area in the east is described as 'suitable for grazing with no cultivation' and pockets comprising an urban area (Heatherbrae) and 'other', which in this case appears to be drainage lines, swamp or floodplain, and a small area utilised for mining and quarrying.

A major land use in the central section of the study area is stud farms, for the breeding and training of thoroughbred race horses, for re-sale else where including countries such as Japan.

The Hunter River estuary supports an important commercial and recreational fishery. Commercial prawn trawling is a particularly important activity carried out in the Hunter River.

Urban settlement

The following urban settlements are located within the wider study area:

- Black Hill / Woods Gully and Lenaghan which are low density residential developments adjacent to the existing F3 Freeway with combined populations of around 395 people.
- Beresfield, Woodberry and Thornton are mostly low / medium density residential areas with populations of around 4600, 3400 and 5800 people respectively.
- Tomago is primarily industrial and rural, with an aluminium plant (Tomago Aluminium Smelter) and a local population of around 150 people.
- Heatherbrae contains highway-related commercial areas, industrial areas and residential areas with approximately 500 residents.
- Hexham is a small semi-rural community of around 150 people, with an element of industrial development situated between the Main Northern Railway line and the Hunter River.

The larger town of Raymond Terrace is situated to the northeast of the study area and has a population of 12,500 people. The location Raymond terrace is shown on **Figure 2.2**.

Industry and employment areas

The industrial area around Weakleys Drive is located at the northern end of the F3 Freeway and is a significant employment source. Further industrial development is proposed at this location.

Both the industrial areas at Heatherbrae and Tomago are identified as 'employment lands' within the Draft Hunter Regional Strategy (DoP, 2005). The areas are consistent with the areas within the Port Stephens LEP zoned for industrial uses.

A proposal to build a gas fired power station adjacent to the Pacific Highway between Old Punt Road and Tomago Road was approved in 2003, however construction had not commenced at the time of this report. The proponents of this development are Macquarie Generation.

The Tomago Aluminium Smelter is located to the south of the study area, but is a notable land use occupying approximately 120 hectares. The smelter is bounded to the west by Tomago Road and provides employment for approximately 2,000 people.

The Hunter Industrial Park is currently being developed on land adjacent to the southbound carriageway of the Pacific Highway at Tomago. The industrial park comprises 49 vacant level land lots, from 2100 to 7000 square metres in size.

A number of industrial businesses operate from an area along the Pacific Highway at Heatherbrae. Types of businesses include motor vehicle sales and repairs, building supplies, materials and equipment and food outlets.

The Weathertex factory, producing modified timber products occupies approximately 10 hectares of land, within a larger parcel owned by the same company. The site is bounded by the Pacific Highway to the north and Masonite Road to the west. Vehicular access to the site is from Masonite Road.

Serviced industrial land subdivision is proposed on two areas fronting Masonite Road. The proponent of this development is a consortium including the Weathertex factory owner. The industrial subdivision adjacent to the Masonite Road roundabout is currently under construction.

SEPP 14 wetlands and nature reserves

Six SEPP 14 wetlands are located within the central and western parts of the study area. These wetlands contain a mosaic of critical estuarine and freshwater habitats that are of regional and national importance for a range of amphibian, fish and bird species. SEPP 14 wetland locations are shown in **Figure 2.2**.

The northern extent of Hexham Nature Reserve (Hexham Swamp Complex) is located within the study area. This Nature Reserve is a gazetted SEPP 14 wetland and listed on the Register of the National Estate.

The Kooragang Nature Reserve is located approximately four km south of the study area, on Kooragang Island.

The Hunter Region Botanic Gardens are situated south west of Heatherbrae and comprise 140 hectares of privately run gardens, most of which has been preserved as natural bushland with other plantings developed for recreational, educational and scientific purposes. The Hunter Region Botanic Gardens are a significant tourist and local visitor attraction, year round.

Water catchment

A portion of the eastern section of the study area is Hunter Water Corporation freehold land, located within the Tomago Special Area boundary. This area is described as the Tomago Sand Beds and together with the Tomaree and Stockton Sand Beds, forms a Groundwater Management Area. The Tomago Special Area boundary is illustrated in **Figure 2.3**.

2.5.3 Property impacts and land acquisition

Maintaining property access and limiting the impacts on private property are important considerations in the selection and refinement of a preferred route option.

The construction of the upgrade would require land acquisition. The number of properties impacted by acquisition would vary depending on the ongoing refinement of the preferred route.

The RTA's *Land Acquisition Policy* would be followed where partial or full land acquisition is required.

2.6 Social and cultural features and issues

2.6.1 Indigenous heritage

Aboriginal land council areas and native title

The study area traverses three physiographic regions and each of these has a distinctive archaeological sensitivity. The western end of the study area occurs in the East Maitland Hills, the majority of the study area is situated on the Lower Hunter Plain, and the eastern end of the study area is situated on the Tomago Coastal Plain (Matthei, 1995). These three sections are referred to as the Black Hill Precinct, the Hunter Floodplain, and the Tomago Sand Beds.

The Hunter River forms the geographical boundary between the two Local Aboriginal Land Councils (LALCs) within the study area. The western part of the study area is located within the Mindaribba LALC area whilst the eastern section of the study area is within the Worimi LALC area.

Land within the study area is not subject to any current native title claims. Review of the National Native Title Tribunal Register of Native Title Claims, Schedule of Native Title Applications, National Native Title Register, Register of Indigenous Land Use Agreements and Indigenous Land Use Agreements Notifications show there are:

- No applications for determination of native title, registered or otherwise.
- No Indigenous Land Use Agreements.
- No native title determinations in the vicinity of the study area.

The native title databases will be regularly reviewed throughout all stages of project development.

Historical sites

A search of the NSW DEC Aboriginal Heritage Information Management System (AHIMS) identified 18 known Aboriginal archaeological sites within the study area itself. There was also one known unregistered site at Black Hill (Kuskie, 1997). Notably, 16 of the 18 sites within the study area were located in the Black Hill Precinct, and two were located in the Tomago Sand Beds, with no previously recorded sites located on the Hunter River Floodplain.

The Black Hill precinct

The Black Hill precinct is an area of high archaeological significance and cultural sensitivity. Over the past 12 years elevated landforms adjacent to the Hexham Swamp have been found to contain a continuous distribution of artefacts, and sites that contain high densities of stone artefacts. In the study area itself Kuskie (Kuskie 1997, 2002) has shown there is a high occurrence of surface archaeological material. From what is known of the area, this is indicative of a valuable sub-surface resource. The Black Hill area is an area of high cultural and social importance to the Aboriginal community.

Hunter River floodplain

The Hunter Floodplain is classified as having a low archaeological potential and cultural sensitivity. Existing models of Aboriginal hunter-gatherer occupation of the Lower Hunter suggest that there is not likely to be significant amounts of archaeological material located in this area and it is considered to be of low archaeological sensitivity. During an initial site walk over on Friday 3 December 2004, representatives from the Mindaribba and Worimi LALC and Traditional Owner representatives expressed their concern about the floodplain being categorised as an area of low sensitivity because very little work had been conducted there previously. Small areas of vertical differentiation on the floodplain, such as old natural levee banks, may contain potential archaeological resources. The determination of low sensitivity would be tested by systematic surveys as part of further studies.

Tomago Sand Beds

The Tomago Sand Beds are classified as having a moderate to high archaeological potential and cultural sensitivity. This section of the study area forms the edge of a Pleistocene dune field, and provides elevated landforms immediately adjacent to the Hunter River floodplain.

This is an indicator that, like Black Hill, the area would have been favourable to Aboriginal occupation, both during the later Pleistocene and the Holocene periods. Reasonably large surface sites, including hearth remains have been found within and adjacent to Raymond Terrace. These sites are suggestive of considerable archaeological potential.

Subsurface investigations at Moffats Swamp (15 km to the northeast of the study area and within the Tomago Sand Beds) have revealed large and ancient archaeological sites, indicating there is also potential for ancient sites to exist within the study area. These may be associated with remnant swamps or drainage lines.

2.6.2 Non-indigenous heritage

A search of existing heritage listings, review of historic maps and consultation with local councils and the Raymond Terrace and District Historical Society has been undertaken, identifying the following items of historical interest within the study area.

Table 2.7: Listed heritage items within study area

ID	Item name and description	Location	Listing
037 & 1323	'Kinross', a private residential house including stone shed / outbuildings, landscaping and curtilage.	68 Wahroonga Street, Raymond Terrace (adjacent to Windeyers Creek).	• Port Stephens LEP 2000. • 'Registered' on Register of National Estate.
069	Two Moreton Bay Fig Trees (*Ficus macrophylla*), which are significant features in the landscape character of the area.	Pacific Highway, just north of Hank Street.	• Port Stephens LEP 2000.
1296	The Hunter Estuary Wetlands are internationally significant wetlands and waterbird habitat.	The Hexham Swamp and related SEPP 14 wetlands fall partially within the study area between Black Hill and Hexham.	• 'Registered' on Register of National Estate.
N/A	Hannel Family Vault.	398B Maitland Road, Hexham.	• Newcastle LEP 2003. • National Trust Register.
4301049	Hexham Bridge (southbound). Built in 1952, this was one of the last steel truss opening span bridges constructed. Still used for southbound travelling traffic.	Pacific Highway, Hexham.	• Newcastle LEP 2003. • S170 Heritage Register (RTA).

The old Hexham Bridge is located outside, but directly adjacent to the study area. The structure was built in 1952 and is listed on the NLEP 2003 and S170 Heritage Register (RTA). This structure was one of the last steel truss opening span bridges constructed and is still in use for southbound travelling traffic.

The Oak Factory located in Hexham at 189 Maitland Road, is also outside, but directly adjacent to the study area and is also listed on the NLEP 2003.

The location of these listed sites has been taken into consideration during development of route options and the selection of a preferred route.

2.6.3 Demographics and social issues

The project would have potential to impact on individuals and communities at National, State, regional and local levels. Road safety and transport efficiency would improve at National and State levels along the Melbourne/Sydney/Brisbane transport corridor. At a regional level there would be improvements in the road network in the Lower Hunter area.

Approximately 7300 residents live within the broader study area that encompasses the southern part of Raymond Terrace, Heatherbrae, Motto Farm, Tomago, Beresfield, Tarro and Woodberry. In this area, analysis of census data indicates that residents reside in just below 3000 households of which the average size is between two and three people. Residents over 65 years old account for 14 per cent of the local adult population, which is similar to the NSW regional profile.

Of the residents of working age, 30 per cent work full time. The unemployment rate in the area is 13.5 per cent, although this varies between 3.3 and 39.4 per cent for individual census districts. The most common weekly employee income bracket (14 per cent) is $200 to $299. Four per cent of the local population are educated to a bachelor degree level or above, which is lower than the NSW figure of 14.5 per cent. The most common employment sector is retail (19 per cent) and the second most common is the manufacturing industry (16 per cent). Residents employed as managers, administrators, professionals and associate professionals accounted for 24 per cent of the workforce. Car ownership is high with only 13 per cent of households not owning any form of motorised transport.

Socio-economic issues

There is a potentially wide and varied range of both positive and adverse socio-economic impacts of the project. Examples of potential socio-economic issues specific to this project that were raised through the community consultation process include:

- Concern about property being directly affected.
- Impacts on residential amenity.
- Impact on community facilities and access to community facilities and services.
- Impact on community linkages.
- Impact on highway-related businesses.

Some of these negative impacts would be evident in physical terms and could therefore be mitigated effectively through design. Social impacts that are difficult to quantify, reinforce the strong relationship between social impacts and community involvement as a source of information about community networks and other characteristics. This highlights the opportunity for potentially affected community members to contribute to the route options development and assessment process.

2.6.4 Noise and vibration

Road traffic noise criteria in NSW are based on guidance in the DEC's Environmental Criteria for Road Traffic Noise (ECRTN 1999).

Those residents who currently experience little or no road traffic noise are likely to be more affected by traffic noise from traffic on a new road alignment than those residents who currently experience some road traffic noise, and for whom, noise from traffic on a redeveloped road may result in little or no change.

The assessment and mitigation of road traffic noise impacts is undertaken as part of the road planning process, from route selection to concept and detailed design and through project completion and operation.

2.6.5 Urban design, landscape and visual amenity

The methodology adopted for the urban, landscape and visual assessment is a qualitative approach. The study area and route options are assessed on the basis of their respective Urban, Landscape and Visual merits.

The *Pacific Highway Urban Design Framework* (RTA 2005) contains six urban design objectives to assist in the planning and delivery of an urban design vision for the Pacific Highway. These objectives are:

- A flowing road alignment that is responsive and integrated with the landscape.
- A well vegetated natural road reserve.
- An enjoyable interesting highway with varied views and vistas of the landscape and pleasant 'restful' places to stop.
- Value the communities and towns along the road.
- Provision of consistency with variety in road elements.
- A simplified unobtrusive road design.

Landscape character and visual setting

The landscape character and visual setting within the study area is greatly influenced by the Hunter River and its floodplain. The floodplain is characterised by open, low-lying farmland, incised by a network of natural/artificial drainage lines. Individual trees, patches of trees, wetlands and areas of swampy ground punctuate the floodplain.

The western and eastern edges of the study area are framed by elevated, gently undulating ridges and hill crests. These edges are largely covered by blocks of native vegetation comprising a mosaic of habitats which support a number of threatened flora/fauna species. The urban areas of Black Hill, Heatherbrae are also situated on this elevated ground contain a range of building types.

The openness of the floodplain is interrupted by a network of transport and utility infrastructure which traverse the central and eastern parts of the study area. The existing Hexham Bridges define the southern boundary of the study area and form a visual barrier along this stretch of the Hunter River.

The existing traffic route also passes through this landscape affording traveller views of the floodplain and river corridor. These traveller views are filtered by landform, native vegetation and intervening development along the F3 Freeway and John Renshaw Drive in the western part of the study area and by urban development at Heatherbrae.

From the elevated ground in the western and eastern sections of the study area residents at Black Hill and Heatherbrae experience panoramic views across the floodplain.

2.7 Biophysical environment issues

2.7.1 Topography, geology and soils

Topographical features

Landform across the study area is dominated by the Hunter River floodplain which covers approximately 1406 hectares (65 per cent) of the study area.

The F3 Freeway, near the offtake point for the project, has been constructed with only minor alteration to natural ground levels. East of the F3 Freeway, natural ground levels rise, forming a

series of undulating ridges and hill crests before descending to the low lying Hunter River floodplain.

The landform at Black Hill is characterised by a gently undulating profile supporting a dense vegetation cover in places. Ground elevations vary from approximately 22 metres Australian Height Datum (AHD) at Black Hill to of 1.5 metres AHD on the floodplain.

The majority of the study area is situated on the low lying Hunter River floodplain where ground elevations range between zero and +1 metre. The existing Pacific Highway defines the southern extent of this landform.

East of the Pacific Highway, ground levels gently rise to approximately 12 metres AHD within the densely vegetated aeolian deposits of the Tomago Sand Beds.

Geology

The study area is part of the Newcastle Bight embayment, located on the northern edge of the Sydney Basin. On a regional level, it is bounded by Carbonaceous Volcanics to the north and Permian bedrock hills to the south and west. At the southern end of the embayment the Hunter River has deposited estuarine and fluvial-deltaic sediments, consisting of gravels, sand, clay and silt from the Quaternary age. Holocene estuarine sedimentation over time, has developed fluvial river and floodplain depositions. The consistency and depth of the sediments is highly variable as a result of various in filled paleochannels.

The western end of the study area is underlain by the Tomago Coal Measures. Available information indicates that three significant coal seams are present in this area. These three seams have been subject to both underground mining and open cut commercial coal mining activities.

Soils

The western section of the study area south of Beresfield and Tarro is characterised predominantly by the Beresfield (be) soil landscape. This soil landscape is of residual origin and lies within the Mine Subsidence District. Limitations include high foundation hazard, water erosion hazard, seasonal waterlogging and high run-off on localised lower slopes.

The central section of the study area, south of Beresfield and Tarro and north of the Pacific Highway is underlain by an estuarine landscape identified as Millers Forest (mf) and is characterised by deep poorly drained soils. Limitations of this landscape include flood hazard, permanently high water tables, seasonal waterlogging, foundation hazard, and low wet bearing strength soils.

East of Old Punt Road and south the existing Pacific Highway, the study area is underlain by an Aeolian landscape identified as Tea Gardens (tn). The soil landscape is characterised by Pleistocene sand sheets.

Between the Hunter River and Tomago Road, a section of the Hexham Swamp (hs) soil landscape unit, characterised by deep soft soils, with a high flood and foundation hazard, high potential for acid sulfate soils and waterlogging is present.

Acid sulfate soils

Acid Sulfate Soils (ASS) include Actual Acid Sulfate Soils (AASS), where the soil pH is below four and/or Potential Acid Sulfate Soils (PASS), which may form AASS when drained or exposed to the atmosphere. The alluvial deposits of the Hunter River floodplain are classified as high probability for ASS.

Around the major watercourses such as the Hunter River, Purgatory Creek and Windeyers Creek, ASS are likely to be encountered within one metre of the ground surface.

Acid Sulfate Rock (ASR) has been encountered adjacent to the study area at Grahamstown Dam and also on the Karuah Bypass. Further testing will be undertaken during the next phase of geotechnical investigations to investigate the likelihood of encountering ASR within potential cut locations.

Geotechnical issues and engineering considerations

To provide an appropriate level of flood immunity, a length of any alignment constructed across the low lying Hunter River floodplain would require elevating. Normally this is achieved through construction of an earth embankment which, when constructed on the deep and soft alluvial deposits of the floodplain, leads to a number of key engineering issues:

- Large time dependent embankment settlements resulting in unacceptable deformation of the road surface during the operational phase of the project. This is particularly an issue with differential settlements at the interface of embankment and bridge structures and also for ensuring that flood immunity is maintained.
- Low bearing capacities, restricting the steepness of embankment batter slopes and height unless stabilization measures are introduced. This issue also impacts the viability of preloading or surcharging soft ground prior to formation of the permanent earthworks.

All route options passing over the floodplain on embankment would require varying degrees of ground treatment and/or utilisation of lightweight fills, to ensure that settlement criteria are achieved and an acceptable factor of safety against embankment failure is achieved during the operational phase of the project.

2.7.2 Hydrology and flooding

WBM Oceanics have been commissioned to undertake hydrology and hydraulic investigations for the project. The primary focus of these investigations was to assess the existing flooding regime and the potential impact of the project on the flooding behaviour of the Hunter River and extent of modifications to the local drainage network.

Hydrological features

Catchment

The study area is located within the Hunter-Central Rivers Catchment. The catchment covers an area of 37,000 square km and extends from Taree in the north to Gosford in the south, and from Newcastle in the east to the Merriwa Plateau and Great Dividing Range in the west.

Watercourses

The Hunter River is the principal watercourse in the study area. It flows in a predominantly south westerly direction from its headwaters at Glenbawn Dam in the upland areas of the Hunter-Central Rivers Catchment prior to its confluence with the Goulburn River at Denman. The central part of the study area crosses the Hunter River once, approximately one kilometre south west of Motto Farm.

All creeks and land drains in the study area are tributaries of the Hunter River. There are four minor watercourses that flow within the study area, namely:

- Purgatory Creek which crosses the study area near the intersection of the Main Northern Railway and the New England Highway east of Tarro.
- Windeyers Creek flows between Heatherbrae and Raymond Terrace before discharging into the Hunter River. It is located in the east of the study area.

- A small unnamed tributary, which extends from Heatherbrae and flows southwest before discharging into the Hunter River at two locations approximately two and three km downstream, respectively.
- Viney Creek which is located in the far west of the study area. Viney Creek flows northwards and joins Weakley's Flat Creek approximately 750 metres north west of the study area before discharging into a swamp near Beresfield. This swamp is connected to Woodberry Swamp, a SEPP 14 wetland.

Flooding

Over 200 floods have been recorded on the Hunter River since European settlement. The most severe flood recorded was the 1955 flood event, wherein the average distribution of rainfall over the entire Hunter River catchment between the 24 and 27 February 1955 was recorded as 270 millimetres. This flood event was later calculated as having an Annual Exceedence Probability (AEP) of approximately 0.5 per cent. The extent of the one per cent AEP extent is shown in Figure 2.1.

A significant proportion of the study area is within a very high hazard zone for flooding. The remaining proportion of the study area within the floodplain is categorised as high hazard (Patterson Britton and Partners, 1996).

The flooding behaviour within the study area is influenced by a number of natural and constructed flow controls. Within the study area, a natural constriction formed by the peninsular at Tarro and high ground at Tomago influences flooding behaviour.

Currently, constructed levees provide protection from floodplain inundation during events up to approximately the 20 per cent AEP flood event.

Local drainage

Local drainage sub catchments within the study area are relatively ill-defined. A network of natural and constructed drains excavated within the floodplain by property owners convey runoff to the Hunter River.

Additional local catchment runoff enters the floodplain from more defined urban sub-catchments that fringe the floodplain. Constructed stormwater drainage lines concentrate and discharge stormwater into the floodplain at specific locations.

Hydrological issues and engineering considerations

Flood immunity

The preferred route will provide the appropriate level of flood immunity, in accordance with the Pacific Highway Route Strategy. The guidelines require that the pavement wearing surface of at least one carriageway remains above the water level during the design flood event. The guidelines target immunity from a one per cent AEP flood event with a minimum requirement for immunity against a five per cent AEP flood event.

Design elevations for a range of flood frequency events were investigated and it was found that levels required to provide immunity against design floods greater than a five per cent AEP flood event, were impractical from a buildability and hydraulic perspective. Consequently five per cent AEP flood event levels have been adopted and achieved in all route options developed to date.

The incorporation of long term embankment settlements is an important consideration in ensuring that flood immunity is maintained over the projects operation.

Flood level considerations

Route options that minimise the proportion of impeded flood flows would assist in minimising the impact on upstream flood levels.

In addition changes in flow velocities resulting from the redistribution of flood waters need to be considered. The critical areas for changes in flood velocities are in the vicinity of culverts/bridges where flow is rapidly contracting and expanding (high velocities requiring scour protection or velocities reduced to acceptable levels through design) and between bridges (low velocity) where sediment and debris conveyed by the flood waters may be deposited.

River geomorphology

Continued development within the Hunter River catchment may impact existing flow regimes and river geomorphology through the introduction of greater areas of impervious surfaces and increased run off velocities entering the local water environment. For example the levee banks along the river upstream of Hexham Bridges are believed to have led to increased flow velocities during flood events and scouring on the outer edges of the river banks.

The location of the required new Hunter River crossing considers the dynamic behaviour of the river and potential for changes in the river alignment.

2.7.3 Water quality

Existing surface water quality

Watercourses within the study area are the Hunter River and its tributaries and associated wetlands.

A formal water quality data collection program has been undertaken by the Hunter Water Corporation and NSW DEC within the Hunter River estuary since 1972.

The Hunter River is a disturbed ecosystem receiving agricultural and urban runoff. It has elevated levels of nutrients and high turbidity.

The quality of water in the river would not influence route selection however the wetlands are sensitive to sediment and pollutants such as oil and changes to pH.

Surface water quality engineering considerations

In order to minimise impacts on water quality, arising from soil disturbance and stormwater pollutants entering the Hunter River, its tributaries and wetlands, it is necessary to consider the inclusion of surface water treatment devices within the footprint of the road alignments. Such devices may include sedimentation (detention) basins and grass drainage swales, which filter pollutants and retain sediments prior to discharging into existing waterways.

2.7.4 Ground water resources

Existing groundwater resources and levels

The Tomago Sand Beds cover an area of 106 square km along a strip of coastal land that varies in width from approximately three km at Lemon Tree Passage to six km at Tomago. The Tomago Sand Beds extend to the eastern side of the Hunter River between Hexham and Raymond Terrace. Part of the eastern section of the study area is located within the catchment for the sand beds and forms part of the Tomago GMA which is classified as a 'special area' under the Hunter Water (Special Areas) Regulation 2003. The Tomago Special Area is shown in **Figure 2.3**. This classification is based on the Tomago GMA forming part of the sensitive water supply catchment area for Newcastle and the Lower Hunter. There are now in excess of 20 pumping stations within the Tomago GMA operated by Hunter Water Corporation. The Tomago Sand Beds are a major source of water supply and the aquifer system is the sole provider of potable water to the Tilligerry Peninsula.

The groundwater levels in the vicinity of the Tomago Sand Beds and within the study area are generally from about 2-5 metres in depth. Previous geological desk top studies undertaken specifically within the study area by GHD LongMac (April 2005) suggests that groundwater levels within the Tomago Sand Beds are generally higher than within adjacent flood plains.

Groundwater issues and engineering considerations

The groundwater quality in the catchment is currently impacted upon by land uses including residential, industry, manufacturing, construction, transport, agriculture, mining, utilities, defence force activities and recreation.

High ground water levels (near surface) would impact on design and construction. This may result in difficult construction conditions imposed by the high groundwater levels within the alignment area in the eastern section. Excavations below or near the water table would be avoided.

2.7.5 Terrestrial ecology

Biosis Research Pty Ltd, were commissioned to conduct a terrestrial flora and fauna assessment. The purpose of this assessment was to identify and evaluate the issues and influences associated with terrestrial flora and fauna on the development of potential route options. This included consideration of the presence of threatened species, populations (and their habitats) and ecological communities listed under the *NSW Threatened Species Conservation Act 1995 (TSC Act)* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

Existing environment: flora and fauna

The study area is generally characterised by cleared farmland across the floodplain areas interspersed with some small fragmented patches of native vegetation.

A remnant block of native vegetation is located at Black Hill in the western part of the study area and forms part of a 'green corridor', extending from Sugarloaf in the west to Hexham Swamp in the east.

A large area of native vegetation also exists in the southeast of the study area forming part of the Tomago Sand Beds.

Hexham Swamp Nature Reserve adjoins the south western boundary of the study area.

Flora and fauna issues and considerations

Biodiversity issues have influenced alignments for the route options in order to protect habitats for endangered or threatened ecological communities, flora and fauna species.

<u>Areas of high conservation</u>

Areas identified as being of high conservation value are:

- The Hunter Estuary Wetlands.
- Hexham Swamp Nature Reserve.
- Core and potential Koala habitat.
- SEPP 14 wetlands.
- Endangered Ecological Communities (EECs) – see below.
- The Hunter River and smaller tributaries.
- Undisturbed native vegetation areas situated in the west and south-west of the study area near Lenaghans Drive and John Renshaw Drive at Black Hill.

- Areas of native vegetation east of the Hunter River, extending from the Tomago Industrial area to the south of Heatherbrae on the Tomago Sand Beds. These are known to contain numerous threatened flora and fauna species, habitats of high conservation value and EECs.

Endangered Ecological Communities

Five of the seven vegetation communities recorded in the study area are listed as EECs under Schedules 1 and 2 of the TSC Act. The EEC designations and locations within the study area include:

- Lower Hunter Spotted Gum- Ironbark Forest, located at Black Hill.
- Swamp Sclerophyll Forest, located at Black Hill Tomago Sand Beds and Heatherbrae.
- Swamp Oak Rushland Forest, located at Black Hill, Hexham Swamp, Hunter River floodplain and Heatherbrae.
- Freshwater Wetland Complexes located on coastal floodplains, (part of) Hexham Swamp and within the Tomago Sand Beds.
- Coastal Saltmarsh, located on low-lying areas adjacent to the main channel of the Hunter River and associated tributaries, and near mangrove forests.

Threatened flora species

Database research (DEC Atlas of NSW Wildlife and DEH Online Database) concluded that ten threatened plant species (listed on the TSC Act) and eight threatened plant species (EPBC Act) have been previously recorded within 10 km of the study area.

During targeted surveys, one threatened flora species, *Callistemon linearifolius* ('red bottlebrush') was recorded in the western section of the study area within the Lower Hunter Spotted Gum-Ironbark Forest EEC.

Based on previous recordings potential habitat for an additional four threatened flora species exists within the study area.

Tetratheca juncea was not recorded in the study area during the targeted searches undertaken in November/December 2004 and July 2005. However a population of *Tetratheca juncea* was recorded in 1985 within the eastern section of the study area. The area has since been cleared and developed. It is possible that *Tetratheca juncea* does occur within the bushland areas of the eastern section of the study area and further surveys will be undertaken to investigate its potential presence.

Threatened fauna species

Database research concluded that 48 threatened animal species (listed on the TSC Act), 12 threatened animal species or their habitat (listed on the EPBC Act) and 20 migratory birds or their habitat have been previously recorded within 10 km of the study area.

Five threatened fauna species were recorded within the study area during the surveys:

- Glossy Black Cockatoo.
- Grey-crowned Babbler.
- Grey-headed Flying-Fox.
- Koala.
- Masked Owl.

A total of 28 migratory birds were recorded within the study area during the surveys. An additional three threatened and six migratory fauna species have been recently recorded within and/or adjacent to the study area.

Key ecological constraints are shown in **Figure 2.2**.

2.7.6 Aquatic ecology

The Ecology Lab was commissioned to investigate issues relating to aquatic habitats and fisheries as part of the route options development process. Field inspections of the major aquatic habitats within the study area were undertaken in December 2004 and July 2005 by The Ecology Lab.

Existing environment: aquatic ecology

Aquatic habitat includes a wide range of habitat types such as:

- Marine and estuarine habitats including seagrass, mangroves and saltmarsh (important fish feeding and nursery habitats).
- Freshwater habitats, including wetlands.

The study area crosses a number of freshwater and estuarine habitats, including the Hunter River, Purgatory Creek, an unnamed creek in the central section and Windeyers Creek in the eastern section.

Aquatic ecology issues and engineering considerations

Fish habitat classification and preferred engineering requirements

The classification of fish habitat ranges from Class 1 (Major Fish Habitat) through to Class 4 (Unlikely Fish Habitat) and is based on the Department of Primary Industries (Fisheries) requirements. The following table details fish habitat locations for watercourses within the study area and preferred engineering solutions according to the fish habitat classifications.

Table 2.8: Fish habitat areas

Classification	Watercourse type	Watercourses within the study area	Preferred engineering solution
Class 1 Major fish habitat	• Large river or creek. • Permanent flow. • 'Critical habitat'.	• Hunter River.	• Bridge or tunnel only. • Single span.
Class 2 Moderate fish habitat	• Small-medium stream. • Defined channel. • Pools or wetlands.	• Purgatory Creek. • Windeyers Creek. • An unnamed creek. • A dam.	• Large box culverts or bridge.
Class 3 Minimal fish habitat	• Named or unnamed stream. • Intermittent flow. • Potential refuge. • Minimal defined channel.	• Two freshwater wetlands in the western portion of the study area.	• Culverts designed to allow fish passage.

Classification	Watercourse type	Watercourses within the study area	Preferred engineering solution
Class 4 Unlikely fish habitat	• Named or unnamed stream. • Intermittent flow rain only. • No pools after rainfall. • No aquatic vegetation	• There are no Class 4 watercourses identified within the study area.	• Causeway, floodway or culvert.

Threatened species of concern

The Hunter River is habitat for the green sawfish and black cod, which are listed as a Threatened and Protected Species under Part 7A of the *Fisheries Management Act 1994* (FM Act).

Protected aquatic vegetation

In addition to SEPP 14 wetlands, other aquatic habitats such as mangroves and seagrasses (protected under the FM Act) and saltmarsh vegetation protected under the TSC Act are known to occur within and/or in proximity to the study area.

There are two threatened aquatic ecological communities (listed under the TSC Act) within the study area:

- Coastal saltmarsh (EEC).
- Freshwater wetland complex (EEC).

These communities are located on the floodplain areas, along the Hunter River corridor and/or on the western edge of the Tomago Sand Beds.

Fisheries and aquaculture

The Hunter River Estuary is an important commercial fishery and supports species including; Mullet; Eastern King and School Prawns and Whiting (Hunter Valley Research Foundation, 2003).

2.7.7 Climate and air quality

Existing climatic conditions and considerations

The development of the project is not expected to have a significant climatic influence and potential impacts within the study area are likely to be limited to those associated with air quality during construction and operation.

Potential air pollutants

Key air pollutants of concern associated with the development of the project include:

- Carbon monoxide (CO).
- Hydrocarbons (HC).
- Nitrogen oxides (NOx).
- Particulate matter (PM10).
- Lead (pb).
- Dust.

Existing local air quality issues and considerations

Local air quality

The NSW National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) Monitoring Plan provides for monitoring at two stations in the Lower Hunter region. Current monitoring has focussed on Newcastle and its environs. However there is also limited monitoring undertaken at existing stations in Wallsend and Beresfield, which are located approximately 7.5 km south and one km north respectively from the study area. **Table 2.9** and **Table 2.10** provide a summary of AAQ NEPM monitoring up until the year 2003 (latest results available) for Newcastle and Wallsend/Beresfield.

Table 2.9: Newcastle air quality monitoring results

Pollutant	Year										*NEPM Standard*
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
CO (ppm)	5.3	4.4	4.8	2.9	4.3	3.3	3.1	4.0	3.2	2.8	9.0 ppm (rolling 8-hour average)
NO_2 (ppm)	0.070	0.049	0.044	0.048	0.039	0.049	0.044	0.040	0.047	0.039	0.12 ppm (1-hour average)

Source**:** NSW DEC, (2004), "AAQ NEPM Annual Compliance Report 2003".

Note - **Bolding** indicates years when NEPM Standard was exceeded.

Table 2.10: Wallsend (and Beresfield) air quality monitoring results

Pollutant	Year										*NEPM Standard*
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	
NO_2 (ppm)	0.048	0.057	0.044	0.058	0.035	0.034	0.054	0.044	0.043	0.050	*0.12 ppm (1-hour average)*
PM_{10} (µg/m3)	**68.0 (81.6)**	**67.1 (66.2)**	**71.1 (100.6)**	**74.7 (71.8)**	47.9 (46.1)	48.0 (38.4)	46.7 **(53.6)**	**75.8 (81.0)**	**157.4 (166.4)**	**105.2 (88.0)**	*50 µg/m3 (24-hour average)*
SO_2 (ppm)	0.073	0.059	0.080	0.101	0.063	0.074	0.041	0.049	0.045	0.047	*0.20 ppm (1-hour average)*
SO_2 (ppm)	0.018	0.020	0.022	0.022	0.016	0.014	0.010	0.013	0.012	0.011	*0.08 ppm (24-hour average)*
Pb (µg/m3)									0.05	0.09	*0.50 (µg/m3) (Annual Average)*

Source**:** NSW DEC, (2004), "AAQ NEPM Annual Compliance Report 2003".

Monitoring results in Beresfield in parenthesis ( )

Note - **Bolding** indicates years when NEPM Standard was exceeded.

The tables above show that existing local air quality parameters for carbon monoxide, nitrogen dioxide, sulphur dioxides and lead are generally below the NEPM standard, as recorded at the Wallsend and Beresfield monitoring stations. Readings for particulate matter (PM10) generally exceed the NEPM standard within the local area, but these readings may be influenced by local industrial emissions that are above the National Pollutant Inventory thresholds.

2.8 Existing infrastructure

The following summarises existing major infrastructure and utilities that have influenced and constrained the development of route options as presented in **Table 2.11**.

Table 2.11: Infrastructure and associated constraints

Infrastructure or Utility	Engineering constraints and considerations
Main Northern Railway, New England Highway and Woodlands Close	All route options would cross Woodlands Close (sealed or unsealed sections), the Main Northern Railway line and the New England Highway. Crossing this infrastructure in the southern half of the study area would present the narrowest corridor and could be integrated with a new structure required over the Hunter River.
Chichester Trunk Gravitation Water Main (CTGWM)	All route options would cross a north south section of the CTGWM, which is currently above ground at this location. Hunter Water Corporation plans underground this section of pipleline and to install an additional trunk water main between Tomago and Tarro.
Underground water pipes	A series of underground water mains exist within the study area to service townships within the area. This includes the Raymond Terrace Trunk Watermain which leads into Raymond Terrace. Three parallel 500 millimetre trunk water mains traverse the eastern section of the study area, running south from the Masonite Road roundabout to the Tomago GMA borelines.
High voltage overhead transmission lines (330 kV) – Transgrid High voltage overhead transmission lines (132 kV) – Energy Australia	All route options would pass under a set of existing 330 kV TransGrid overhead transmission lines. There is a minimum 12 metres vertical clearance required by TransGrid between the project and the overhead transmission lines. Route options that pass under these overhead transmission lines close to the F3 Freeway take off point would meet vertical clearance requirements already in place for the F3 Freeway crossing. Any crossing of these overhead on the floodplain would incur clearance difficulties as the road elevation must achieve the minimum design levels for flood immunity. In addition, embankment construction on soft ground has potential to result in unacceptable vertical and lateral movement of soils supporting the transmission towers. Passing underneath the transmission lines near the Hunter River would also constrain the vertical alignment on the approach to the river crossing.

Infrastructure or Utility	Engineering constraints and considerations
Low voltage overhead transmission lines	A route option through Heatherbrae would require relocation and/or burial of the low voltage overhead transmission lines located adjacent to the existing Pacific Highway. Transmission lines are located on both sides of Woodlands Close would require burial or realignment and protection within the project corridor.
High voltage underground electricity cables	Underground electricity cables that may be affected by the project are located within Heatherbrae adjacent to the existing Pacific Highway, along Masonite Road and Woodlands Close in the central part of the study area.
Gas	All route options within the study area would pass over the buried Tarro to Hexham high pressure secondary gas main which runs parallel to Woodlands Close. A network of low pressure polyethylene gas mains are located in the Heatherbrae area along Masonite Road and the existing Pacific Highway.
Telecommunications	Visionstream, Telstra and Optus fibre optic cables located within the study area would be overpassed with the structure over the Woodlands Close/Main Northern Railway/New England Highway infrastructure corridor. Telstra fibre optic cables are also located in the Heatherbrae area adjacent to the existing Pacific Highway and Masonite Road.

3 Community consultation

Since the Minister for Roads announced the F3 Freeway to Raymond Terrace project in October 2004, community involvement has been integral to the route options development and route selection process. This chapter describes how the community and stakeholders have been involved in consultation undertaken to date, by detailing forums and activities that have already taken place and by summarising the key issues raised during the consultation activities.

3.1 Objectives of the consultation program

The needs and interests of the community and other key stakeholders residing within or having an interest in the study area are diverse. It is therefore paramount that effective consultation activities are implemented to maximise community involvement and the capture of views throughout all stages of project development, including the route options and preferred route selection processes. A set of objectives, as documented in the *Community Involvement Plan* (Maunsell, 2005) has been developed for this project as follows:

- To ensure an open, accountable and transparent community involvement process.
- To ensure all potentially affected property owners and interested stakeholders are provided with sufficient information about the project and the likely impacts, so that they can provide informed input.
- To ensure appropriate and direct communication with property owners and/or managers in relation to access to, and investigations on landholdings within the study area by study team members and/or the RTA representatives.
- To encourage community support and involvement in the project to facilitate better and more generally accepted outcomes.
- To provide a range of accessible opportunities for stakeholders, interested groups and the wider public to contribute to the project through issues identification, information provision, and options evaluation.
- To build an ongoing relationship between the RTA, its contractors and stakeholders in order to gain long term support for the project and in particular the Preferred Route.

3.2 Stakeholders

The *Community Involvement Plan* included a range of consultation methods to encourage participation by a range of stakeholder groups. Four stakeholder groups have been identified for the project, as presented in **Table 3.1**.

Table 3.1: Stakeholder groups

Group 1 Potentially affected landowners	This group comprises landowners within the study area that could potentially be directly affected by the highway upgrade.
Group 2 Interest groups	This group comprises local residents and community groups, business and community groups, community facility/service providers, environmental interest groups, emergency services and local schools.
Group 3 Government agencies	This group comprises State and Commonwealth Government agencies, Local Government, Local Aboriginal Land Councils and Federal, State and Local elected representatives.

Group 4 The broader community	This group comprises the broader community in the study area (in addition to property owners and interested persons in nearby areas). Also included are existing and potential users of the highway upgrading including road user groups, and bus companies.

3.3 Consultation initiatives

As mentioned above, a *Community Involvement Plan* has been developed and implemented for the project. Consultation activities undertaken to date include the following:

- Establishment and regular updating of a project website: www.rta.nsw.gov.au/pacific.
- Establishment of a 1800 (toll free) project information line from the outset of the project to field direct enquiries.
- Ongoing use of an 'Interested Persons' database enabling interested parties to register and receive updates at key project milestones.
- A Planning Focus Meeting was held with key stakeholders from Government agencies, Port Stephens, Maitland and Newcastle Councils and community interest groups.
- A community information session has been held.
- Three community updates have been released since the project commenced providing updates on the project status, and providing contact details for enquiries.
- Five advertisements have been placed in local and regional newspapers, advising the public of key project stages and advising of opportunities for involvement.
- A community liaison group (clg) has been formed and five clg meetings have been held including a route options workshop. A clg bus tour of the study area was also undertaken.
- Meetings with Councils, local interest groups local councils, Local Aboriginal Land Council representatives, Department of Environment and Conservation (DEC), Department of Primary Industries (DPI), Department of Planning (DoP) and Department of Natural Resources (DNR).
- Interviews conducted with businesses in Heatherbrae.
- Public display of the route options at eight locations, with displays being staffed at five different locations.
- Individual meetings upon request with potentially affected land and business owners following release of the route options.
- Public display of the preferred route at eight locations.

The consultation process has been fundamental to the formulation and progression of route options by providing the study team with an insight into the key issues associated with the study area. Issues raised by stakeholders have been considered and have fed into the route option development and assessment process and have resulted in amendments and changes to alignments.

3.4 Consultation with Government agencies and Councils

A number of meetings have been held between November 2004 and March 2006 with representatives from the government agencies and local councils. These meetings have assisted the study team in better understanding the various requirements of the community. Additional issues raised were raised in the clg (where representatives of the three local Councils are members) and the Planning Focus Meeting. Specific issues raised by particular stakeholders are

outlined in **Table 3.2**. A summary of submissions and responses on the route options are documented in the *F3 to Raymond Terrace Submissions Report*, Maunsell 2006. The report is available on the project website.

Table 3.2: State government agencies and local council issues

Stakeholder Group	Issues
Port Stephens Shire Council	Safety at the Pacific Highway / Tomago Road intersection.
	Proposed residential growth at Raymond Terrace.
	Flooding.
Newcastle City Council	The inclusion of an interchange at the New England Highway.
	Pedestrians and cyclists should be considered for both crossing and movement along the highway if appropriate.
	Flooding.
Maitland City Council	Future development of 10,000 residential dwellings is proposed for the Maitland urban area.
	The need to maintain good access to the area (for residents and industry), including an interchange at the New England Highway.
	There is some concern regarding excessive traffic on potential access roads.
	Flooding.
	Integration with other transport infrastructure in the region, for example F3 Freeway to Branxton.
DoP / DNR	The need to consider both the Newcastle Airport and Newcastle Port expansions.
	As part of the Unsworth Review, a strategic bus corridor is proposed in Maitland.
	Flooding.
DEC	Indigenous heritage issues at Black Hill and the need to establish and maintain good contact with Local Aboriginal Land Council representatives of Mindaribba and Worimi as well as Native land owners.
	Hexham Swamp is considered a constraint and any route option that passes through the swamp will not be supported.

3.5 Route options consultation

The community were invited to complete feedback forms which were distributed to potentially affected property owners, community liaison group (clg) members and other residents within and immediately surrounding the study area. The feedback form was available at the eight display locations and also on-line on the project website.

Between Thursday 27 October and Saturday 29 October 2005, five of the eight display locations were staffed by members of the Project Team and the RTA. The staffed displays provided an opportunity for members of the community and other interested parties to directly engage and discuss issues of concern with the Project Team.

Potentially affected landowners were advised by letter and telephone call about the route options display process, locations and timing. In addition, a series of individual meetings were arranged and have been conducted by the Project Team at various locations, including potentially affected property locations, RTA's Hunter Office and Maunsell's Sydney office to further discuss the project and key issues of concern.

In total, 1500 copies of Community Update No. 2 were printed and distributed to members of the community, relevant Government agencies, local councils and other stakeholders. Copies of the update were also enclosed within letters sent to members of the clg, potentially affected property owners and placed at the display locations. Further copies of the update were distributed to properties and businesses within the study area on the day of the route options announcement (i.e. Friday, 21 October 2005) and in the week beginning Monday 24 October 2005.

Members of the clg received a copy of the Route Options Development Report (Maunsell 2005), Community Update No. 2, Pacific Highway Overview brochure and a feedback form shortly after the announcement of the route options display by the Minister for Roads.

A clg meeting was held on Thursday 3 November 2005 at the Heatherbrae Information Centre, Motto Farm. The purpose of the meeting was to formally introduce the two short listed feasible options, explain the route options display process, describe the value management process and provide a question and answer session.

3.5.1 Consultation and submissions

A total of 85 completed feedback forms were received by Maunsell up to Friday 2 December 2005. During the display period discussions by staff were held with up to 42 attendees or groups of attendees.

As of Friday 2 December 2005, 24 meetings had been conducted with potentially affected property owners. This figure does not include the landowners that took part in discussions at the staffed displays or at the clg meeting held on Thursday 3 November 2005. Formal submission letters have been received from 18 property owners within the study area and stakeholders.

During the route options display period, 55 telephone calls were recorded on the 1800 Project Information Line. Details of the calls received are discussed in the following sections.

Key issues raised in submissions received until Friday 2 December 2005 have been collated and reviewed.

3.5.2 Summary of issues register

A total of 55 telephone calls have been recorded since the announcement of the route options display on Friday, 21 October 2005. Of the 55 telephone calls, 31 have been general comments and requests for additional information as opposed to registering specific issues of concern to the Project Team.

A summary of the issues registered by interested stakeholders is presented in **Table 3.3.** The issues were recorded from the following sources:

- The 1800 (toll free) Project Information Line (up until the Thursday, 24 November 2005).
- Meeting with potentially affected landowners.
- Discussions at staffed displays.
- Feedback Forms and written submissions (received by Maunsell up until Friday, 2 December 2005).

Table 3.3: Issues recorded during route options display feedback process

Option	Issue	Frequency	Option sub total
A1	Land/ property acquisition	1	13
	Property/ local access	1	
	Terrestrial ecology/ flora and flora	4	
	Hydrology and flooding	3	
	Social and business effects	1	
	Noise and vibration	1	
	Safety	1	
	European and Aboriginal heritage	1	
A2	Land/ property acquisition	5	22
	Social and business effects	1	
	Property/ local access	2	
	Terrestrial ecology/ flora and flora	1	
	Noise and vibration	2	
	Visual and urban design	3	
	Hydrology and flooding	7	
	Safety	1	
A3	Land/ property acquisition	13	101
	Social and business effects	29	
	Property/ local access	22	
	Terrestrial ecology/ flora and flora	2	
	Noise and vibration	23	
	Visual and urban design	3	
	Hydrology and flooding	1	
	Safety	6	
	Construction	2	
B1	Property/ local access	1	10
	Terrestrial ecology/ flora and flora	2	
	Safety	4	
	Social and business effects	1	
	Noise and vibration	1	
	European and Aboriginal heritage	1	

Option	Issue	Frequency	Option sub total
B2	Land/ property acquisition	5	10
	Engineering design	1	
	Social and business effects	1	
	Noise and vibration	1	
	Visual and urban design	1	
	Construction	1	
B3	Social and business effects	34	48
	Property/ local access	4	
	Terrestrial ecology/ flora and flora	5	
	Noise and vibration	2	
	Visual and urban design	1	
	Land/ property acquisition	2	

Source: Maunsell F3 Freeway to Raymond Terrace Issues Register

Note: This table includes some late submissions that were received in January.

Table 3.4 provides representative examples of the feedback submitted during the route options display.

Table 3.4: Representative examples of feedback comments

Route option	Issue comment
A1	• Concerns on whether or not property would be directly affected, and exact location and arrangement of interchange. • Would noise mitigation measures be included in road design or would these be dependant on residents requesting them. • If land acquisition is necessary, there must be sufficient land parcels remaining to move stock to higher ground during floods. • Height of the roadway. • Property access must be maintained to Lenaghans Drive. • Cuts through Spotted Gum and Ironbark forest – build road closer to existing route.
A2	• A bush fire setback must be maintained adjacent to the Hunter Botanic Gardens. • Runs close to the property on Woodlands Close. • Property access must be maintained to Woodlands Close. • Will affect views from residences. • Flooding impact.

Route option	Issue comment
A3	• Whether property acquisition would be required. • Concerns about impacts on local businesses as Option A3 passes directly through the centre of Motto Farm / Heatherbrae. Difficult to determine the potential magnitude of impact from the Community Update No. 2. • Option A3 would impact on amenity (particularly noise, emissions, urban design) and also business viability. • Upgrade footprint will require land acquisition. • Exposure/ visibility for businesses in Heatherbrae/ Motto Farm to enable passing trade. • Travel from interchange to local facilities may be significant. • Noise impact. • Visual amenity of noise wall placement. • Safety concerns with regards to motorway through town. • If land acquisition is necessary, there must be sufficient land parcels remaining to move stock to higher ground during floods. • Property access must be maintained. • Local traffic movements must be maintained. • Impacts on property value of freeway passing nearby. • Connectivity between east and west parts of Heatherbrae/ Motto Farm. • Signage to local facilities required. • Removal of access to southbound service stations and facilities would mean drivers would have to travel further between rest stops therefore increasing risk of accidents.
B1	• Concerns on whether or not property would be directly affected, and exact location of interchange. • Would noise mitigation measures be included in road design or would these be dependant on residents requesting them. • If land acquisition is necessary, there must be sufficient land parcels remaining to move stock to higher ground during floods. • Height of the roadway. • Property access must be maintained to Lenaghans Drive. • Cuts through Spotted Gum and Ironbark forest communities at Black Hill.
B2	• Concerned that proximity of this option could render businesses unviable. • A bush fire setback must be maintained adjacent to the Hunter Region Botanic Gardens. • Potential for direct access to Tomago and Newcastle Airport. • Roadway must be 50 metres from Dairy Farmers plant effluent irrigation area. • May have a less dramatic effect on landscape. • Land severance would restrict business operations.

Route option	Issue comment
B3	• Would property acquisition be required. • Concerns about the impact on business at Heatherbrae as Option B3 passes directly in front. Cannot determine the degree of impact from brochure. • This option would not be a problem for business currently fronting the Pacific Highway at Heatherbrae. • This upgrade section would not remove a high proportion of traffic as it is mostly local and therefore, this would not affect businesses too much. • Exposure/ visibility for businesses in Heatherbrae/ Motto Farm. • Travel from interchange to local facilities may be significant. • Reduced noise in Heatherbrae a benefit. • Route passes over shed structure and over effluent irrigation area of Weathertex factory operations. • Concern that B3 will force closure of the Weathertex factory. • Signage to local facilities required. • A bypass of Heatherbrae is needed.

Source: Maunsell F3 Freeway to Raymond Terrace Issues Register, Friday, 2 December 2005

3.5.3 Feedback form analysis

The feedback forms received by Maunsell are predominantly from respondents located within the study area (54 per cent). A further 28 per cent were received from the wider area, such as Beresfield, Hexham, Tomago, Woodbury, Thornton and Raymond Terrace. Location details were not supplied by eight per cent of respondents.

A favoured combination of route sections were selected by most respondents. The variety of combinations produced is not conducive for a simple analysis of the responses as some respondents did not offer a preference. In the western part of the study area there does not appear to be a clear preference for either Option A1 or B1. Those respondents living in parts of NSW outside of the local area appear to favour Option B in its entirety.

Within the study area there seemed to be an even divide between Option A and B, especially at the eastern end (i.e. Masonite Road). Sixteen responses were received from Weathertex factory employees and favoured Option A3 due to a perceived lower level of impact on the Weathertex factory site.

Responses received were dominated by those relating to Options A3 and B3 at the eastern end of the study area, whilst a lesser number of preferences were specified between A1 and B1, and A2 and B2.

3.5.4 Contribution of the consultation process

Submissions received and issues raised during the route options display have provided valuable input to the development of route options and in the assessment and refinement of the preferred route. These inputs have enabled extensive local knowledge to be incorporated into the selection and refinement of the preferred route.

3.6 Ongoing consultation

Community consultation will continue following the ministerial announcement of the preferred route through to the preparation of the environmental assessment and refinement of the concept design. Many of the previously used consultation methods would be applied, however the focus would be on the preferred option and refining the option to minimise and manage impacts.

It is expected that the clg would continue to operate, with membership potentially reviewed to focus on the preferred route.

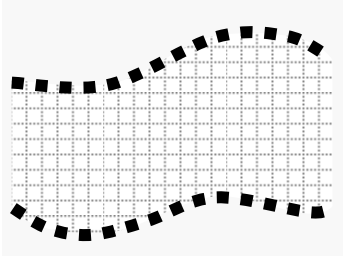
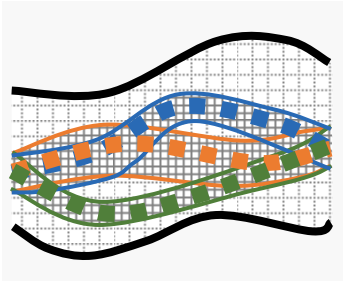
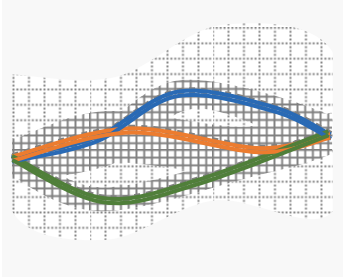
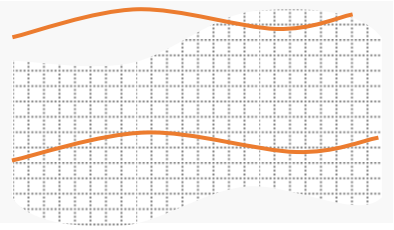
Consultation would be undertaken as part of the projects responsibility under Part 3A of the EP&A Act.

4 Route options

This chapter provides an overview of the route options development and evaluation process, from the development of an initial long list of route options through to the selection of the preferred route for public exhibition.

The route option development process is presented in **Figure 4.1**.

Figure 4.1: Overview of route option development process

1. Study Area Familiarisation • Project and study area familiarisation. • Data collation and review. • Identification of key constraints. • Mapping of constraints. • Initiation of community involvement program. • Conduct preliminary specialist investigations.	
2. Preliminary Route Option Development - Corridor Identification • Establish preliminary routes (long list) and alignment corridors. • Conduct Phase 1 Multi Criteria Analysis (MCA) broad assessment on long list of options. • Ongoing community involvement activities. • Eliminate unfeasible route options. • Refine number and scope of shortlisted options resulting in the identification of feasible routes.	
3. Feasible Route Option Development • Further investigation of feasible routes (short list). • Quantify the inputs for detailed Phase 2 MCA on feasible routes. • Prepare Route Options Development Report. • Display feasible routes. • Seek community feedback.	
4. Selection of a Preferred Route • Collate and analyse community feedback. • Undertake further investigations, if required. • Value Management studies. • Undertake detailed Phase 2 MCA. • Recommendation of a route for further investigation. • Identification of the preferred route. • Announcement of the preferred route.	

4.1 Assessment criteria

Route options identified for the project were assessed through a Multi Criteria Assessment (MCA) framework which comprises an agreed set of evaluation criteria and performance measures developed specifically for this project.

MCA is a systematic process that facilitates the development and comparison of route options and has assisted with the selection of the preferred route. The MCA process has been implemented in two phases (refer **Figure 4.1** above) as follows:

4.1.1 Phase 1 broad assessment

This involves the utilisation of broad evaluation criteria and performance measures to coarsely sieve route options and eliminate options with 'fundamental flaws' or those that do not meet the criteria and stated objectives. The Phase 1 assessment was undertaken to short list and determine feasible route options to proceed to the preferred route selection stage. Feasible route options were placed on public display between Friday 21 October and Friday 2 December 2005.

4.1.2 Phase 2 detailed assessment

The Phase 2 detailed assessment involves scoring each feasible option against a comprehensive set of weighted criteria.

The evaluation criteria developed for this project include both qualitative factors such as potential environmental and social impacts and quantitative factors such as project costs for route lengths. Primarily these criteria are based on:

- The Pacific Highway Upgrading Program and project specific objectives.
- Issues raised in the community involvement process to date.
- Consideration of relevant statutory requirements and policy guidelines in relation to environmental issues.

Each options score against the specific criteria is multiplied by the respective weight to give a numerical indication of the relative performance of each option. This provides the opportunity for a more robust assessment to be conducted on the feasible route options.

Phase 2 detailed assessments were undertaken during the Value Management Workshop (VMW) and during the Project Team Workshop and are discussed in **Chapters 4.7 and 4.10.** Criteria utilised as a starting point in the VMW are provided in **Table 4.1.**

4.2 Study area familiarisation

4.2.1 Information collation and review

Since the announcement of the upgrade in October 2004, identification and documentation of constraints within the study area has been ongoing. Prior to the initiation of the preliminary specialist field investigations listed in **Chapter 2.1**, desk top analyses were conducted collating information from key government agencies, local councils and other stakeholders on land use, flora and fauna, hydrology and flooding, ground conditions and cultural heritage. This information was reviewed and presented using geographical information software to identify broad route option corridors within the study area.

4.2.2 Constraints identification and mapping

Constraint mapping has been updated and incorporated into the route option and preferred route development process as specialist field investigations have been completed. Key data sets that were reviewed and utilised during the identification of constraints included:

- 1:25,000 scale topographical maps.
- Aerial photography that was dated March 2004.
- Records held by the Department of Environment and Conservation in relation to flora and fauna, heritage.
- Records held by the Department of Planning and Department of Natural Resources for soils, SEPP 14 wetlands, SEPP 44 Koala habitat.
- Records held by the Department of Primary Industries for geology.
- LEPs for Newcastle, Maitland and Port Stephens.
- Other relevant reports and mapping held by local councils.

4.2.3 Context

Between Black Hill and the Hunter River, a number of route options were geometrically possible. The horizontal alignment of potential route options within this area is driven primarily by avoidance of the northern extents of Hexham Swamp and other isolated areas of SEPP 14 wetlands. An alignment in this area also needs to be sufficiently offset from the high voltage overhead transmission lines to ensure adequate safety for road users and to avoid deformation of the towers from ground movements induced by highway construction.

Near the northern and southern boundaries of the study area, the Hunter River is approximately orthogonal to the existing highway, presenting opportunities for a more optimal crossing of the waterway. A perpendicular river crossing would minimise the number of piers in the water, length through adjacent wetland and length of construction over water. It is noted that a number of other significant factors influence the optimal Hunter River crossing locations and include hydrological, environmental, urban design, social and economic consideration. These issues are discussed under the relevant sections of this report.

East of the Hunter River, the study area forms a 'bulb' around Heatherbrae, facilitating three broad corridors for route options located north, south or through the settlement.

South of Heatherbrae, the Hunter Region Botanic Gardens, Tomago GMA, freshwater wetlands and Koala habitat are considerations for a route option through this area. Severance and fragmentation of native vegetation are also an important consideration.

North of Heatherbrae, a western option would traverse the floodplain between the Hunter River and the residential area of Heatherbrae. Visual amenity, property impacts, soft soils and flood management are key considerations.

For a through town option, highway service related business interests within Heatherbrae, urban design and amenity, property and social and community impacts are key considerations.

4.3 Preliminary route option development

4.3.1 Corridor identification

The Project Team held a route options workshop in December 2004, to enable the team's various specialist consultants to present their findings from Phase 1 studies and to present newly identified project constraints. During the workshop, these findings were integrated with the preliminary constraint analysis and a long-list of initial route options were generated within the

study area. Following the workshop, the route options were reviewed to ensure that minimum design criteria, such as horizontal radii, were achieved.

In conjunction with the study team generating route options, the clg participated in a workshop during January 2005 to also identify potential routes. The set of route options produced during the Project Team workshop in December 2004 was augmented by those produced by the clg workshop in February 2005. This resulted in 14 route options being considered that represented geometrically viable route options within the study area. Every attempt was made to avoid or minimise contact with environmentally sensitive areas such as SEPP 14 wetlands, where practicable.

These route options formed the basis for identification of broad corridors. Through the central section routes could pass either to the north or south of the Hunter River and in the eastern section, corridors include to the north, south and through the centre of Heatherbrae.

4.3.2 Expanded study area

A combination of community feedback, clg generated route options to the south of the study area and investigations conducted as part of the route options development process led to the expansion of the study area which was announced in April 2005. The study area expansion allowed the consideration of route options within a corridor to the south of the Hunter River.

4.3.3 Eliminated routes

Route options passing through Hexham Swamp, either utilising the abandoned railway corridor, or passing through the wetland itself were rejected on sensitive environmental grounds through consultation with the relevant government agencies and stakeholders. However, a route option utilising the existing Pacific Highway immediately to the east of the Hunter River crossing was considered potentially viable and one that would be subject to further assessment.

A further study area expansion to incorporate a route option passing further to the south of Heatherbrae was also considered. A route option through this region would pass through the central area of the Tomago GMA. A preliminary investigation into the viability of this route option, including discussions with Hunter Water Corporation indicated that the route option would not be feasible due to groundwater management, native vegetation and flora and fauna issues.

4.3.4 Route identification

A Phase 1 assessment was performed on the long list of 14 route options. The outcome of this assessment was three short listed route options. Preliminary vertical alignments for these three route options were generated to enable further assessment.

Further information from specialist investigations arising from the Phase 2 specialist studies, together with ongoing discussions and site visits with key stakeholders and government agencies instigated a revised application of the Phase 1 MCA on the short listed route options.

A key aspect of the Phase 2 specialist studies was the quantification of the potential impacts on flooding, and the waterway areas required to mitigate upstream effects on the three route options. The investigation indicated that a significant proportion of an alignment traversing the central section of the floodplain, north of the Hunter River and/or to north of Heatherbrae, would be required to allow for the passage of floodwaters.

The construction of route options across the Hunter River floodplain on embankment would require a substantial volume of material. Preliminary investigations indicate that an alignment between Heatherbrae and the Hunter River would require approximately 1.2 million cubic metres of fill material to cross the floodplain along the northern study area boundary. Further, preliminary results from geotechnical ground investigations were also reviewed, indicating the

nature and extent of soft soils through the central part of the floodplain and in the area around Windeyers Creek, north of the existing highway. Land use, severance and amenity issues were also incorporated in the revised Phase 1 assessment.

After further assessment, the route option between Heatherbrae and the Hunter River (known as Option C) was abandoned due to the length of bridging required for flood management, the amount of imported fill material required and the high cost of construction over extensive lengths of floodplain. Option C performed at a level below that of options already abandoned.

This further assessment confirmed Options A and B as the only route options suitable for further development and to proceed to public exhibition.

4.4 Feasible route options development

Prior to public display, Options A and B were split into three sections (western, central and eastern) to enable a combination of route options to be considered for the selection and development of a preferred route. The division of these three sections is where Options A and B converge.

Options A1 and B1 are located in the western section, A2 and B2 in the central section and A3 and B3 in the eastern section of the study area. These sections can be linked to create eight different route option combinations. Options A and B are described below and shown in **Figure 4.2.**

4.4.1 Western section

Section A1 commences with a full interchange at the F3 Freeway south of John Renshaw Drive roundabout before crossing through an area of native vegetation at Black Hill. This section passes close to the CTGWM and the Glenrowan homestead.

Section B1 commences with a full interchange at the F3 Freeway south of John Renshaw Drive roundabout before crossing through an area of native vegetation at Black Hill. Initially, the route passes under a set of 330 kV overhead transmission lines before turning eastwards and paralleling the transmission lines for a short distance. It avoids the Glenrowan Homestead and Hexham Swamp, however, it does cross some freshwater wetlands.

4.4.2 Central section

Section A2 requires a long bridge structure to cross Woodlands Close, the New England Highway and the Main Northern Railway line. This section would cross some small areas of SEPP 14 wetland (i.e. SEPP 14 wetland Nos. 832 and 826a). Section A2 crosses a large area of the Hunter River floodplain and parallels a set of 330 kV overhead transmission lines. Flood management and soft soil issues would need to be addressed. Culverts would be required for Purgatory Creek and a long bridge structure would be constructed over the Hunter River.

Section B2 deviates in a south-easterly direction under the 330 kV transmission lines and passes through some communities of Swamp Oak Floodplain Forest. This section of Option B requires a long bridge structure to cross Woodlands Close, the Main Northern Railway line, New England Highway and the Hunter River. It crosses floodplain which is subject to flood management and soft soil issues. East of the Hunter River, this section parallels the existing Pacific Highway and crosses SEPP 14 wetland No. 830.

4.4.3 Eastern section

Section A3 follows the alignment of the existing Pacific Highway, passing through the centre of Motto Farm and Heatherbrae. The upgrade would be built to motorway standard with no direct access for vehicles or pedestrians. Service roads parallel to the motorway would connect to an interchange at Masonite Road. Section A3 would be constructed under traffic and construction traffic delays would be expected. A full interchange would be provided at Masonite Road.

Section B3 crosses the existing Pacific Highway north-west of the Hunter Region Botanic Gardens and continues across the western edge of Tomago Sand Beds. It passes through an area of native vegetation known to support Koala populations east of Motto Farm and Heatherbrae, avoiding designated areas of 'core' and 'potential' Koala habitat.

Section B3 passes across land proposed for future industrial development. This section could be constructed independently of the existing road network, reducing the potential for traffic delays. An interchange would be provided, in part, on the Raymond Terrace bypass near Windeyers Creek.

Figure 4.2: Route options displayed for public comment

4.5 Evaluation of options

To establish which of the two route options within each section performed to a higher relative standard, an analysis of engineering, environmental, social and economic considerations was undertaken by Maunsell in November 2005.

The analysis involved an assessment of each route option section against the evaluation criteria developed for this project.

The evaluation criteria developed for this project are primarily based on:

- The Pacific Highway Upgrading Program and project specific objectives.
- Issues raised in the community involvement process.
- Consideration of relevant statutory requirements and policy guidelines in relation to environmental issues.

Evaluation criteria which did not differentiate between the two route options were omitted from the assessment.

The evaluation criteria and results for both route options within each section are provided below. As the route options had not been fully defined at this time, the analysis is a based on a 100 metre wide upgrade corridor for comparative purposes.

Table 4.1: Value management comparison tables

Pacific Highway Upgrade Program and project objectives	Evaluation criteria	Units of measurements	Option A green			Option B purple		
Traffic and transportation evaluation criteria								
Pacific Highway Upgrade Program objectives								
Reduced travel times and delay	Total route length of construction.	(km)	A1	A2	A3	B1	B2	B3
			3.4	5.1	4.3	3.1	5.6	5.5
Project specific objectives								
Maximise the use of the existing road reserve, where possible	Area of additional land to be acquired beyond the existing road reserve boundaries.	(hectares and percentage of area of section) - area based on a 100 metre wide corridor, for comparative purposes only	A1	A2	A3	B1	B2	B3
			34 100 %	51 100 %	25 58 %	31 100 %	48 85 %	49 83 %
	Length of road in high risk ASS areas.	(km)	0.6	5.1	0	0.8	4.3	0.3
	Length of road in soft soils.	(km)	0.5	5.1	0.3	0.7	4.3*	0.3
	Length of road on embankment/structure.	(km) *Note: (note 3.0 km of one carriageway of B2 may utilise existing embankment)	1.8	5.1	4.3	1.9	5.6*	2.9
Economic evaluation criteria								
Pacific Highway Upgrade Program objectives								
Maximum effectiveness of expenditure	Level of economic performance.	(BCR)	Above 1.0			Above 1.0		

Pacific Highway Upgrade Program and project objectives	Evaluation criteria	Units of measurements	Option A green			Option B purple		
Approach to the integration of ESD principles								
Pacific Highway Upgrade Program objectives								
Reconstruction of the route managed in accordance with ESD Principles	Area of native vegetation loss.	(hectares) area based on a 100 metre wide corridor, for comparative purposes only	A1	A2	A3	B1	B2	B3
			13	10	0	12	9	27
	Area of SEPP 14 wetland loss	(hectares) area based on a 100 metres wide corridor for comparative purposes only	0	3.5	0	0.1	4.4	0
	Number of Endangered Ecological Communities affected.	(number)	2	3	0	2	2	0
	Number of threatened species (terrestrial) potentially affected.	(number)	Option A has the potential to impact on 64 fauna and 1 flora species			Option B has the potential to impact on 70 fauna and 1 flora species		
	Extent of cultural heritage sensitive areas affected.	(km)	2.8	0	0.8	2.1	0	5.5
	Non indigenous heritage sites affected.	(number)	A2 - Direct impact upon one item: two Moreton Bay Fig Trees (Ficus macrophylla), which are of local significance.			No direct impact – although it does cross immediately to the north of Hexham Swamp, which is 'Registered' on the Register of National Estate.		

Pacific Highway Upgrade Program and project objectives	Evaluation criteria	Units of measurements	Option A green			Option B purple		
	Extent of direct impact on waterways and potential for water quality impacts.	(number of new waterway crossings, length of bridges, qualitative assessment)	A1	A2	A3	B1	B2	B3
			0	2	0	0	1	1
			A2 - Purgatory Creek A2 - Hunter River Overall length of structures: around 2.5 km Water quality Impact: Moderate			B2 – Hunter River B3 - Windeyers Creek Overall length of structures: around 2.2 km Water Quality Impact: Moderate		
	Length of route in Tomago GMA.	(km)	0 km			B3 only - 2.5 km		
	Noise sensitive properties within 150 metres of highway.	(number)	A1	A2	A3	B1	B2	B3
			1	0	61	1	5	9
			Hunter Region Botanic Gardens Newcastle Equestrian Centre Pacific Gardens Mobile Home Park; Sir Francis Drake Motel, Best Western Motto Farm Hotel; Heatherbrae Caravan Park; Hunter River High School.			Hunter Region Botanic Gardens Pacific Gardens Mobile Home Park		
	Air quality receivers within 150 metres of highway.	(qualitative)	Option A3 would have a higher impact upon urban air			Option B3 would have a lower impact upon urban air		

Pacific Highway Upgrade Program and project objectives	Evaluation criteria	Units of measurements	Option A green			Option B purple		
			quality than B3 as it runs through the centre of the Motto Farm and Heatherbrae.			quality as it is located away from the residential areas of Motto Farm and Heatherbrae when compared with A3.		
Project specific objectives								
Provide a flood immunity on at least one carriageway between 1% AEP (target) and 5% AEP	Length of carriageway situated in one per cent AEP flood area.	(km)	A1	A2	A3	B1	B2	B3
			0.6	5.0	0	0.8	3.5	1.0
Land use evaluation criteria								
Project specific objectives								
Provide transport developments which are complimentary with land use	Compatibility with existing and proposed land use zonings.	(qualitative assessment)	Existing and future land use zonings have been considered in the development of route options.					
	Extent and nature of impacts on existing highway related businesses and other businesses.	(qualitative assessment)	Existing business at the Beresfield Highway Service Centre; the Oak Factory and service stations at Hexham and businesses at Motto Farm and Heatherbrae are likely to experience some loss of passing highway trade.			Existing business at the Beresfield Highway Service Centre; the Oak Factory and service stations at Hexham and businesses at Motto Farm and Heatherbrae are likely to experience some loss of passing highway trade.		
	Length of road through visually sensitive areas.	(km)	Option A1 would predominately be in cutting near Black Hill.			Option B1 would predominately be in cutting near Black Hill.		

Pacific Highway Upgrade Program and project objectives	Evaluation criteria	Units of measurements	Option A green			Option B purple		
			Option A2 crosses 5.0 km of floodplain, much of which would be visible from surrounding elevated areas. Option A3 would have significant visual impacts on Heatherbrae's urban environment.			Option B2 crosses 3.5 km of floodplain, much of which would be visible from surrounding elevated areas, Option B3 would not be visible from Heatherbrae due to the surrounding forested corridor but would result in native vegetation clearance.		
	Extent and nature of agricultural businesses affected.	(number and qualitative assessment)	Option A affects seven major landowners utilising their land for the grazing of cattle except one which is a horse racing stud farm.			Option B affects three major landowners utilising their land for the grazing of cattle.		
Community evaluation criteria								
Pacific Highway Upgrading Program objectives								
Development a route that involves the community and considers their interests	Area of land to be acquired from non government property owners.	(hectares) area based on a 100 metre wide corridor, for comparative purposes only	A1	A2	A3	B1	B2	B3
			6	48	15	10	40	43
	Ability for key local movements to be maintained in a convenient direct manor. Local movements include: Woodberry/Beresfield to Heatherbrae/Raymond Terrace	(qualitative)	Connectivity of local movements would be maintained using a combination of existing highway, new upgrade and service roads through Motto Farm and Heatherbrae. The			Local traffic movements would continue to utilise the existing highway.		

Pacific Highway Upgrade Program and project objectives	Evaluation criteria	Units of measurements	Option A green	Option B purple
	Woodberry/Beresfield to Hexham Raymond Terrace/Heatherbrae to Hexham		location of interchanges would impact on the volume of traffic using the service roads.	
	Ability for route to not obstruct major view corridors.	(qualitative)	The alignment traverses 5.6 km of floodplain, of which at least one kilometre would be highly visible from Black Hill. Grade separated structures of high architectural quality, would be required to cross the Main Northern Railway line. The Hunter River Bridge would be dominant in the local landscape and visible from Heatherbrae and highly visible from the existing highway. It is unlikely to be visible from Tarro/ Woodberry.	The alignment traverses 4.3 km of floodplain, of which at least one kilometre would be highly visible from Black Hill. Design flexibility in the proportions and spanning arrangements of the new Hunter River Bridge would be complicated (to avoid existing infrastructure), and the structure would be dominant in the local landscape. It is unlikely to be visible from Tarro/ Woodberry

4.6 Value Management process

The Value Management process provides the opportunity for key stakeholders to contribute to the route options development process in a structured forum. The rationale underpinning the VMW was to assist in the selection of a route option that achieves the best overall balance between functional, ecological, social, economic and engineering aspects. The VMW is one part of the process in the determination of a recommendation for the preferred route.

The Value Management Workshop (VMW) for this project was held over two days in December 2005. A total of 40 participants attended the workshop, including representatives from the community liaison group, local councils, state government agencies and local aboriginal land councils as well as the RTA and the Project Team. Tierney Page Kirkland Pty Ltd was engaged by Maunsell as a sub consultant to independently facilitate and report on the VMW.

The Value Management Study Report is attached as Appendix A and is summarised below.

4.7 Value Management Workshop methodology

The workshop was structured to focus on the key issues and assessment process that needed to be understood and considered in the selection of a preferred route.

The first day focused on providing an update to participants on the key opportunities and constraints within the study area and the presentation of the two feasible route options that were placed on public display. This information phase was provided to refresh and or heighten the understanding of the current status of the project before a Phase 2 Multi Criteria Analysis (MCA) on day two.

Following the project update and presentation of the feasible options, participants discussed evaluation criteria for the MCA and agreed that the Project Team's criteria, as discussed in **Chapter 4.5**, were an appropriate starting point for the VMW evaluation criteria.

The workshop participants proceeded in prioritising and weighting each of the agreed criteria with a numerical value between one (not important) and 100 (very important). Each criterion was also classified as Environmental (E), Technical (T) or Community (C).

A quantitative assessment for each route option against the majority of the agreed VMW criteria was provided to all workshop attendees (**Table 4.1**), enabling participants to compare and score route options within each section against the evaluation criteria.

The second day incorporated a review of day one and the weighting that had been adopted for each of the agreed evaluation criteria. Following the review, the day progressed with scoring each the two route options in the western, central and eastern sections of the study area. A high score was reflective of the route option performing well against the evaluation criteria.

The scores were multiplied by the weightings derived on day one and totalled to give each route option within each of the three sections an overall score. Scores for the two options within each section were compared and discussed before the group selected a conditional preferred option for the western, central and eastern sections.

4.8 Workshop outcomes

4.8.1 Western section

In the western section (Section 1), the results for Option A1 and B1 were similar with Option A1 performing better against the workshops weighted evaluation criteria, than Option B1. The advantages and disadvantages of Option A1 were discussed and are summarised as follows:

- Advantages:
  - Further away from Hexham Wetlands.
  - Further away from Black Hill resident.
  - Less fragmentation of wildlife corridor.
  - Greater volume of cut material produced – longer cutting.
  - Visually further from Black Hill community.
  - Better integration with existing road network.
  - Noise generators aggregated.
- Disadvantages:
  - More constrained for interchange options.
  - Closer to Glenrowan.

In view of the above and following supplementary discussions regarding the merits of each route option though this section, the group selected Option A1 as their preferred alignment, subject to investigation of an alignment closer to John Renshaw Drive that would minimise the fragmentation of the native vegetation block and locate the Upgrade further from the Black Hill residential area.

4.8.2 Central section

In the central section (Section 2), the results indicated Option B2 performed better against the workshops weighted evaluation criteria, than Option A2. The advantages and disadvantages of Option B2 were discussed and are summarised as follows:

- Advantages
  - Crosses less of flood plain.
  - Crosses less of soft soil.
  - Largely follows existing transport corridor.
  - Combines the major infrastructure corridor and Hunter River crossings with one structure.
  - Less native vegetation loss.
  - Easier to stage construction.
  - Better connectivity.
  - Better visual aspects.
  - Less agricultural land disturbance.
  - Less environmental impact.
  - Lower impact on ecological communities.
  - Provides better access to Tomago and surrounding area.
  - Improves access to the airport.
  - Less potential for impacts on Aboriginal heritage.

- Hunter crossing major structures contained within the same visual landscape.

- Disadvantages:
  - Slightly greater impact on SEPP 14 wetland.
  - Business / land acquisition required.

In view of the above and following supplementary discussions regarding the merits of each option though this section, the group selected Option B2 as their preferred alignment through this section.

4.8.3 Eastern section

In the eastern section (Section 3), the results indicated Option A3 performed better against the workshops weighted evaluation criteria, than Option B3. However, further discussion revealed the route options to be closer than the raw numbers indicated. The group undertook qualitative analysis in relation to the advantages and disadvantages of Option A3 when compared with B3 as follows:

- Advantages:
  - Infrastructure consolidated.
  - Less water quality impacts.
  - Less impact on threatened species and migratory species.
  - Greater visibility for business community.
  - No new traffic noise sources.
  - Lower risk to cultural heritage.
  - Potential opportunity for streetscape improvement.
  - Maintains more wildlife corridor.
  - Less mitigation required for wildlife.
  - Less loss of vegetation.
- Disadvantages:
  - Difficult to build.
  - Extensive service relocation.
  - Community severance, loss of connectivity.
  - Greater number of individual people affected.
  - Significant impact on community.
  - Greater exposure to traffic noise.
  - Greater noise / visual mitigation requirements.
  - Freeway environment through Heatherbrae.

In view of the above participants identified Option A3 as their preferred alignment through this section, subject to further investigation of the potential ecological impacts of Option B3 and social and community impacts of Option A3.

4.8.4 Consideration of cost

Cost was excluded from the initial evaluation and discussed following the MCA for Sections 1 2 and 3. A relative comparison of cost was provided to VMW participants as follows:

- Section 1 – Options A1 and B1 are approximately the same in terms of cost.
- Section 2 – Option B2 is about 25 per cent less than Option A2.
- Section 3 – Option A3 is approximately 10 per cent more expensive than Option B3.

It was pointed out that since no detailed design had been undertaken for either alignment, it was not possible to be more definitive in terms of cost.

4.8.5 Summary and conclusions

In summary, the participants agreed on the following outcomes of the VMW:

- Option A1 be investigated further, including consideration of a realignment closer to John Renshaw Drive.
- Option B2 be investigated further.
- Option A3 be investigated further, subject to further consideration of environmental issues on Option B3 and social and community issues on Option A3.

4.9 Further investigations

Following the outcomes and recommendations from the VMW for further consideration of route options in Sections 1 and 3, additional studies were undertaken and are discussed in the following sections.

4.9.1 Revised Option A1 study

A revised Option A1, crossing the Chichester pipeline and passing within close proximity of John Renshaw Drive, was investigated. The assessment included generation of preliminary vertical and horizontal geometry for the main carriageway and interchange with the F3 Freeway and a review of ecological, land use and property impacts. The revised Option A1 was found to have the following advantages over the original Option A1:

- A reduction in the fragmentation of the Lower Hunter Spotted Gum (EEC) native vegetation block in Black Hill.
- Improved amenity to residents of Black Hill as the alignment would be further from the residential precinct.
- Reduced proximity to Hexham Swamp wetlands.

The revised Option A1 north was found to have the following disadvantages when compared to the original Option A1:

- Longer length of route.
- More overall loss of Lower Hunter Spotted Gum (EEC).
- Greater impact on a freshwater wetland (EEC).
- Less generation of cut material to balance the earthworks for the central and eastern sections of the upgrade.
- Two crossings of the Chichester pipeline.
- Difficulty in providing an interchange within close proximity of John Renshaw Drive.
- More costly.

The Project Team assessed that the disadvantages outweighed the advantages of the revised Option A1 and subsequently determined that the original Option A1 be selected as the preferred route.

4.9.2 Further ecology surveys

Biosis undertook targeted surveys in February 2006 for Options A1, B2 and B3. The key aims of the survey were to carry out:

- Targeted searches for threatened flora and fauna in the eastern (A1), central (B2) and western sections (B3).
- Assessment of the condition of plant communities in the Black Hill (A1) and Tomago Sands areas (B3).

Table 4.2 provides a summary of the potential impacts of the preferred route on endangered ecological communities (EECs) and threatened species based on the Biosis Study (2006).

Ecological constraints in relation to the route options are shown in **Figure 4.3.** Ecological constraints in relation to option A1B2B3 are summarised in **Table 4.2**.

Table 4.2: Endangered ecological communities and threatened species

Name	Condition	Impact of route
Endangered ecological communities		
Lower Hunter Spotted Gum - Ironbark Forest in the Sydney Basin Bioregion	Regenerating remnants, generally in good condition. Contains small hollows. Feed trees for glossy black cockatoo are present	Option A1 would remove approximately four per cent of the vegetation in the block east of the F3 Freeway. Option A1 would also fragment habitat leaving approximately one third and two thirds of the vegetation block north and south of the route respectively.
Swamp Oak Floodplain Forest of the NSW South Coast, Sydney Basin Bioregion	Exists in disturbed remnant patches. Hollows providing potential habitat for microbats and other fauna	A1 passes through two sections of this vegetation community on the floodplain. A1 would pass through the central part of the most western community, removing approximately 20 per cent of the vegetation. A1 would pass through the northern part of eastern community, removing approximately 20 per cent of the vegetation.
Swamp Sclerophyll Forest on Coastal Floodplains at the NSW North Coast Region, Sydney Basin and South East Corner Bioregion	Exists in regenerating patches	A1 passes through this small area and would require removal of vegetation and result in habitat fragmentation (currently mapped as Spotted Gum). Further field studies

Name	Condition	Impact of route
		will be required to quantify the extent of Swamp Sclerophyll Forest.
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	Coastal saltmarsh within SEPP 14 No 830 is in good condition	B2 would pass over this wetland containing saltmash on structure.
Freshwater Wetlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions	The freshwater wetland near Black Hill is disturbed, grazed, currently dry and contains one flora species only. Wetland no. 830 is currently dry and degraded, there is a monoculture of Phragmatis. Wetland adjacent to Windeyers Creek consists of pools and flats and is disturbed extensively Wetland adjacent to Masonite Road is in good condition with deep permanent water, native vegetation and fish.	A1 bisects the wetland C in Black Hill. The crossing would affect approximately 12 per cent of the wetland. B2 crosses part of wetland 830 on structure. B3 bisects wetland F (associated with Windeyers Creek). The crossing would affect four per cent of the wetland. B3 would remove a wetland G adjacent to Masonite Road. The size of this wetland is 1.0 ha.
Threatened species		
Callistemon lineofolius	More than 500 plants were recorded in the Black Hill area.	A1 would remove a group of approximately 25 plants.
Maundia triglochinoides	Previously recorded but not confirmed due to access limitations.	If present, A1 may affect the individual plants
Grey-crowned babbler	Species not seen during targets searches, however record exists. Potential foraging and nesting habitat exists.	A1 & B3 would remove and fragment potential habitat.
Glossy Black Cockatoo	Feed trees present with Black Hill and the Tomago Sand Beds	A1 and B3 would remove some feed trees
Wading birds (species not given)	Sandpipers and dotterels were observed feeding on mudflat in the wetland adjacent to Windeyers Creek. The particular species were not identified. Protected by RAMSAR Convention, EPBC Act and TSC Act.	B3 would bisect the wetland adjacent to Windeyers Creek, removing potential bird habitat. The crossing would affect four per cent of the wetland.

Name	Condition	Impact of route
Microbats	15 species were recorded along the preferred route particularly in Black Hill and Tomago Sandbeds. Threatened species include: *Myotis adversus, Mormopterus norfolkiensis, Miniopterus schreibersii, Scoteanax rueppellii* probably *Saccolaimus flaviventris* and *Kerivoula papuensis*.	Potential roost trees would be removed by B3, especially on Hunter Water Corporation land. Some potential roost trees would also be removed in A1. Both B3 and A1 would remove some foraging habitat.
Koala	There are many records of Koalas in the Tomago Sands area. Port Stephens koala plan maps Swamp Mahogany and woodlands on the Tomago Sands as 'supplementary' habitat (not SEPP 44).	B3 would fragment 'supplementary' koala habitat and increase isolation of core habitat.
Squirrel Glider	Records in Spotted gum-Ironbark forest at Black Hill. No sampling undertaken.	If present, A1 may affect squirrel glider habitat.
Brush-tailed Phascogale	Records in Tomago Sands. No sampling undertaken.	If present, B3 may affect brush tailed Phascogale habitat.

Other threatened species

The report considers it unlikely that either the Wallum Froglet or the Green and Golden Bell Frog occur in the area affected by the preferred route.

The Grey-Headed Flying Fox occurs in the area but no 'camps' are currently present in the area affected by the preferred route. Potential impact could include a minor reduction in foraging area.

The long-nosed potoroo has not been recorded within 10 km of the study area, although potential habitat occurs at Black Hill and the Tomago Sand Beds (options A1 and B3).

Other woodland communities

The condition of two non EEC woodland communities along the preferred route were assessed.

An extensive, continuous stand of Coastal Sand Apple-Blackbutt Forest occurs on the Tomago Sand Beds and would be traversed by B3. The community is generally in very good condition although there is some fragmentation by tracks and easements. Large hollow-bearing trees occur, particularly around the Hunter Water dam. There are scattered feed trees for the Glossy Black Cockatoo in this area.

The Weathertex pine plantation area, which would also be crossed by B3, was also assessed. Most of the area has been cleared, with significant weed invasion, or converted to pine plantation. There are, however, 2-3 ha of fragmented *Eucalyptus pilularis - Corymbia gummifera - Angophora costata* open forest containing some koala feed trees and feed trees for the Glossy-Black Cockatoo; no evidence of seed cones being eaten was observed. Two EEC freshwater wetlands (F & G), described in **Table 4.2**, also occur in this area.

Ecological constraints in relative to the route options are shown in **Figure 4.3**.

Aquatic habitats

The preferred route would cross SEPP 14 wetland no. 830 in Section 2, which is in good condition and contains mangroves. Freshwater wetlands and coastal saltmarsh EECs are present within this wetland (refer to **Table 4.2**).

Two unlisted freshwater wetlands (F & G) would also be affected. These are considered to be EECs (see **Table 4.2**). Wetland F is extensive and connects with Purgatory Creek. Species diversity is low but the wetland contains mudflats which provide food for wading birds. The small wetland G, has greater diversity of aquatic plants and contains native fish.

No threatened fish or other aquatic species were observed. The threatened Green Sawfish and the Black Cod occur in the Hunter River but there is little potential for theses species to be affected by the route.

Figure 4.3: Ecological constraints in relation to route options displayed for public comment

4.9.3 Further socio economic assessment of Option A3 and B3

Further investigations undertaken by Maunsell during January, February and March 2006 into socio-economic impacts have focused on Section 3. A literature review was conducted to investigate the likely impacts of a highway bypass compared to a through town upgrade.

There are many studies that detail the impacts of highway bypasses. Consistently, such studies report that there is no significant negative impact on the overall economic vitality of a bypassed town. There is evidence that a bypass may lead to decreased turnover for certain service oriented business, but in the usual business cycle, these are replaced with other profitable operations. In some cases, such as Goulburn, NSW, the impact can be seen to be positive and increase the vitality of the town, as reported in 'Evaluation of the economic impacts of bypass roads on country towns' (RTA 1996).

In order to assess likely socio-economic impacts of Options A3 and B3 in detail, further work has been undertaken to compare the property acquisition, noise, connectivity, road safety, visual, business and local industry impacts.

The results of these investigations can be summarised as follows:

- Option A3 would impact a significantly greater number of properties and business than Option B3 in terms of property acquisition.
- The potential noise impact (without mitigation measures) would affect a greater number of properties under Option A3 than B3.
- Under Option B3 the existing road network through Heatherbrae would be maintained and there would be no impact on local connectivity. Under Option A3 limited access / connection points would be provided to service roads and consequently to the Kingston Parade/Rainbird Close dwellings (46 properties) and businesses in Heatherbrae.
- From a highway passing trade perspective, Option B3 provides the most logical access for long distance passing trade and tourists whilst providing no change for the remainder of the customer base. Option A3 provides less convenient access.

The conclusion of the further socio economic impact investigations is that under B3, there would be little or no change to the existing situation within Heatherbrae, with the exception of potential decreases in turnover for some highway dependent businesses. These would in part be mitigated by adequate signage to the services from the motorway.

Option A3 would have greater socio economic impacts on Heatherbrae.

4.9.4 Further community consultation

Following the route options display, consultation activities continued within the study area, with a focus on the Heatherbrae community. Meetings with property owners and stakeholders are ongoing.

The clg met on Tuesday, 17 January to discuss the Value Management Workshop and resultant further investigations. Community groups formed within the community have also provided further feedback.

In total, six feedback forms have been received since Friday 2 December 2005, when the route options display closed. Four of the six forms were from residents of the Heatherbrae area, who suggested B3 was a better route option than A3 on the basis of construction impacts and the impact on properties and businesses.

In addition, 18 letters have been received since Friday 2 December 2005. Fourteen of these submissions are from Heatherbrae residents to either the Project Team directly of via Port

Stephens Council. The letters included issues related to construction, access, safety and property impacts.

A petition sent to John Bartlett, MP which was forwarded to the Minister for Roads, contains approximately 200 signatures in support of the B3 Option.

The project information line has remained active and 21 calls have been logged since the end of the route options display.

B3 option group

The residents of Kingston Parade and Elkin Avenue have formed a community action group (the B3 Option Group) to support Option B3 over Option A3.

The Project Team met with the B3 Community Group in Heatherbrae on Tuesday 28 February to discuss the route options, present photo montages of the two options and to listen to the concerns and key issues that the group have in relation to the A3 section.

The key concerns raised by the community were:

- Vibration.
- Quality of vegetation in B3 area, referred to as 'bush'.
- How much noise would be generated and how it would affect residents.
- The connection between Raymond Terrace and Kingston Parade is essential.
- There will be long term impacts from the project.
- The project will affect property values.
- Potential for relocating disturbed vegetation.
- People's homes are valuable.
- Business will be impacted more with A3.
- Concerns with regard to constructability – short term impacts, time, people, businesses.
- Air pollution.
- Bus stops for the high school.
- Pedestrian crossings.
- Some bushland is zoned industrial.

Weathertex factory

A number of responses during the route options display were received from employees of the Weathertex Factory, Masonite Road. The responses mostly related to loss of job concerns if the factory were closed. Consultations are being undertaken with the owners of the Weathertex Factory to develop an alignment that is not to the detriment of operations of this factory.

Heatherbrae businesses

Although a formal group has not been formed, businesses located in Heatherbrae have been vocal in expressing their opinions on both Options A3 and B3. Submissions indicate there is no clear preference for Option A3 or B3, perhaps in part due to the difficulty in visualising the final outcomes.

Businesses cite visibility from the highway, and access from the highway as being important, which is possibly the reason for some business to identify A3 as a preferred option. However,

effective visibility of businesses would be impacted by a 110 km/h speed environment. In addition, there would be no direct access to business or private residents to the upgrade under Option A3.

4.9.5 Further consideration of planning and land use for Option A3 and B3

A review focusing on planning, land use and cultural heritage was undertaken for Option B3 in January 2006. The purpose of the review was to ensure the information was current and to develop further understanding of the constraints and opportunities associated with Option B3. Planning constraints are shown in relation to the route options in **Figure 4.4.**

Table 4.3 summarises the results of this review.

Table 4.3: Option B3 planning and land use review

Element	Outcome
LEP Zonings and permissibility's were re-checked.	Within each of the LEP zones traversed, development for the purposes of a road by or under the authority of any Government is not 'prohibited' therefore there is nothing in the zoning to constrain the approval process under the new Part 3A of the *Environmental Planning & Assessment Act 1979*. It is also acknowledged that the area east of Masonite Road though which a section of Option B3 would traverse, is zoned 4a industrial.
SEPP 44	Under the new Part 3A of the EP&A Act, development approval would not be required from the relevant local council. The provisions of SEPP 44 should still be considered by the proponent when undertaking the EA, and by the Director-General of the DEC when considering whether to grant concurrence.
Port Stephens Council *Comprehensive Koala Plan of Management* (CKPoM)	Under the Port Stephens Council CKPoM, impact upon land within the Tomago Sand Beds is not compatible with the conservation goal (relating to Preferred and Supplementary Koala Habitat) of the CKPoM, which is to minimise and restrict loss of habitat to that permissible in accordance with the performance criteria for development applications. Option B3 would not traverse 'core' koala habitat, but would traverse a section of 'supplementary' koala habitat.
Native Vegetation Act 2003	Approval is not required under the *Native Vegetation Act 2003* for this project under the new Part 3A of the EP&A A ct.
Hunter Water (Special Areas) Regulation 2003	Clause 9 of this Act states that should potential exist to pollute water within a special area (during construction or operation) an environmental protection license (under the *Protection of Environment Operations Act 1997*) may need to be obtained prior to development within the Tomago Sand Beds Special Area / Tomago Sand Beds Catchment Area.
Groundwater	Development of mitigation measures to protect the groundwater quality and reserves of the Tomago Sand Beds aquifer will require further consultations with Hunter Water Corporation to ascertain specific control measures that may be implemented during design, construction and operation. Further consultation with Hunter Water Corporation in February 2006 has provided additional information regarding the location of key extraction bores, possible mitigation measures and preferred design features, such as the minimising the depth of cut.

Element	Outcome
Draft Lower Hunter Regional Strategy	Land zoned for industrial use in Heatherbrae and Tomago is identified within the strategy as 'employment lands', namely where land is currently underutilised. Major growth is not expected.
Indigenous heritage	Field investigations have potential to yield significant and/or substantial amounts of aboriginal artefacts. However, at this stage, the Tomago Sands Beds are considered to have less archaeological potential and cultural sensitivity than the Black Hill area (classed by Biosis as having high archaeological potential and cultural sensitivity). It is therefore likely that management measures suggested for the Black Hill area could be considered for the Tomago Sand Beds in the event that aboriginal heritage items are identified.
Non-indigenous heritage	Based on existing investigations, the potential for impact of B3 on non-indigenous heritage items is assumed to be low. Additional field investigations are required however, prior to commencement of any construction.
Land Use and property impacts	An assessment of the number and type of properties that could be potentially impacted by Option B3 was undertaken and the implications of this impact were considered.

Figure 4.4: Planning constraints in relation to route options displayed for public comment

4.9.6 Design development of Option A3 and B3

To further understand the constraints and opportunities associated with Option A3 and B3, further design development was undertaken for both route options in Section 3 during January, February and March 2006.

Option A3

A detailed review of interchange ramp locations to the east, west and within Heatherbrae was undertaken. The resulting traffic routes and volumes were utilised to determine the number, location and travel direction of lanes required for service roads under various interchange ramp configurations.

Alternatives assessed included:

- A one way 'loop' service road configuration.
- Connection of a service road on the northern side of Heatherbrae to Masonite Road roundabout through the extension of Elkin Avenue.
- The use and potential widening of Giggins Road on the southern side of Heatherbrae.

Engineering concepts for a number of viable options were developed, costed and assessed based on their merits.

In developing the alternatives mentioned above, it was determined that extensive strip acquisition and some full acquisition of properties could not be avoided for Option A3.

Option B3

Design development for Option B3 was undertaken to minimise potential impact on flora and fauna, the Tomago GMA and the Weathertex Factory.

West of Masonite Road, the realignment moves Option B3 closer to Heatherbrae, minimising the fragmentation of native vegetation, removing the need for the alignment to be in a deep cutting and positioning the alignment further from Hunter Water Corporation's bore line.

East of Masonite Road, the alignment has been adjusted in consultation with the Weathertex Factory to minimise impact on the factories operation. The revised alignment also misses the Kinross Industrial area comprising a 30 lot industrial subdivision.

4.9.7 Additional traffic modelling for A3 and B3

A Paramics traffic model of the existing route and two route options has been generated. Paramics is a traffic micro simulation modelling package that considers road network geometry, traffic volumes and the behaviour of drivers.

The purpose of the model is to compare the impacts of the two alternatives that require further investigation. These routes are A1B2B3 and A1B2A3.

The model has been utilised to investigate the Level of Service of intersections, travel time savings and expected traffic volumes on all parts of the road network for these route options.

The model has also assisted in the identification of the most beneficial interchanges on the basis of the routes that traffic is likely to take through the study area.

Estimated AADT on sections of the route option combination A1B2A3 are presented in **Table 4.4**. The figures for the scenario without a connection between the existing road network and the upgrade near Tomago Road assume provision of north facing ramps at a location south of Heatherbrae, as analysis of the traffic flow indicates that without this provision, this option would require multiple service road lanes.

Table 4.4: Option A1B2A3 estimated AADT on the Upgrade

Section	Without a connection between the existing road network and new motorway near Tomago Road		With a connection between the existing road network and new motorway near Tomago Road	
	2009	2029	2009	2029
F3 Freeway to Tomago Road	7200	14,200	8000	15,850
Tomago Road to Heatherbrae South	7200	14,200	32,200	62,000
Heatherbrae South to Masonite Road Roundabout	32,200	62,000	32,200	62,000
Masonite Road Roundabout to Raymond Terrace Bypass	18,750	37,300	18,750	37,300

Source: Maunsell (2006)

Table 4.5 presents the estimated AADT for the option A1B2B3 with or without a connection between the existing road network and the upgrade near Tomago Road. Traffic on the upgrade in Section 3 increases significantly when a connection from the existing Pacific Highway provides the opportunity for traffic from Newcastle and the New England Highway to use the link.

Table 4.5: Option A1B2B3 estimated AADT on the Upgrade

Section	Without a connection between the existing road network and new motorway near Tomago Road		With a connection between the existing road network and new motorway near Tomago Road	
F3 Freeway to Tomago Road	7200	14,200	8000	15,900
Tomago Road to Heatherbrae South	7200	14,200	17,750	35,050
Heatherbrae South to Raymond Terrace Bypass	4800	9750	15,400	30,600

Source: Maunsell (2006)

4.9.8 Revised cost estimates

Cost estimates for Option A3 and B3 were updated following design development of both options and the incorporation of subsequent requirements arising from the additional investigations. The revised cost estimates and are documented in **Table 4.6** below.

Table 4.6: Revised cost estimates

	Option A3 ($M)	Option B3 ($M)
Cost	$127	$96

4.10 Project Team workshop

4.10.1 Background

In February 2006, the Project Team and senior RTA representatives held a Route Selection workshop to conduct a detailed (Phase 2) Multi Criteria Analysis of the route options. The workshop considered all available information, including the additional investigations and design development that had been undertaken since the VMW. The additional investigations and design development are documented in **Chapter 4.9.** The Project Team Route Selection Report, Maunsell 2006 is provided in **Appendix B.**

4.10.2 Key principles

The objective of the workshop was to select the better performing route option (A or B) within Sections 1, 2 and 3.

The assessment incorporated a paired analysis to determine the relative weightings of each of the agreed Project Team workshop evaluation criterion. These criteria are based on the Pacific Highway Upgrade Program Objectives and were grouped into Social, Environmental or Technical categories. The cost of each option was considered the fourth category.

Each route option within Section 1, 2 and 3 was scored against the agreed Project Team Route Section Workshop evaluation criteria. This provided a relative assessment of the better performing option (A or B) under each of the categories within Sections 1, 2 and 3.

In each Section, the option that performed better under the majority of the four categories was selected overall as the better performing option.

4.10.3 Evaluation criteria

Evaluation criteria agreed with participants during the VMW and based on the Pacific Highway Upgrade Program objectives were utilised as a starting point for the Project Team Route Section Workshop evaluation criteria.

The criteria were reviewed and the revised criteria used in the Project Team Route Selection Workshop are given in **Table 4.7**.

Changes to the evaluation criteria when compared to the VMW criteria were:

- Area of Native Vegetation loss was modified to exclude the area of Endangered Ecological Communities (EEC's) and SEPP 14 wetland loss as this was considered double counting.
- The "Area of EEC and threatened species habitat loss" criteria was replaced with two separate criteria for:
  - Number of Endangered Ecological Communities affected.
  - Number of threatened species potentially affected.
- "Construction risk – constructability" criterion was changed from "Potential for impacts associated with construction activities"
- "Impact on sense of place" and "Landscape quality and view corridors" were changed from "Length of road through visually sensitive areas" and "Ability for route not to obstruct view corridors". The sense of place criterion was added to consider the feelings, emotions and attachments to a locality by residents. "Landscape quality and view corridors" is a qualitative measurement of the length of road through visually sensitive areas.

- "Potential to sustain businesses reliant on highway through trade" replaced "Visibility of businesses from highway". This was reflective of route options submissions indicating loss of passing trade is key local community issue.

The following criteria were added to the Project Team workshop evaluation criteria:

- Road safety.
- Total route length of construction / travel efficiency.
- Compatibility with existing and proposed land use zonings.
- Air quality receivers within 500 metres of highway.
- Non indigenous heritage sites.
- Length of road on embankment / structure. The length of road on embankment or structure is technically significant in relation to visual impact, earthwork volumes, constructability and construction duration.
- Length of carriageway situated in one per cent AEP flood area. This criterion represents the extent of floodplain traversed and is generally proportional to the extent of flood mitigation measures required, such as structure or culvert length and number.

The following criterion were used in the VMW but deleted from the Project Team workshop evaluation criteria:

- Regional connectivity. This criterion was not considered to differentiate between the route options.
- Number of Wildlife corridors crossed. This was addressed with the addition of "Number of Endangered Ecological Communities affected" and "Number of threatened species potentially affected".
- Number of commonwealth listed species (matters of NES) present. This was addressed with the addition of "Number of threatened species potentially affected".
- "Length of road in high risk ASS areas" was omitted as the length of road through Acid Sulfate Soils (ASS) is generally directly proportional to "length of road in soft soils" which is included in the evaluation criteria.

Each of the agreed criteria was placed within one of three categories as follows:

- Social (S).
- Environmental (E).
- Technical (T).

The agreed evaluation criteria for the each category and their units of measurements are provided in **Table 4.7**.

Table 4.7: Project Team Route Selection Workshop evaluation criteria

Category	Reference	Evaluation criteria	Units of measurement
Social	A	Noise sensitive properties within 500 metres of highway.	(number)
Social	B	Air quality receivers within 500 metres of highway.	(qualitative)
Social	C	Compatibility with existing and proposed land use zonings.	(qualitative)

Category	Reference	Evaluation criteria	Units of measurement
Social	D	Landscape quality and view corridors.	(qualitative)
Social	E	Extent and nature of agricultural businesses affected.	(qualitative)
Social	F	Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local community issue).	(qualitative)
Social	G	Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).	(qualitative)
Social	H	Number / area of lots requiring partial of full acquisition.	(qualitative)
Social	I	Impacts during construction	(qualitative)
Social	J	Impact on sense of place	(qualitative)
Environmental	A	Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)	(hectares)
Environmental	B	Area of SEPP 14 wetland loss	(hectares)
Environmental	C	Number of Endangered Ecological Communities affected.	(hectares)
Environmental	D	Number of threatened species potentially affected.	(number)
Environmental	E	Extent of cultural heritage sensitive areas affected.	(km)
Environmental	F	Non indigenous heritage sites affected.	(number)
Environmental	G	Extent of direct impact on waterways and potential for water quality impacts.	(number of new waterway crossings, length of bridges, qualitative assessment)
Environmental	H	Length of route in Tomago GMA.	(km)
Technical	A	Total route length of construction / travel efficiency.	(km)
Technical	B	Length of road in soft soils.	(km)
Technical	C	Length of road on embankment/structure.	(km)
Technical	D	Length of carriageway situated in one per cent AEP flood area.	(km)
Technical	E	Ability for key local movements to be maintained in a convenient direct manner.	(qualitative)
Technical	F	Construction risk – constructability.	(qualitative)

Category	Reference	Evaluation criteria	Units of measurement
Technical	G	Road safety.	(qualitative)

4.10.4 Assumptions

Where a criterion has quantitatively measured, this has been undertaken for a 100 metre wide corridor for comparative purposes only. The actual route would be less than 100 metres wide. The values available in **Table 4.1** were utilised in the assessment where applicable. A GIS analyst was present at the Project Team workshop to assist in any specific additional GIS information required for the assessment.

The assessment was undertaken on Options A and B as presented at the VMW. The VMW report is attached as **Appendix A**.

Social, Environmental or Technical constraints that would prevent the project progressing have been avoided in the development of feasible route options.

4.10.5 Scoring and ranking process

For each group of criteria, a paired analysis was undertaken in place of the more simplified approach adopted for the VMW. The paired analysis procedure establishes a relative weighting of evaluation criteria within each group by comparing each criterion, one at a time, against all other remaining criteria.

The two criteria being compared are assessed to be of either equal, more or less importance. The relative level of importance between two criteria is indicated by a multiplier of one (nearly equal) to three (significantly more important). For example, in **Table 4.9,** a scoring of 3G for D against G indicates that Road Safety (G) was considered significantly more important than the length of carriageway in the one per cent Annual Exceedence Probability flood event area (D).

The assessment tables are provided below.

Table 4.8: Environmental evaluation criteria – paired analysis

	A	B	C	D	E	F	G	H	
A	-	2B	2C	3D	2E	A/F	1G	2H	
B	-	-	B/C	2D	2E	1B	1B	B/H	
C	-	-	-	1D	D/E	2C	2C	1C	
D	-	-	-	-	D/E	2D	2D	1D	
E	-	-	-	-	-	2E	2E	1E	
F	-	-	-	-	-	-	1G	2H	
G	-	-	-	-	-	-	-	1H	
H	-	-	-	-	-	-	-	-	Total
Totals	**0.5**	**5**	**8**	**11.5**	**10**	**0.5**	**2**	**5.5**	**43**
Relative weighting	**1%**	**12%**	**19%**	**27%**	**23%**	**1%**	**5%**	**13%**	**100**

Table 4.9: Technical evaluation criteria – paired analysis

	A	B	C	D	E	F	G	
A	-	2A	2A	2A	1A	2A	2G	
B	-	-	B/C	2D	2E	1F	2G	
C	-	-	-	1C	1E	1F	2G	
D	-	-	-	-	1E	1D	3G	
E	-	-	-	-	-	1E	2G	
F	-	-	-	-	-	-	2G	
G	-	-	-	-	-	-	-	Total
Totals	**9**	**0.5**	**0.5**	**3**	**7**	**2**	**12**	**34**
Relative weighting	**26%**	**1%**	**1%**	**9%**	**21%**	**6%**	**35%**	**100**

Table 4.10: Social evaluation criteria – paired analysis

	A	B	C	D	E	F	G	H	I	J	
A	-	2A	1A	2A	1A	1F	1A	1H	2A	A/J	
B	-	-	1B	B/D	1B	2F	1G	2H	1B	1J	
C	-	-	-	2D	2E	2F	2G	2H	1C	1J	
D	-	-	-	-	1D	2F	2G	1H	2D	1J	
E	-	-	-	-	-	2F	EG	EH	2E	EJ	
F	-	-	-	-	-	-	2F	2F	3F	1J	
G	-	-	-	-	-	-	-	1G	1G	1J	
H	-	-	-	-	-	-	-	-	1H	1J	
I	-	-	-	-	-	-	-	-	-	2J	
J	-	-	-	-	-	-	-	-	-	-	Total
Totals	**9.5**	**3.5**	**1**	**5.5**	**5.5**	**17**	**7.5**	**7.5**	**0**	**10**	**67**
Relative weighting	**14%**	**5%**	**1%**	**8%**	**8%**	**25%**	**11%**	**11%**	**0%**	**15%**	**100**

4.11 Project Team Route Selection Workshop results

Table 4.11 summarises the results by section and group. If the difference in results for the same section was less than the largest criteria weighting for that group, the outcome was considered equal.

Table 4.11: Numerical results from Project Team workshop

	A1	B1	A2	B2	A3	B3
Social	221	197	266	316	155	376
Environmental	146	171	229	230	280	147
Technical	386	403	264	371	261	331

4.11.1 Section 1

Workshop participates recommended that the Option A1 be adopted as the preferred route in Section 1 because the route performs better than Option B1.

Option A1 also has other advantages over Option B1 as listed below:

- Was further from the residential area of Black Hill and would potentially better satisfy community expectations through this section.
- Minimises fragmentation in the native vegetation in Black Hill.
- Closer to John Renshaw Drive and the Chichester Pipeline. This consolidates major infrastructure into a smaller corridor.
- Provides a greater distance between Hexham Swamp and the upgrade.

4.11.2 Section 2

Workshop participates recommended that the Option B2 be adopted as the preferred route in Section 2 because the route performs better than Option A2.

Option B2 also has other advantages over Option A2 as listed below:

- Has the shortest length through deep soft soils and flood affected areas.
- Provides opportunities to connect with the existing Pacific Highway, Tomago and surrounding areas.
- Has the lowest project capital cost.
- On balance, represents the best overall value for money option.

4.11.3 Section 3

Workshop participates recommended that the Option B3 be adopted as the preferred route in Section 3 because the route performs better than Option A3.

Option B3 also has other advantages over Option A3 as listed below:

- Would better satisfy community expectations through this section.
- Allows the existing highway to be used as a local access road without the need to build any new local roads.
- Has the lowest project capital cost.
- On balance, represents the best overall value for money option.

4.12 Summary of results

Following evaluation of the options against the criteria, the relative cost performance of the options was considered and is provided below:

- In Section 1, the cost of Option A1 is approximately equal to Option B1.
- In Section 2, the cost of Option B2 is approximately 30 per cent cheaper than Option A2.
- In Section 3, the cost of Option A3 is approximately 25 per cent cheaper than Option B3.

On this basis Option B2 in Section 2 and B3 in Section 3 were selected as providing the best value for money. In Section 1 the cost was not considered a differentiator between Option A1 and B1. The benefits of Option A1 over B2 are provided in **Chapter 4.11.1.**

Table 4.12: Project Team workshop results summary

Group	Section 1	Section 2	Section 3
Social	A1 and B1 equal	B2	B3
Environmental	A1 and B1 equal	A2 and B2 equal	A3
Technical	A1 and B1 equal	B2	B3
Cost	A1 and B1 equal	B2	B3
Overall Result	**A1**	**B2**	**B3**

5 Preferred route

5.1 Identification of the preferred route

The process to select the preferred route is based a number of considerations including:

- Initial studies on terrestrial and aquatic flora and fauna, hydrology and hydraulics, geotechnical, socio economic, traffic and transport, planning and land use, indigenous and non indigenous heritage, noise and vibration and urban design.
- Engineering to generate preliminary route options and identify route corridors.
- A coarse (Phase 1) Multi Criteria Assessment (MCA) to determine feasible route options.
- Incorporation of ongoing community and stakeholder feedback.
- Further studies including engineering development of feasible route options.
- A Value Management Workshop (VMW) incorporating a Phase 2 MCA.
- Additional studies particularly in Section 3 on engineering, environmental and socio economic issues.
- A Project Team workshop incorporating a Phase 2 MCA.

As a result of the above process, the Project Team determined Option A1 in Section 1, B2 in Section 2 and B3 in Section 3 be selected as the preferred route.

In Sections 1 and 2, this selection was in agreement with the VMW and Project Team workshop outcomes.

In Section 3 the Project Team selected Option B3 as the preferred route. This decision, which differs from the recommendation of the VMW, was made after considering the VMW, the outcomes of the project team's preferred route workshop, further studies undertaken since the VMW and community input. **Chapter 4** describes how the preferred route was selected.

5.1.1 Refinement of the Preferred Route

The Weathertex factory owner and management staff have indicated that their operations are reliant on the following key items within their property:

- The factory structure.
- A bore field to extract water.
- An irrigation area, where effluent with a high Biological Oxygen Demand is sprayed over an area with an established micro biological profile to break down the effluent.

The RTA and the Project Team are working with the Weathertex Factory to develop an alignment through this area that considers the key items and will not cause closure of the factory.

The alignment east of Masonite Road incorporates the outcomes of preliminary discussions with Weathertex. The preferred route corridor is reflective of this ongoing development.

Consideration of environmental impacts, including Koala habitat, fragmentation of native vegetation and minimisation of potential impacts on the Tomago GMA, has lead to refinement of the preferred route west of Masonite Road.

Consultation with Hunter Water Corporation has indicated that if an alignment were to traverse the Tomago GMA, its preference would be to:

- Avoid the main bore line that runs approximately east west.
- Avoid alignment in cutting.

The preferred route has subsequently been moved closer to Heatherbrae. The preferred route corridor is reflective of this ongoing development.

West of the Hunter River, the alignment has been slightly modified with the introduction of a larger radius curve over the Hunter River and a curvilinear alignment between Hexham and Black Hill to minimise impact on Hexham Swamp.

Details of the preferred route are discussed below.

5.2 Preferred route

This section describes the preferred route incorporating refinements as discussed in **Chapter 5.1.1**. The division of the western, central and eastern sections has been maintained as shown on the feasible route options.

The preferred route is shown in **Figure 5.1**. The route is shown as a 150 metre corridor to allow for fine tuning of the alignment and to accommodate surface water treatment ponds, construction compounds, stock pile areas, batching plant facilities and access roads. The corridor is wider in some areas to provide for interchanges. The final formation will be less than 60 metres wide in most locations.

Figure 5.1 also shows a preferred route corridor to facilitate further refinement of the alignment and interchange configurations through further consideration of environmental, engineering, social and economic issues.

5.2.1 Alignment

Western section (Section 1)

This section of the preferred route alignment commences with a full interchange at the F3 Freeway south of John Renshaw Drive roundabout, before crossing through an area of native vegetation at Black Hill. This section passes close to the CTGWM and the Glenrowan homestead.

Central section (Section 2)

The preferred route deviates in a south-easterly direction in the central section under the 330 kV transmission lines and passes through some communities of Swamp Oak Floodplain Forest. This section requires a long bridge structure to cross Woodlands Close, the Main Northern Railway line, New England Highway and the Hunter River. It crosses floodplain which is subject to flood management and soft soil issues. East of the Hunter River, the preferred route parallels the existing Pacific Highway and crosses SEPP 14 wetland No. 830 on structure.

Eastern section (Section 3)

This section crosses the existing Pacific Highway north-west of the Hunter Region Botanic Gardens and continues across the northern edge of Tomago Sand Beds. It passes through an area of vegetation east of Heatherbrae avoiding designated areas of 'core' and 'potential' Koala habitat.

The alignment avoids the Weathertex factory and passes across land proposed for future industrial development.

This section could be constructed independently of the existing road network, reducing the potential for traffic delays. A partial interchange would be provided near the Hunter Region Botanic Gardens and also on the Raymond Terrace bypass near Windeyers Creek.

Figure 5.1: Preferred route

5.2.2 Functional elements of the preferred route

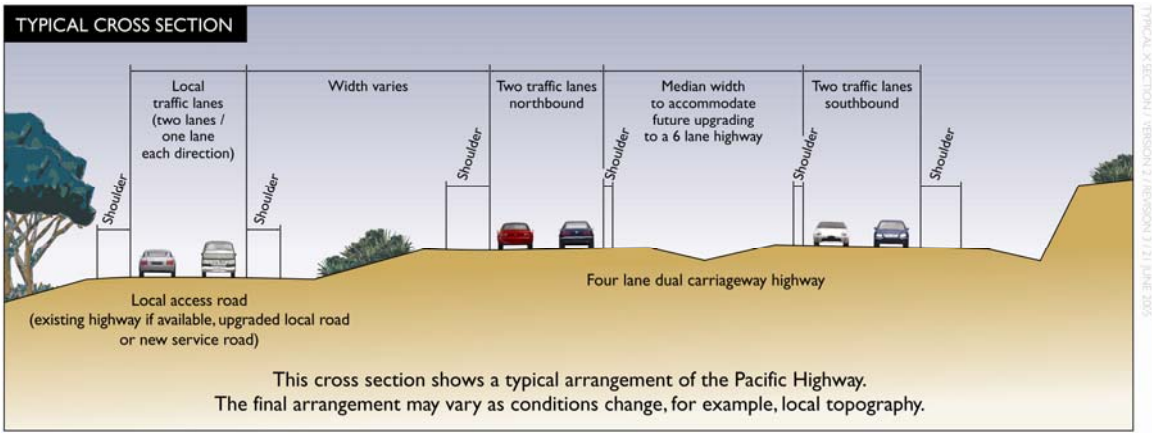
Main carriageway

The preferred route would be constructed to provide dual carriageway having two traffic lanes in each direction with a provision to upgrade to three lanes in the future. The third lane would be constructed in the central median.

The pavement areas on each carriageway would comprise two 3.5 metre wide traffic lanes and a 2.5 metre wide outer shoulder. Additional widths would be provided for verges and these would be dependent on batter configurations.

A typical arrangement for a cross section of the Pacific Highway is shown in **Figure 5.2**. The final arrangement would vary along the preferred alignment route, being dependent on study area characteristics, such as local access road provisions and topographical variations.

Figure 5.2: Typical cross section



The preferred route alignment would be in cut, fill, at grade or elevated on structure along its length depending on:

- Local variations in topography.
- RTA engineering design standards for highways.
- The need to raise the road level above the 1 in 20 year ARI design flood event.

Access

The project would be constructed to 'M Class' standard which would entail controlled access along the full length of the upgrade route. Configurations would be generally be as follows:

- Access to the main carriageway would primarily be limited to interchanges.
- Access to local roads would be maintained by the provision of service roads, construction of overpasses and adjustments to individual property access if required.
- Temporary access arrangements may be required as part of specific construction staging works.

The existing road network would remain and access to townships such as Heatherbrae, Tarro and Beresfield, would be maintained.

Overpasses

To maintain local connectivity, overpass structures would be utilised at interchange or potential cross over locations. These are likely to occur near the F3 Freeway, near Tomago and or the Hunter Region Botanic Gardens and at the tie in to the Raymond Terrace Bypass.

Interchanges

Interchange layouts and arrangements will be further investigated and refined during the development of the concept design. Proposed interchanges are discussed in **Chapter 5.3**.

New bridges and culverts

New bridges and culverts would be required to cross existing infrastructure and enable the passage of flood waters without adversely affecting water levels upstream. The following key structures would be required:

- New major structure over the Main Northern Railway, New England Highway and Hunter River approximately 1200 metres in length.
- Structure to elevate the northbound carriageway above the 1 in 20 year flood level across SEPP 14 wetland no. 830, located on the eastern side of the Hunter River approximately 700 metres in length. The southbound carriageway would be constructed at grade within the existing road reserve.
- A new bridge structure over Masonite Road.
- A new bridge structure over Windeyers Creek.
- New bridges at grade separated interchange locations.
- New bridge for the crossover structure to maintain the existing Pacific Highway connection.
- Culverts in the freshwater wetland area located adjacent to Black Hill.
- Culverts in the floodplain west of the Hunter River, to provide for passage of floodwaters. These culverts would also act as fauna underpasses.

5.3 Traffic and transportation potential impacts

It is expected that the preferred route would result in benefits for traffic travelling through the study area. Trips through the study area may be local, for example from Newcastle to Raymond Terrace, or interstate, for example from Sydney to Brisbane. Travel time through the area on the new route would be decreased and removal of through trips from the existing network could reduce travel times for the remaining traffic.

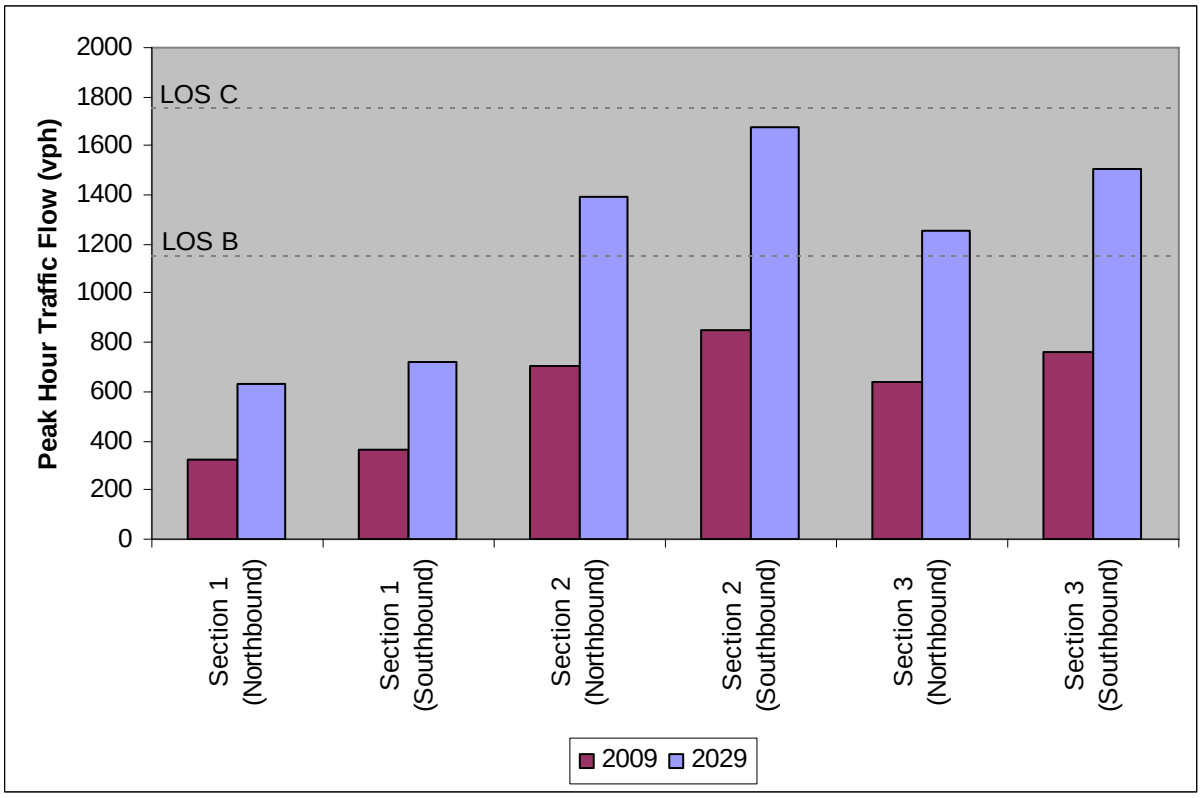
The preferred route meets the traffic specific project objectives for the project. The upgrade would be dual carriageway road designed to 110 km/h. It would be expected that crashes at mid block locations would decrease for traffic transferring to the preferred route. Crash rates on the existing road network may decrease since the preferred route would reduce conflict between through traffic and local traffic using intersections on the existing route.

In 2004, the minimum travel time from the F3 Freeway at Black Hill to the Masonite Road roundabout is approximately 10 minutes during peak periods. The preferred route, with a signposted speed of 110 km/h, would enable this trip to be made in approximately eight minutes, a saving of two minutes. However, if forecast traffic growth is accounted for, the time saving could reach up to 20 minutes in 2029 if no improvements are made to the local road network.

At the concept design stage of the project, interchanges will be designed to provide at least Level of Service (LOS) C. The preferred route would operate at a midblock LOS B or above in both

2009 and 2029 (based on the methodology included in the Austroads Guide to Traffic Engineering Practice Part 2 1988) as illustrated by **Figure 5.3**.

Figure 5.3: Preferred Route Level of Service



Access to and from the preferred route would be provided at grade separated interchanges at the following locations:

- F3 Freeway, Black Hill - a full interchange would be provided to the south of the John Renshaw Drive roundabout.
- Heatherbrae - a partial interchange providing access from the motorway to Heatherbrae township and vice versa would be provided.
- Raymond Terrace Bypass - a partial interchange providing access from the local road network to the motorway and vice versa would be provided.
- Provision has also been made for a possible interchange at Tomago Road. This arrangement may be integrated with a cross over from the existing highway to the Upgrade and vice versa.

The layout and configuration of the interchanges will be further developed at the concept design stage of the project.

The existing road network would remain in place following construction of the preferred route. Therefore, the preferred route would not affect existing access to businesses, communities and properties. In some cases, local roads would pass over or under the preferred route in order to maintain the access arrangements.

Access to and from the Beresfield Highway Service Centre would be provided from the western interchange at Black Hill. Traffic would leave and return to the motorway via the same interchange location.

Heatherbrae business would continue to service passing trade and would also be patronised by motorway trade if adequate sign posting is provided. For example, traffic travelling northbound

could leave the motorway at Heatherbrae, pass through the town and rejoin the motorway at the Raymond Terrace Bypass interchange.

It is essential to maintain links to these service areas, as the closest major rest area with fuel and food services is at a distance of approximately 75 km to the south (Ourimbah). To the north, a truck stop and driver reviver facility is provided 12 km north of Raymond Terrace and certain towns on the route, such as Bulahdelah and Karuah, provide services.

Table 5.1 indicates the percentage of daily traffic that the preferred route could remove from the existing road network. The table indicates that 51 per cent of daily traffic in 2029 would pass through Heatherbrae township. By 2029 the amount of daily traffic passing through Heatherbrae with the preferred route constructed would increase by 30 per cent over existing 2004 volumes.

Table 5.1: Proportion of traffic removed from the existing road network

Road name	2029 estimated traffic		Per cent decrease
	Without preferred route	With preferred route	
John Renshaw Drive	42,000	26,100	-38 per cent
New England Hwy (North of Hexham Bridge)	106,600	90,700	-15 per cent
Pacific Hwy (East of Hexham Bridge)	88,700	72,800	-18 per cent
Pacific Hwy (Heatherbrae)	62,500	31,900	-49 per cent

Calculations assume connection between the existing road network and the new motorway near Tomago Road

5.4 Planning and land use

5.4.1 Statutory planning

LEP zoning

The preferred route would traverse a number of zonings under Newcastle City Council and Port Stephens Shire Council LGAs as documented below:

- Within the Newcastle LGA, the preferred route crosses zonings including:
  - 4(b) – Ports and Industry Zone.
  - 5(a) – Special Uses Zone.
  - 7(b) – Environmental Protection Zone.
  - 7(c) – Environmental Investigation Zone.
- Within the Port Stephens LGA, relevant zonings include:
  - 1(a) – Rural Agricultural "A".
  - 4(a) – Industrial General "A".
  - 7(a) – Environment Protection "A".
  - 7(c) – Environment Protection "C" (Water Catchment).

Based on the definitions of 'utility installation' (includes road transport undertakings) contained in relevant LEPs, development for the purposes of a road by or under the authority of any

Government department, or in pursuance of any Commonwealth or State Act, is not 'prohibited' under any of the zonings traversed by the project.

Within the Newcastle LGA, the area of land traversed by the preferred route zoned *4(a) – Ports and Industry Zone* and *5(a) – Special Uses Zone* is minimal, however the area of land zoned *7(b) – Environmental Protection* Zone and *7(c) – Environmental Investigation Zone is* approximately 33 hectares.

Within the Port Stephens LGA, the alignment impacts on approximately 6 hectares of land zoned *7(a) – Environment Protection "A"* and approximately 6 hectares of land zoned *7(c) – Environment Protection "C" (Water Catchment)*. This land comprises native vegetation and koala habitat, and water catchment and associated bore lines. The refined preferred route alignment has been located as close as possible to the developed industrial areas of Heatherbrae to minimise impact and fragmentation of bushland and maximise the distance from Hunter Water Corporation's main bore line.

Approvals under Commonwealth legislation

The preferred route is approximately 50 metres from the area mapped by DEH as being part of the Hunter Estuary Wetlands, a Protected Matter under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Potential also exists to impact on flora and fauna species listed under the EPBC Act and this will also be the subject of further studies. Development that may have a significant impact on a matter protected by the EPBC Act would be referred to the Australian Government's Department of the Environment and Heritage (DEH) to seek approval.

Consultation will be undertaken with the DEH to discuss the project and its potential impact on the Hunter Estuary Wetlands, to determine if referral is required under the EPBC Act.

5.4.2 Land use

The alignment passes through the vegetated area of Black Hill and to the south of the Chichester pipeline. The alignment passes adjacent to the Glenrowan homestead before continuing east across open floodplain used for grazing, passing to the north of Hexham Swamp and land used by Dairy Farmers.

This area, west of the Hunter River, is characterised by large parcels of rural land utilised for grazing and limited cropping and the number of actual properties affected would be small. The alignment would be visible for a number of elevated residential properties at Black Hill.

In the central section, the alignment crosses the Chichester pipeline, the Main Northern Railway, the northern extent of development at Hexham and the New England Highway before crossing the Hunter River. The alignment would potentially pass over one or more properties within the northern extent of Hexham. These include two industrial premises and three residential dwellings. The upgrade would pass over this area on structure. Acquisition of some of these properties may be required.

Figure 5.4: Planning constraints in relation to the preferred route

East of the Hunter River, the northbound carriageway would traverse SEPP 14 wetland no. 830 on structure, while the southbound carriageway would be at grade and located within the existing Pacific Highway road reserve.

The preferred route would parallel the existing Pacific Highway through pasture land used for grazing.

The alignment would cross the front of a property previously used by Rutile and Zircon Mines (Newcastle) Limited and then Carrolls Pine (currently disused).

The alignment crosses the existing Pacific Highway before heading northeast and crossing the northern edge of the Hunter Region Botanic Gardens (HRBG). The large parcel of land adjacent to the Pacific Highway and surrounding the HRBG is owned by Hunter Water Corporation and leased to the HRBG for preservation of native vegetation. The HRBG are open for public viewing.

Northeast of the HRBG, the alignment would directly impact a small number of residential and commercial properties.

The alignment then traverses the northern edge of an area of native vegetation within the Tomago GMA.

East of Masonite Road, the alignment avoids a bore field utilised for the operation of the Weathertex Factory. Discussions with the owners are ongoing to develop an alignment through this area that will allow the continued operation of the factory.

The alignment would cross a wetland associated with Windeyer's Creek before connecting to the Raymond Terrace Bypass.

Impact on agricultural land

DPI (formerly NSW Agriculture) data classifies land on its suitability for agricultural production. The maps are produced by evaluating biophysical, social and economic factors that influence the use of land for agriculture.

Class 1 is preferable for agricultural production whilst Class 5 is not. The preferred route avoids all Class 1 agricultural land, however does result in the loss of some Class 2 agricultural land between Black Hill and the Hunter River.

5.4.3 Property impacts and acquisition

The following property impacts are based on the current route alignment and are subject to change as the alignment is refined and developed during concept design within the corridor depicted in **Figure 5.1**.

It is estimated that full acquisition could be required of approximately 13 lots.

Acquisition from approximately 24 landowners would be required.

Any property acquisition would be subject to more detailed investigations.

5.5 Social and cultural potential impacts

5.5.1 Indigenous heritage

Black Hill precinct

The western end of the study area (the Black Hill precinct) is classified as being of extremely high archaeological significance and cultural sensitivity, and is an area of high cultural and social importance to the Aboriginal community. It is noted that any potential route alignment within

the western section of the study area would need to traverse this area and the alignment would traverse the Black Hill high sensitivity precinct for approximately 2.6 km.

Archaeological and cultural heritage issues may arise in the Black Hill precinct that would require intensive management. Historical precedents demonstrating this have already been set at other development sites in the area. The following mitigation measures and steps are recommended:

- Intensive consultation would be undertaken with Aboriginal stakeholders and the NSW DEC in accordance with DEC Interim Guidelines and RTA policy.
- Detailed route walkover and extensive archaeological and subsurface testing, would be undertaken prior to any development.

Hunter River floodplain

The Hunter Floodplain is classified as having a low archaeological potential and cultural sensitivity. Existing models of Aboriginal hunter-gatherer occupation of the Lower Hunter suggest that there is not likely to be significant amounts of archaeological material located in this area. Data from the AHIMS does not currently identify any sites within this area. The alignment would traverse the Hunter Floodplain for 7.4 km and follows the existing highway corridor for more than half of that length.

A testing programme would be carried out to confirm archaeological potential. Archaeological and cultural heritage issues that may arise on the floodplain will be mitigated and managed.

Tomago Sand Beds

The Tomago Sand Beds are classified as having a moderate to high archaeological potential and cultural sensitivity. There is potential for ancient sites to exist within this area that may be associated with remnant swamps or drainage lines. Representatives of the Worimi LALC believe this area to be archaeologically sensitive.

Data from the AHIMS does not currently identify any sites within vicinity of the preferred route. Two sites are identified within the Tomago Sand Beds, however these are adjacent to the Masonite roundabout. The alignment would traverse the Tomago Sand Beds area for a length of approximately 3.4 km.

Worimi LALC are currently undertaking field work to for this Project within the Tomago Sand Beds to quantify the cultural sensitivity of the site. Subsurface testing would be undertaken in this area to quantify its archaeological potential. Archaeological and cultural heritage issues that may arise on the sand sheets would require careful management.

National Parks and Wildlife Act 1974 Part 6 approvals

The *National Parks and Wildlife Act 1974* (NPW Act) is the primary legislation regulating the protection of Aboriginal heritage and is administered by the NSW DEC. Part 6 of the Act provides protection for Aboriginal objects and Aboriginal places. A NPW Act section 87 permit is required to disturb, move or take possession of an Aboriginal object or disturb land for the purpose of discovering an Aboriginal object. A permit under section 90 is required to destroy, damage or deface an Aboriginal object or place.

As part of this project, a section 87 permit will be sought to undertake subsurface testing within the Black Hill and Tomago Sand Beds as this activity would result in disturbance of land.

In addition to ongoing consultation with the Aboriginal communities, more formal consultation will be undertaken as part of preparation of an application for a consent and permit under Part 6 of the NPW Act. This additional consultation will be in accordance with the Interim Community Consultation Requirements for Applicants (NSW DEC, 2004).

Following the additional investigations described above, a full Indigenous Heritage Assessment would be undertaken by the Mindaribba and Worimi LALCs. The associated report would be requested and if available appended to the EA and summarised in a section within the EA.

5.5.2 Non-indigenous heritage

None of the listed non-indigenous heritage items identified in the *Preliminary Non-indigenous Heritage Investigation* (Maunsell, 2005) are directly impacted by the preferred route.

The alignment is, however located approximately 50 metres away from part of the Hunter Estuary Wetlands (Hexham Swamp) which is 'Registered' on the RNE, primarily for their natural significance.

Actions which are likely to have a significant impact on an item on the RNE require referral to the Australian Heritage Council (advisors to the Minister for Environment and Heritage). If required, consultation with the AHC and DEH would be undertaken during the EA.

Possible mitigation measures to reduce the potential impact on Hexham Swamp could include ensuring that the crossfall of the upgrade falls away from the wetlands and that appropriate water quality control ponds are utilised.

Unidentified items

Desktop studies and consultation with relevant groups and government agencies have indicated that high levels of disturbance and modification within the study area are likely to result in little potential for identification of previously unidentified non-indigenous heritage items.

A site walkover to identify such potential items would be undertaken as part of the EA, and should any new items be identified an assessment of significance would be undertaken.

The *Preliminary Non-indigenous Heritage Investigation* (Maunsell, 2005) would be progressed as part of the EA. This would potentially include a historic landscape assessment for the preferred route by a qualified historic landscape consultant, and a site walkover along the preferred route alignment to identify any previously located items of historic significance.

The *Non-Indigenous Heritage Report* would be produced in accordance with the following:

- RTA Heritage Guidelines.
- Australia ICOMOS Burra Charter.
- Various NSW Heritage Office guidelines.

The full report would be appended to the EA.

5.5.3 Social issues

Key social impacts on different stakeholder groups are detailed below.

Residents along or near preferred route

Depending on proximity to the alignment, residential properties in the vicinity of the preferred route could experience significant negative impacts to the quality of residential amenity. Such impacts could include traffic noise, visual impact, property acquisition, transformation of a rural locality, alterations to property access and in some cases loss of a dwelling.

In particular, properties at Black Hill with a view across the floodplain, isolated rural properties, dwellings adjacent to the New England Highway at Hexham and north of the Shell garage adjacent to the Pacific Highway at Heatherbrae would be affected.

Construction impacts may include dust, noise and vibration impacts, and construction vehicle traffic.

Residents and business located along existing Pacific Highway

The existing traffic route through the study area would be retained as the main local access route, separating regional and long distance traffic from local traffic. The majority of residents and businesses currently fronting the Pacific Highway in Heatherbrae would benefit from reduced noise and vibration and improved safety associated with the removal of a proportion of long distance traffic and heavy vehicles.

Some businesses at Beresfield and Heatherbrae comprising accommodation services, takeaway food outlets, service stations and restaurants are currently heavily reliant on passing trade and may experience changes (dependent upon business type, reputation, signposting etc) following the reduction in traffic levels.

Indigenous community

Consultation with the indigenous community, namely representatives from LALC's, has provided information about indigenous cultural heritage sites and areas of significance throughout the study area. Consultation with the indigenous community would be ongoing throughout the concept design and EA.

Rural agricultural businesses

The preferred route would have a range of access, property acquisition and amenity impacts on rural properties. Owners of agricultural properties often have plans for improvements or sale, which could be impacted by changes to land values, severance of land parcels and the character of an area. Some rural agricultural properties within the study area have been subject to severance in the past as a result of the development of infrastructure in the area such as development of the New England Highway, the Chichester pipeline and high voltage overhead transmission lines.

Local government

At the time of writing, Newcastle City Council did not have a preferred option as they stated they believe additional ecological, archaeological, visual and environmental investigations need to be undertaken before a decision could be made.

The Maitland LGA is not impacted by the preferred route, but Maitland City Council has advised that it believes accessibility to be important, preferring an additional full interchange at a central location. Maitland City Council also noted that both options have potential to improve traffic flows on the existing network, and also that existing flood impacts must not be negatively impacted.

A formal submission has not been received Port Stephens Shire Council.

Road users generally

There is widespread local and state support for a safer upgraded highway with reduced travel times and potentially fewer accidents.

5.5.4 Noise and vibration

A strategic noise assessment was carried out as part of the route options development by Wilkinson Murray (March 2005). This strategic noise assessment has been used to provide

guidance on potential impacts and likely criteria for the assessment of impacts which would be undertaken during the detailed environmental assessment.

To determine indicative noise impacts from the Project, the following indicators have been considered:

- Number of sensitive receivers within 500m of the centreline of the upgrade. In the more densely populated areas, this generally only includes the first two rows of receivers and assumes those beyond would be subject to significantly reduced impact due to reflection.
- Number of residences where noise level criteria would be for a new freeway.
- Number of residences where noise level criteria would be for an upgrade of a freeway.

The table below provides a summation of number of properties which may be impacted, relating to the above noted indicators.

Table 5.2: Approximate number of sensitive receivers

Section	Areas (Suburbs)	Receivers within 500 metres of the existing road alignment	Receivers within 500 metres of preferred route alignment	Number of residences where base noise level criteria would be for a new freeway	Number of residences where base noise level criteria would be for a redeveloped freeway
Eastern	Woods Gully	28	32	4	28
	Beresfield	115	101	0	101
Central	Tomago	3	3	0	3
Western	Heatherbrae	103	25	5	20

A detailed noise assessment in accordance with the NSW Government Environmental Criteria for Road Traffic Noise (ECRTN) or the RTA Environmental Noise Management Manual (ENMM) will be undertaken as part of the detailed Environmental Assessment for the project. This will confirm the location and nature of noise mitigation required.

Key noise criteria from the ECRTN guidelines are presented in **Table 5.3.**

Table 5.3: Noise criteria from ECRTN guidelines

Area	Measurement	Maximum average noise levels (dBA)
Residential		
New Freeway or Arterial Road Corridor	$L_{Aeq,15hr}$ (7.00 am-10.00 pm)	55
	$L_{Aeq,9hr}$ (10.00 pm-7.00 am)	50
Redevelopment of Existing Freeway or Arterial Road	$L_{Aeq,15hr}$ (7.00 am-10.00 pm)	60
	$L_{Aeq,9hr}$ (10.00 pm-7.00 am)	55
Schools		
Inside Classrooms	$L_{Aeq,1hr}$	45
Playgrounds	$L_{Aeq,1hr}$	55

Area	Measurement	Maximum average noise levels (dBA)
Parks and Recreational Areas		
Passive recreational areas	$L_{Aeq,15hr}$	55
Commercial Premises		
Internal noise level in offices	L_{Aeq}	45

5.5.5 Urban design, landscape and visual amenity

The urban design, visual and landscape constraints and opportunities have been assessed for the preferred route. Constraints associated with an upgrade of the Pacific Highway through the study area are significant, and it is acknowledged that no project of this nature would occur without an effect on the existing urban design, visual and landscape characteristics of the area.

The alignment would be in cutting through the vegetated area of Black Hill, minimising the visual and noise impacts for the surrounding residential areas, before emerging onto the vast expanse of the Hunter River floodplain. Flat batters of 1:3 or 1:4 (vertical to horizontal) would be utilised where embankment is constructed on the floodplain, to blend the upgrade with the flat topography.

Culverts utilised for the passage of floodwaters and fauna movements on the floodplain west of the Hunter River will require careful consideration to conform to the urban design and landscape objectives.

The new crossing of the Hunter River near the existing Hexham Bridges would be highly visible and will require careful consideration in the form and geometry of the structure provided.

East of the Hunter River, the alignment parallels the existing highway, consolidating this infrastructure corridor. The use of landscaping would aid in separating the existing highway from the Upgrade while maintaining existing views across the floodplain and Hunter River.

Where the alignment traverses the northern edge of the Tomago GMA behind Heatherbrae, reforestation to mitigate the potential impact on the Coastal Sand Apple Blackbutt Forest area would be important.

Noise mounding and plant screening at the Hunter Region Botanic Gardens could also be considered. The noise environment of Heatherbrae would be improved with fewer traffic movements within the town.

5.6 Biophysical environment potential impacts

5.6.1 Ground conditions

West of the Hunter River the preferred route traverses approximately 2.5 km of soft compressible soils varying in depth between approximately five and 20 metres. Soft compressible soils to 20 metres in depth were identified during the design and construction of the southern approach ramps to the existing Hexham Bridge.

Immediately east of the Hunter River, the southbound carriageway would be constructed on soft ground adjacent to SEPP 14 wetland no. 830. The northbound carriageway would be elevated on structure above the SEPP 14 wetland.

The main impacts and constraints associated with soft soil deposits include:

- Significant time dependent settlements, which could occur over a considerable period (years).

- Embankment stability which may restrict the steepness of batter slopes unless stabilisation measures are introduced.

East of Tomago Road, the preferred route would be constructed on the geological boundary of the soft alluvial soils of the Hunter River floodplain and the Aeolian sand deposit of the Tomago Sand Beds. The constraint to the project development along this section of the route would depend on the nature of the transition of these two geological units.

Where embankment is constructed on soft compressible soils, treatment options include the use of vertical drainage to accelerate the rate of settlement in conjunction with preloading and or surcharging the area concerned. The aim would be to take out the majority of anticipated settlement before the Upgrade was operational.

The preferred route east of the crossing of the existing Pacific Highway would be founded on favourable ground comprising sand deposits of the Tomago Sand Bed formation.

A short section of ground treatment is also likely to be required on the approach embankments to the structure crossing Windeyers Creek and associated wetland. The options for ground treatment would be similar to those discussed above.

The extent and depth of soft soils and required ground treatment will be determined from additional geotechnical investigations.

5.6.2 Hydrology and flooding

As a minimum, one carriageway of the upgrade must target immunity from a 1 in 20 year ARI flood event. The TUFLOW numerical flood model developed by WBM Oceanics indicates 1 in 20 year ARI flood levels within the study area varying between 2.2 metres AHD near Black Hill to 3.0 metres AHD near Heatherbrae. For immunity against a 1 in 100 year event, the flood model indicates levels varying between 3.8 to 4.5 metres AHD, but immunity from this event has been considered impractical due to:

- The requirement to import significant volumes of fill material for construction of the additional volume of embankment.
- Excessive settlement and instability of the embankment.
- Additional length of waterway area required to minimise potential impact on upstream water levels.
- Visual impact arising from excessive height of embankment or structure required across the floodplain.

To provide immunity from the 1 in 20 ARI flood levels, a combination of embankment, culverts and structure would be utilised. Sufficient waterway area would be provided to minimise impact on upstream water levels, control flood velocities and scour and minimise potential changes to inundation durations.

During flood events above the 1 in 20 year ARI, floodwaters breach the New England Highway embankment near the crossing of the Main Northern Railway, and a significant proportion of the floodwaters traverse the floodplain west of the Hunter River.

The main spans of the new structure over the existing constriction at the Hexham Bridges would extend partially onto the western floodplain and several hundred metres of additional structure and/or culverts would be also be provided for the passage of floodwaters, provision of local drainage and for fauna underpasses. The exact length and location of these structures is being determined by modelling the preferred route in the calibrated numerical model that has been developed for the project.

The location of the proposed new bridge crossing over the Hunter River is away from the natural bend in the River where geomorphologic change and scour are less likely to occur.

The existing Pacific Highway between the Hunter River and Tomago Road is overtopped during flood events greater than approximately the one in five year ARI and this area conveys a significant volume of floodwater during larger flood events. The southbound carriageway of the preferred route would be constructed to the level of the existing Pacific Highway in this area and would not impact on the existing flood regime. The northbound carriageway would be constructed on structure above SEPP 14 wetland no 830 and the 1 in 20 year ARI level.

East of Tomago Road the existing Pacific Highway is above the 1 in 20 year ARI and the upgrade would be constructed to a similar elevation on embankment.

Additional planning and detailed modelling will be required during the concept design and prior to construction of the project. The *Water Management Act 2000*, Part 2 Hunter Valley flood mitigation works, Section 256 stipulates that consent from the Minister is required for "flood work on a floodplain". The installation of culverts as a flood mitigation measure under the preferred route alignment embankment may be construed as flood work. In this respect, floodplain means "any lands declared to be within the floodplain of the Hunter River".

5.6.3 Water quality

Construction of the project would involve working in and adjacent to sensitive environmental areas, including wetlands, floodplains and areas adjacent to the Hunter River, Windeyer's and Purgatory Creeks and other water courses draining to the Hunter River. Water quality issues may arise during the following events or activities:

- During flood events, soil disturbance activities and the influx of suspended sediments into the local water environment by surface water run off can result in detriment to water quality. The upgrade is not expected to worsen this aspect of water quality. Reduced velocities in some areas may result in increased deposition of sediment and debris within the floodplain upstream of the highway during major flood events.
- During storm events, highway runoff may potentially convey stormwater pollutants into the local water environment.
- Construction activities have potential to pollute waterways through runoff of silt from exposed ground, water collecting in excavations, stockpiled materials, plant and wheel washing facilities and site roads. Potential spillages or uncontrolled release during application of potentially polluting material such as cement, concrete, diesel or hydraulic fluid are also considerations. Potential leakage of stored fuel, oil or chemicals on site for equipment maintenance is also a consideration.

Figure 5.5: Key constraints in relation to the preferred route

Dangerous Goods transportation presents a risk to both humans and the environment and arises from traffic incidents resulting in the rupture of storage tanks/containers and consequential release of hazardous substances and/or dangerous goods.

In all of the above cases, site specific water quality control and mitigation measures would be implemented. Water Quality management in the Tomago GMA is discussed in **Chapter 5.6.4**.

Site specific water quality control and mitigation measures may include:

- Grassed swales parallel to new sections of the upgrade.
- Designing the crossfall of the road to fall away from sensitive environmental areas
- Capturing and piping stormwater runoff from sensitive environmental areas to other areas
- Permanent surface water detention or retention basins.
- Utilising constructed wetlands.

5.6.4 Ground water resources

The Tomago GMA is protected by legislation including the Hunter Water (Special Areas) Regulation 2003, Water Sharing Plan for the Tomago Tomaree Stockton Groundwater Sources (as amended Thursday, 1 July 2004), Water Act 1912 and the Water Management Act 2000. These statutes aim to protect the ground water reserves within the aquifer system for the ecosystem and as a potable water supply.

The preferred route traverses approximately 2.9 km of the Tomago GMA. The location of the preferred route in relation to the GMA and the main water extraction bore line is shown on **Figure 5.5**

Initial discussions were held with Hunter Water Corporation (HWC), RTA and Maunsell in 2005 and February 2006 regarding potential impacts on water quality and mitigation measures for the feasible route options. It is understood from these discussions, that the boreline under consideration in **Figure 5.5** is strategically important as it is located in close proximity to the Tomago Water Treatment Plant and provides significant volume and hydraulic head to charge other bores in the area.

The preferred route avoids this boreline and also minimises the length of the alignment in cutting, to prevent contact with the groundwater table and prevent exposure of pyritic material and naturally occurring metals.

The potential contamination of the aquifer is an important consideration in the development of the preferred route, mitigation and water quality control measures. Potential contamination sources include construction activities, highway runoff and operational hazards and risks such as spills.

Discussions with HWC have indicated a preference to direct all runoff through operational basins and provide opportunity to treat all runoff from the road in the Tomago GMA to prevent recharging the aquifer with potentially contaminated water. This could be achieved through collection and piping of runoff to a less environmentally sensitive area, where normal water quality control mitigation measures would be applied before discharge.

In addition to potential impact on the quality of drinking water, there are a number of groundwater dependent ecosystems in the area of the preferred route road alignment within the Tomago Sand Bed area. Schedule 5 (high priority groundwater dependent ecosystems) in the Water Sharing Plan for the Tomago Tomaree Stockton Groundwater Sources (as amended Thursday, 1 July 2004) notes that protection of the groundwater reserves is required to ensure ecosystems are protected during construction and operation (i.e. Swamp Forest located to the south of the study area in the eastern section).

During the Environmental Assessment, it will be necessary to consider the cumulative impacts of the project on the future viability of the Tomago borefield area in relation to quantity and quality of the bore water sources and the future developments in the surrounding area. Additional investigations will focus on:

- Ground water movements in the study area.
- Surface water discharge requirements and locations.
- Groundwater levels. This will determine cut and fill requirements and associated risks to the integrity of the groundwater supply.
- Precise locations of the existing groundwater bores within the study area.

Further consultation will be undertaken with:

- Hunter Water Corporation to determine any provisions relating to reconfiguration of existing ground water extraction boreholes in relation to the proposed development area. Access arrangements to the groundwater boreholes would also need to be maintained.
- Department of Natural Resources to determine any special requirements or direction under section 9 (Pollution of Waters), clause 3 of the Hunter Water (Special Areas) Regulation 2003.

5.6.5 Ecology

The preferred route would have direct and indirect impacts on EECs, threatened species and aquatic habitats. These are summarised in **Table 5.4**. The areas have been calculating using the road width with a six metre allowance either side of the earthworks formation.

Table 5.4: Ecological impacts of the Preferred Route

Ecological issue	Status	Option A1	Option B2	Option B3
		Potential impact and area affected	Potential impact and area affected	Potential impact and area affected
Spotted Gum-Ironbark Forest	EEC	Would pass through regenerating remnants in good condition (18.5 hectares)	Nil	Nil
Swamp Oak Floodplain Forest	EEC	Would pass through two disturbed remnants. (6.0 hectares)	Nil	Nil
Swamp Sclerophyll Forest	EEC SEPP 14	Would pass through one patch in Black Hill	Nil	Nil
Coastal Saltmarsh	EEC SEPP 14	Nil	May cross some saltmarsh on structure within wetland 830*	Nil

Ecological issue	Status	Option A1 Potential impact and area affected	Option B2 Potential impact and area affected	Option B3 Potential impact and area affected
Freshwater Wetlands	EEC SEPP 14	Would bisect wetland C (0.5 hectares)	Would cross part of SEPP 14 wetland 830* (4.7 hectares)	Would cross wetlands F & G (1.5 hectares)
Callistemon linearifolius	TSC Act	Would impact 25 plants. Interchange could impact a further 50 to 70 plants.	Nil	Nil
*Maundia triglochinoides***	TSC Act	*If present*, may be affected.	Nil	
Grey-crowned babbler**	TSC Act	*If present*, may affect foraging & nesting habitat.	Nil	*If present*, may affect foraging & nesting habitat.
Glossy Black Cockatoo	TSC Act	Would remove potential feed trees	Nil	Nil
Migratory Wading Birds	TSC Act EPBC Act RAMSAR Convention	Nil	Nil	Would remove feeding habitat (0.5 hectares)
Microbats (6 species)	TSC Act	Would remove foraging habitat and roosting trees	Nil	Would remove foraging habitat and roosting trees
Koala	TSC Act	Nil	Nil	Would fragment 'Supplementary habitat'.
Squirrel Glider**	TSC Act	Nil	Nil	*If present*, may be affected.
Brush-tailed Phascogale**	TSC Act	Nil	Nil	*If present*, may be affected

* Wetland No 830 is a SEPP 14 wetland containing mangroves and both a Coastal Saltmarsh EEC, and a degraded Freshwater Wetland EEC.

** Potential occurrence only. Presence not confirmed.

Terrestrial ecology

Impacts on terrestrial ecology would include the removal of *Callistemon linearifolius*, and potential impacts on mammals, including microbats, in the Black Hill and Tomago Sand Bed areas.

Further studies will be required to confirm the following:

- Presence of *Maundia triglochinoides*.
- Presence of *Tetratheca juncea.*
- Presence of the Grey-crowned babbler.
- Extent of foraging by the Glossy Black cockatoo on the route.

- Extent of usage of wetland F by wading birds.
- Location of roosting sites for microbats.
- Presence of the Squirrel Glider (Option B3).
- Presence of the Brush-tailed Phascogale.

Further searches for feeding areas of the Glossy Black Cockatoo may also be required. Although *Allocasuarina* seed cones are the preferred food for the glossy black cockatoo, it has certain preferred trees which have a higher number of seeds per cone. The area under these trees is littered with broken cones. If present, removal of these favoured trees would be an impact requiring careful mitigation.

Surveys for mammals would be required to determine the type of fauna crossing required in the B3 area.

Potential mitigation measures, which will be defined during the Environmental Assessment include:

- Design of the alignment and interchange to minimise impact on *Callistemon linearifolius*.
- Rehabilitation of remnant forest EECs along Option A1.
- Rehabilitation of woodland in the Black Hill and Tomago Sands area to provide resources for woodland birds.
- Planting *Allocasuarin*a trees to provide additional feeding habitat for the glossy black cockatoo.
- Creation of additional mudflats in wetland F for wading birds.
- Measures to facilitate fauna movement across Option B3.
- Rehabilitation of woodland in the Tomago sands area.
- Construction of roosting boxes to replace roosting trees for microbats.

Aquatic ecology

The route would affect Freshwater Wetland EECs, wetlands F and G, SEPP 14 wetland no 830 and part of No 832 and shown in **Figure 5.5**. Wetland No 830, on the banks of the Hunter River, also contains saltmarsh EEC. Crossing this wetland would affect mangroves. The crossing of the Hunter River and Purgatory Creek could potentially involve Key Threatening Processes under the TSC Act and the FM Act.

Seven part tests would be required for the green sawfish and the black cod in the Hunter River but impacts are not expected to be significant.

Crossing of the main channel of the Hunter River during the prawn season (October to May) may affect prawn trawler operations. Prawn fishers should be consulted and notified of works.

Potential mitigation measures will be developed in the Environmental Assessment but could include:

- Ensure that fish passage is maintained at all times.
- Apply DPI (Fisheries) Guidelines for watercourse crossings "Why do fish cross the road".
- Design crossings on structure to avoid changing hydrology and avoid restricting flow to sensitive aquatic habitats.
- Design structures to minimise shading in key fish habitat locations where possible.
- Design creek crossings to avoid key threatening processes.

- Employ best practice environmental controls when crossing the Hunter River.
- Develop a habitat compensation plan involving rehabilitation of degraded wetland habitat in the area to compensate for Impacts on Wetland No 830.
- Creation of a new wetland to compensate for removal of wetland G and impacts on other freshwater wetlands.
- Consult with and notify prawn fishers if construction to take place in B2 during October-May.

5.6.6 Climate and air quality

The project is not expected to have a significant climatic influence.

Potential air quality impacts are likely to result from construction and operation of the upgrade and are discussed below.

The primary source of air quality impacts during construction is likely to be associated with dust, which may be generated and dispersed by any of the following:

- Movement of construction traffic along unsealed roads.
- Clearing of vegetation, leaving exposed soils that may be eroded by wind or construction vehicle movements.
- Movement of soils from cleared areas (including loading and offloading of soils).
- Transportation of construction materials.

Other impacts associated with construction may include:

- Emissions from vehicles, plant and equipment.
- Smoke emissions from accidental or controlled fire.
- Odour from emissions and onsite chemical use and storage.

The preferred route would be a high quality road with flatter vertical grades and less interruption to traffic flow than the existing traffic route. The preferred route would also be shorter in length than the existing traffic route. It is likely that these issues would lead to an overall reduction in vehicle emissions and a relative improvement in air quality.

Bypassing Heatherbrae would also move a significant proportion of vehicles and resulting emissions further from the town centre.

Whilst motor vehicles are the dominant source of carbon monoxide and nitrogen in an urban environment, the existing local air quality, and surrounding industries such as smelters, would also be taken into consideration in the Environmental Assessment of the upgrade.

A specialist air quality assessment will be undertaken as part of the Environmental Assessment in accordance with the new Part 3A of the EP&A Act.

The air quality assessment would provide an analysis of:

- Existing environment (air quality).
- Potential construction impacts and mitigation measures.
- Potential operational impacts and mitigation measures.

The Environmental Assessment would take into consideration proximity of nearest residential properties and other sensitive receivers in relation to all proposed activities (construction and operation).

Specific air quality assessment criteria for NSW are outlined in the NSW DEC guidelines "*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales"* (DEC, August 2005).

5.7 Existing infrastructure potential impacts

A number of existing infrastructure items would be traversed by the preferred route alignment including:

- The Chichester Trunk Gravitation Water Main (CTGWM).
- High voltage overhead transmission lines (330 kV) (Transgrid) and (132 kV) (Energy Australia).
- Raymond Terrace Trunk Watermain.
- The Main Northern Railway.
- The New England Highway.
- Woodlands Close.

HWC plans to underground the section of Chichester Trunk Gravitation Water Main (CTGWM) within the study area. Consultation to ensure adequate access for maintenance and future upgrade would need to be undertaken with HWC during detailed design.

The high voltage overhead transmission lines (330 kV) (Transgrid) would be crossed at Black Hill and on the floodplain. The key objective will be to ensure adequate lateral offset and overhead clearance (minimum 12 metres). The route would also pass under a set of 132 kV transmission lines near the Hunter Region Botanical Gardens.

The Raymond Terrace Trunk Watermain consists of three parallel pipes that lead into Raymond Terrace from the bore lines within the Tomago Sand Beds. The preferred route alignment would pass over the pipeline in fill. Consultation to ensure adequate access for maintenance and future upgrade would need to be undertaken with HWC during detailed design.

The Main Northern Railway, New England Highway and Woodlands Close would be traversed in one structure incorporating the Hunter River crossing. The vertical clearances required over the Main Northern Railway and New England Highway are 7.1 metres and 5.3 metres, respectively. A 30 metre clear span and 10 metre vertical clearance is required for navigation in the Hunter River.

5.8 Economic evaluation

A road user cost benefit analysis was undertaken to assess the economic attractiveness of the preferred route. Initial modelling for the economic appraisal has been carried out following cost benefit analysis guidelines outlined in the *RTA Economic Analysis Manual*, Version 2, 1999 (updated 2002).

The following factors were considered in the analysis, in comparison to the base case:

- Construction costs.
- Travel time (cost) savings.
- Vehicle operating cost savings.
- Accident cost savings.

For the purpose of the cost benefit analysis, it has been assumed that the nominal construction cost is spread across a three year period between 2006 and 2008 with the instalment payable annually. It is assumed for the purpose of the analysis that the project would open to traffic in 2009.

Table 5.5 summarises the results of the cost benefit analysis. The appraisal models all cash flows over a 33 year period, including the three years of construction between 2006 and 2008, at a (real) discount rate of seven per cent per annum. All cash flows have been discounted to 2006. The discounted cash flows are subsequently used in the calculation of economic indicators.

Table 5.5: Results of road user cost benefit analysis for preferred route

	Incremental to Base Case ($2006 million)
Construction Costs	367
Construction Costs Present Value ($ million)	321
Benefits: savings in [a]	
Vehicle Operating Costs	29
Travel Time Costs	341
Accident Costs	223
Total Benefits	393
Economic Return	
Net Present Value	72
NPV/ Capital Cost	0.23
Benefit Cost Ratio (BCR)	>1.0

[a] Based on traffic forecasts in Section 5.3 and 110 km/h signposted speed limit

The results show, based on the assumptions used, that the preferred route generates net benefits for road users. The BCR for the preferred route is above 1.0 the BCR and will be refined as the Preferred Route and Concept Design are developed.

It should be noted that the analysis is based on assumptions regarding traffic flows on the proposed road link. Furthermore, the economic appraisal is limited in considering road user costs and benefits. An analysis of other attributes to include wider community effects and impacts have not been included in the appraisal at this stage.

6 The next steps

6.1 Changes to the Environmental Planning and Assessment Act 1979

The NSW Parliament passed the *Environmental Planning and Assessment Amendment (Infrastructure and Other Planning Reform) Act 2005 No 43* on Thursday, 16 June 2005. This amendment came into force on Monday, 1 August 2005. The amendment introduces a new Part 3A to the *Environmental Planning and Assessment Act 1979* (EP&A Act) to cover the assessment of major infrastructure development. This type of development was previously assessed under Part 4 and/or Part 5 of the EP&A Act.

6.2 Assessment under Part 3A of the EP&A Act

To commence environmental assessment for the project under Part 3A, the RTA would firstly lodge a project application report with the Director General (DG) of the DoP. The project application report is a part of the project application and helps to define the key issues associated with the project. The report summarises the process involved in developing the preliminary design, the assessment and selection of options, document community consultation undertaken and details the preferred option. Additionally the report will propose the scope for the EA.

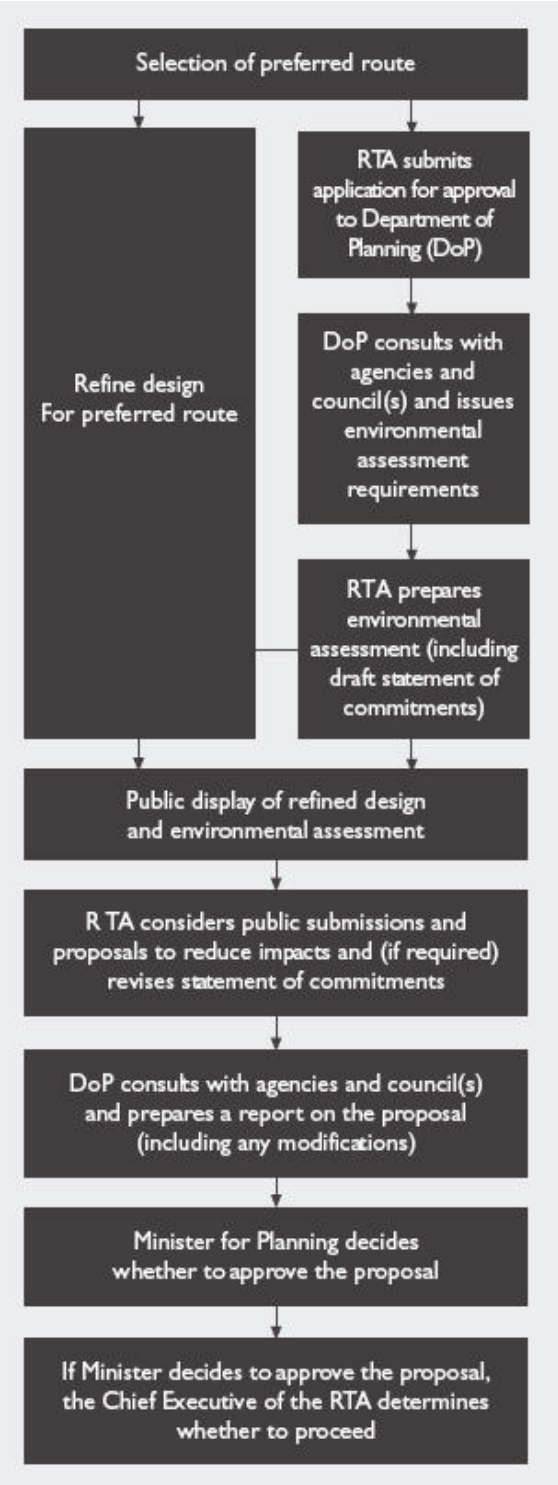
The level of EA required for the project under the new Part 3A would be determined by the DG of Planning. EA requirements are intended to focus the EA on issues that have not been adequately addressed by previous work and cannot be addressed by standard mitigation measures to be applied during construction. The EA should also focus on areas where impacts are considered to be significant and require more detailed assessment. EA requirements are issued after consultation with the relevant public authorities and local Councils. The EA may also include a draft statement of commitments in respect of environmental management and mitigation measures proposed to be undertaken if the project is approved.

When completed, the EA would be publicly exhibited and submissions would be sought. The RTA may be asked to prepare a report on the submissions and revise its statement of commitments. It would also consider modifications to the project to minimise environmental impacts. The DoP may request the RTA to display, for public information, a Preferred Project Report which identifies proposed modifications to the project.

The DoP would consider the EA, the public submissions and any report requested from the RTA in recommending to the Minister for Planning whether the project should be approved.

If the Minister approves the proposal, the Chief Executive of the RTA considers the approval and determines whether to proceed. The assessment report and Ministers decision will be placed on the DoP's website and potentially in other locations within 14 days. The RTA would also upload the assessment to its website. **Figure 6.1** describes the major steps under the Part 3A assessment and approvals process.

Figure 6.1: Part 3A of the EP&A Act, simplified approval process chart



Source: RTA

6.3 F3 to Raymond Terrace Project

By an order gazetted on Friday, 29 July 2005, the Minister for Planning declared that the new Part 3A applies to all projects for which the proponent is also the determining authority and which otherwise would have required an environmental impact statement (EIS) to be obtained under Part 5.

Within the meaning of Part 5 of the EP&A Act, the RTA is both the proponent and the determining authority for the F3 to Raymond Terrace project. It is likely that the project would (but for Part 3A for the EP&A Act) require an EIS to be produced under Part 5 of the Act. Consequently, the RTA proposes to submit the F3 to Raymond Terrace project to the DoP for approval under Part 3A of the Act in the manner described above.

Following the announcement of the preferred route for the F3 to Raymond Terrace project, additional more detailed investigations would be undertaken as part of the EA and to provide input into the refinement of the design for the proposal.

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F3 to Raymond Terrace

Upgrading the Pacific Highway

Value Management Workshop Report

August 2006

F3 to Raymond Terrace
Upgrading the Pacific Highway

Value Management Workshop Report

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			Name/Position	Signature
1	31/03/2006		Louisa Rebec Technical Director - Environment	
2	4/5/2006		Geoff Bowmaker Technical Director	

Table of Contents

1 Executive summary

1.1 Project background

The New South Wales Roads and Traffic Authority (RTA) has been investigating route options to upgrade the Pacific Highway between the F3 Freeway and the Raymond Terrace bypass. The investigation of route options commenced following the projects announcement by the Minister for Roads in October 2004 and the completion of familiarisation and preliminary specialist studies. Planning for this project is being funded by the NSW Government as part of the 10 year Pacific Highway Upgrade Program and **currently there is no preferred option for the project**.

Since 1996, the Pacific Highway Upgrade Program has resulted in almost 230 km of the highway now being a double-lane divided road. A further 235 km of new highway have been approved for construction or have had a preferred route identified. The F3 Freeway to Raymond Terrace Project is one of a final group of five projects, which are proceeding to the selection of a preferred route. The project will target the objectives of the Pacific Highway Upgrade Program, which are to:

- Significantly reduce road accidents and injuries;
- 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 the principles of ecologically sustainable development (ESD); and
- Maximise the effectiveness of expenditure.

The F3 Freeway to Raymond Terrace Project will provide the 'missing link' between the F3 Freeway, south of John Renshaw Drive and the Raymond Terrace bypass, north of Heatherbrae. The project will involve the construction of a new 13 km section of dual carriageway motorway and include interchanges at the F3 Freeway (southern) and in the vicinity of Masonite Road (northern), service roads and a new bridge structure across the Hunter River.

Maunsell Australia Pty Ltd (Maunsell) has been commissioned by the RTA to undertake the route options development and selection, preliminary engineering concept design, environmental assessment and community consultation for the project. Consultation with the community has been carried out principally via the establishment and operation of a Community Liaison Group (CLG) comprising 25 people. The CLG has met formally on six occasions coinciding with key project milestones. Informal one-on-one meetings and/or telephone calls have been carried out. The CLG has provided a suitable forum to discuss the project, raise key issues and concerns, disseminate information (two-way) and to work together with the project team in developing feasible route options.

The RTA has initiated the route options development process, with two feasible route options identified within the defined study area. These options were publicly displayed between, Friday 21 October and Friday 2 December 2005, and feedback has been received and analysed.

A Value Management Workshop (VMW) was held to enable representatives from key government agencies, local councils, CLG members, the local aboriginal community and other interest groups to articulate their concerns and to highlight

the important issues that need to be considered and addressed as part of the process for the selection of a preferred route. The VMW provided an effective way to advance the project by recording the major issues identified by the workshop participants. Moreover, it facilitated the generation of ideas and recommended measures that could mitigate potential constraints/impacts and improve the overall performance of the route option selected by the group.

The VMW was held over two days on Thursday and Friday, 8 & 9 December 2005. Tierney Page Kirkland Pty Ltd was engaged by Maunsell as a sub consultant to independently facilitate and report on the VMW.

A full list of participants who attended the VMW is included in Appendix 1.

During the introductory session of the VMW, key representatives of the RTA and Maunsell provided brief presentations to update all participants on the current status of the project and to refresh the key project issues and study area attributes / constraints. A summary of these presentations is provided in **Section 3**.

As part of the analysis phase, the workshop objectives were clarified and agreed. In addition, the Pacific Highway Upgrade Program objectives and the specific project objectives were considered and confirmed. Participants' assumptions, issues and concerns were also assessed. The advantages and disadvantages of the two feasible route options were analysed to assist with the selection of the most appropriate route alignment. The results of this analysis are presented in **Sections 4 & 5**.

1.2 Key outcomes from the value management workshop

Through a process of analysis, discussion and assessment during the workshop there was general consensus by the group regarding the 'next steps'.

It was recommended that:

- Option A1 be investigated further, including consideration of a realignment closer to John Renshaw Drive;
- Option B2 be investigated further;
- Option A3 be investigated further subject to further consideration of environmental issues on Option B3 and social and community issues on Option A3.

In addition the group recommended that:

- Buffer zones to wetlands be maximised, where practicable;
- Further community consultation regarding interchange locations be undertaken, where appropriate;
- Adequate signage (safety and directional) be provided along the motorway;
- Rehabilitation of the wetlands at Hexham be incorporated into the construction works as part of an agreed package of mitigation measures;
- Appropriate habitat management plans be developed including compensatory offsets to minimise potential environmental impacts;
- The link between Options A1 and B2 be developed and refined;
- An Aboriginal archaeological assessment and a cultural heritage assessment be undertaken leading to the development of a plan of management;
- The development of this project be consistent with the Draft Lower Hunter Regional Planning Strategy;
- Motorway impacts on the community be minimised (e.g. noise, visual amenity, night lighting);
- Local materials be sourced and utilised as much as possible for project construction;
- Recycled materials be utilised as much as possible during construction;
- A high quality urban design and landscape vision for the project be adopted, incorporating the use of native plants endemic to the local area; and
- Sufficient corridor area be acquired to accommodate construction areas and the installation of mitigating devices / treatments.

An integral component of the workshop was the development and preparation of an action plan. The primary aim of this action plan is to provide as a mechanism to progress the project, address and resolve issues raised by the group and to conform with the objectives of the workshop. The action plan developed and agreed by the group is provided in **Section 8** of the report.

2 Introduction

2.1 Value management rationale

The VM process was implemented to provide the opportunity for a wide range of stakeholders to input into the route options development process for the F3 Freeway to Raymond Terrace Project. The workshop was held to maximise the capture of key stakeholder issues, discuss project concerns, distil community feedback from the Route Options Display and to 'input into' the decision making process in relation to the selection of a preferred route.

A structured approach was adopted to ensure that key issues were identified and that the route alignment recommended by the study team supports the achievement of the Pacific Highway Upgrade Program and project specific objectives. In addition, through consensus, the likelihood that the options recommended will address real needs and priorities to the greatest possible extent is greatly enhanced.

The session achieved an open and two-way exchange of information by enabling all participants to articulate concerns, explore options and appreciate the key issues associated with constructing the F3 Freeway to Raymond Terrace Project. The rationale underpinning the VMW was to assist in the selection of a route that achieves the best overall balance between functional, ecological, social, economic and engineering aspects.

2.2 Workshop methodology

It should be noted that preparation work prior to, and actions following the workshop, form an integral part of the process and have a major bearing on the results achieved.

The workshop was structured to maximise outcomes by highlighting the critical issues that need to be addressed in selecting the most appropriate alignment within the defined study area. Tierney Page Kirkland's (TPK) role was to independently facilitate and manage the VM process. Declan Tierney facilitated the session with technical support provided by Lucie Hedman.

Following on from the introductory presentations the workshop methodology confirmed the;

- *program and project objectives, and*

went on to revisit and confirm the;

- *challenges facing the project;*
- *assumptions / givens; and*
- *critical issues & concerns.*

finally the process enabled participants;

- *to have input to the option selection process, and*
- *to suggest ideas to improve the recommended option.*

The session concluded with the preparation of an action plan, which is included in **Section 8** of the report.

2.3 Value management workshop report

The information contained in this report has been distilled from the pre-workshop briefings and the data generated during the workshop itself. The report seeks to

provide an overview of the workshop process and a record of the data generated during each workshop session.

It is envisaged that this VMS report will assist the RTA in determining a route for further investigation the development of an engineering concept design and carrying out of an environmental impact assessment under the NSW *Environmental Planning and Assessment Act 1979*.

3 Information phase

3.1 Information gathering

The initial stage of the workshop was used to answer queries and address any critical aspects raised by participants about the project. It also provided an opportunity for the project team to update the participants on key project issues, the work undertaken to date and to present the two feasible route options on public display. This sharing of information was designed to refresh and / or heighten the understanding of the current status of the project. It provided a suitable platform to assist participants in recommending an option or combination of options to be investigated further.

At the end of each presentation, the participants were invited to discuss and raise issues / concerns. A summary of each presentation provided by members of the project team is provided in this section.

3.2 General background to the project – Mark Eastwood / Greg Baird

RTA representatives, Mark Eastwood and Greg Baird welcomed everyone to the session and thanked all the participants for taking the necessary time from their daily schedules to attend the workshop.

Following this presentation, the group summarised the key points as follows:

- The $2.2 Billion Pacific Highway Upgrade Program has been in place since 1996;
- Approximately 230km of the Pacific Highway from Hexham to the Queensland border is now a double-lane divided road. A further 235 km of new highway has been approved for construction or a preferred route has been identified with the final 230km of the highway in planning.
- The Commonwealth Government has increased its funding contribution to match that of the State (NSW) Government for the next three years. The Commonwealth Government funding contribution will be $160M for each of these years;
- There is a lot of pressure to accelerate the program;
- It could take up to 20 years to finalise the Pacific Highway Upgrade Program;
- A key aim associated with Pacific Highway Upgrade projects is to separate local and through traffic within the bounds of practicality;
- The most important objective is to reduce the number of fatal road crashes and improve road safety on the route;
- There are “no easy answers”;
- Issues associated with traffic noise in affected areas are being addressed;
- The project needs to cater for future growth in traffic volumes;
- Selection of the preferred route option needs to be finalised by June 2006;
- When the route alignment has been determined there will be greater certainty in terms of potential land use impacts within each Local Government Area; and
- There is a long lead-time associated with the procurement and delivery of Pacific Highway Upgrade projects due to the planning and development process, and extent of issues that need to be addressed.

3.3 Description of the study area - Ken Conway

Mr Conway described the study area in some detail. He highlighted the following:

- The project will result in the construction of a new bridge over the Hunter River;
- Environmental issues will present challenges for the project and a great deal of effort has already been expended to address these issues;
- The New England Highway intersects with the Pacific Highway within the study area;
- The project will cross major infrastructure items such as the Chichester Trunk Gravity Water Main, Main Northern Railway Line, New England Highway, overhead transmission lines and the existing Pacific Highway;
- The upgrade will provide a new two-lane dual carriageway with capacity to upgrade a dual three lane carriageway in the future;
- The project straddles three Local Government Areas (LGA); and
- It will be necessary to construct embankments / structures within and over floodplain areas.

3.4 Environmental issues - Ken Conway

Mr Conway continued to present environmental issues / challenges confronting the project. The following points were raised:

- There are several designated areas of nature conservation located within the study area;
    - Six gazetted SEPP 14 wetlands
    - Core /potential areas of Koala habitat
    - Hexham Wetlands Nature Reserve
    - Hunter Estuary Wetlands Ramsar site (located outside the study area)
    - Hunter River & associated mangrove areas and saltmarsh habitats
    - Five endangered Ecological Communities (ECC) listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act)
- Threatened species in the area are to be considered, including:
    - 10 & 8 threatened plant species listed on the TSC Act / EPBC Act
    - 48 & 12 threatened animal species, 28 migratory bird species
    - Potential habitat for a range of threatened flora/fauna species listed under the TSC Act / EPBC Act
- The study area traverses two Local Aboriginal Land Council (LALC) areas. Mindaribba (west) and Worimi (East);
- Some areas of high archaeological significance and cultural sensitivity exist within the study area such as Black Hill;
- Currently there are no native title claims in force in the study area;
- There are 18 Aboriginal heritage sites recorded on DEC's AHIMS within the study area;
- There are several non indigenous heritage listed items within and adjacent to the study area;

- Hydrology / water quality issues have been identified and considered as part of the route options development process;
- Potential severance of agricultural properties and urban areas is a key issue;
- It is important to mitigate the impacts on residential amenity (noise, air quality, visual amenity);
- Impacts on local business associated with the loss of passing trade is a topical issue in the community;
- Provision of pedestrian connections is a key issue for Option A3;
- The project will be assessed under the requirements of *NSW Environmental Planning and Assessment Act 1979* (EPA Act) & the *NSW Environmental Planning and Assessment Regulation* (Regulation 2000);
- Newcastle City Council, Maitland City Council and Port Stephens Council Local Government Areas (LGAs) are all contained (in part) within the study area;
- New provisions under Part 3A of the EP&A Act may need to be satisfied;
- Compliance with LEP zoning provisions for each LGA needs to be achieved;
- There is a potential requirement for integrated approvals to be obtained;
- The Hunter Region Botanic Gardens have been considered as part of project assessment and both route options have avoided direct contact with the gardens;
- Acid sulfate soil issues will be addressed; and
- Hexham Wetlands is a "no go" area.

3.5 Ground conditions – Willem Clasie

Mr Clasie summarised the ground conditions within the study area. The key points raised include:

- Ground conditions vary considerably across the study areas;
- Residual soils within the elevated topography of Black Hill are underlain by sedimentary bedrock at shallow depth and present no significant constraint to the engineering design;
- Deep soft alluvial soils within the Hunter River floodplain present a major constraint to the engineering design;
- Aeolian (wind deposited) sands of the Tomago Sand Bed formation are located to the south of the existing Pacific Highway, east of the Hunter River. This formation presents no significant constraint to the engineering design;
- Key issues associated with the construction of embankment across the floodplain include:
    - Significant settlement (up to 1-2 metres) that if untreated will occur over extended time periods (up to 100 years); and
    - Destabilisation of the embankment formation due to the weak floodplain foundation material.

- Mitigation measures for traversing soft soils on embankment include:
    - Minimise the length of floodplain traversed where soft soil deposits are shallowest, or cross the floodplain where soft soils are shallowest;
    - Provide vertical drainage in the soft soils to increase the time rate of settlement and soil strength;
    - Utilise lightweight embankment material; and
    - Construct the embankment well in advance (up to two years) of the general construction period
- A combination of the above mitigation measures is likely to be required; and
- Potential Acid Sulfate Soils (PASS) have been identified within the Hunter River floodplain and study area. An acid sulfate soils management plan will need to be developed prior to construction.

3.6 Flooding and hydrology – Willem Clasie

- The major watercourse within the study area is the Hunter River;
- Minor watercourses within the study area include Purgatory, Windeyers and Viney Creeks;
- Flood events inundate the majority of the study area. The populated areas of Motto Farm, Heatherbrae and Tarro and Black Hill are above the 1 in 100 year Average Return Interval (ARI) flood event;
- Typical flood levels for a 1 in 100 ARI flood event within the study area range from 3.9 to 4.5 m AHD, and for a 1 in 20 ARI, approximately 2.4 to 3.0 m AHD;
- The project will target immunity from the 1 in 20 ARI flood event as a minimum;
- Key issues associated with floodplain management include minimising changes in flood levels (as to not adversely affect landuse and property owners) flood velocities, inundation periods and flow paths;
- Mitigation measure will include the provision of long structures (1.5 to 2.5 km) to provide sufficient areas for the passage of flood waters and the use of culverts where required; and
- A numerical flood model will be utilised to determine the length and location of structures required.

3.7 Engineering issues - Simon Tsui

Mr Tsui outlined the key engineering issues that would need to be considered as part of the design of an upgrade with the study area. The key issues:

- Connection of the upgrade to existing communities and business through the local road network will need to be considered;
- Earthworks are an important consideration as a balance in cut and fill will be difficult;
- The potential fill deficit would be addressed by utilising local sources of fill materials where appropriate;
- Lightweight fill may be utilised in embankment construction along the proposed upgrade route to minimise settlement on the floodplain;

- Pre-loading of embankments on the floodplain may be also used to minimise deformation of the road pavement in the operational phase;
- Major structures should incorporate sound urban design principals e.g. bridges, retaining walls, interchanges, flood relief structures and special structures for crossing existing utilities and transport infrastructure;
- Constructability will be a critical issue particularly for the development of through town option;
- The cost of structures is up to seven times greater than earth embankment when crossing areas of floodplain;
- Managing utilities within the route corridor will be critical;
- The project will be designed to meet RTA design standards; and
- Adequate drainage must be provided along the alignment.

3.8 Community consultation - Sigrid Sanderson

Ms Sanderson described the community consultation program and range of activities that have been implemented / conducted since the project announcement in October 2004. The following key points were identified by the group during this presentation:

- An extensive consultation program is being implemented including a (toll free) Project Information Line, face to face interviews, a project website, community information sessions, community liaison group meetings and business survey;
- Two feasible route options have been placed on public exhibition between Friday 21 October 2005 and Friday 2 December 2005, seeking community feedback;
- A survey has been undertaken to identify the 'very important' social and community issues (87 returned forms, 12 written submissions from businesses / government agencies received to date);
- 54 per cent of returned feedback forms were received from the study area, with 28 per cent from the broader area. The remaining feedback forms were from either areas outside the broader area, or unknown;
- Road safety has emerged as the number one key issue;
- General issues raised included impacts on the floodplains, terrestrial flora and fauna, noise and vibration, timing of the project, impacts on businesses and long term residential planning at Motto Farm and Heatherbrae;
- Appropriate roadside signage advising the travelling public on the local highway services available at Motto Farm / Heatherbrae will be required;
- From the community feedback received the majority of preferences were for either the full Option A (A1 A2 A3) or full Option B (B1 B2 B3), however overall no clear option preference was demonstrated;
- The majority of issues raised by the community are related to Section 3 (i.e. Option A3/B3); and
- For commercial businesses located at Motto Farm / Heatherbrae, highway frontage and access is an important issue.

3.9 Traffic issues - Sigrid Sanderson

Ms Sanderson went on to outline the key traffic issues associated with the project. The outcomes generated from this presentation are described below:

- Approximately 28,000 vehicles per day were recorded at John Renshaw Drive and 49,000 at New England Highway;
- Peaks traffic movements occur during the school holiday periods;
- The existing road network will continue to be congested even after this upgrade is constructed;
- Statistics show 184 crashes in 2001-2003, with 3 fatalities, 82 injuries (128 casualties) – data obtained from NSW Police records;
- There is a high forecast growth rate for traffic to 2009 – 16 per cent to 19 per cent overall and up to 26 per cent for heavy vehicles;
- It is a 'given' for both options that there will be no change to the current road network at John Renshaw Drive, New England Highway and the Pacific Highway between Hexham and Motto Farm;
- There is still work to be done on the modelling of traffic flows and volumes;
- An economic review of both options, following the RTA's economic guidelines, has been undertaken – both options produced a Benefit Cost Ratios (BCR) between 1.0 and 2.0 – no major differences between either option; and
- 15 per cent of traffic on the F3 Freeway travelled north of Raymond Terrace on the day of the traffic study / count was undertaken.

3.10 Route options summary - Ken Conway

Mr Conway summarised the key points in relation to the two feasible options recently displayed for community feedback. The group listed the following points following his presentation.

- Key project development stages includes:
    - Project familiarisation
    - Route options development
    - Preliminary engineering concept design
    - Environmental impact assessment
- Project commencement date was October 2004;
- The overall project program to the EIA display is 100 weeks;
- Three options were initially identified and short-listed – A: Central Route, B: southern route, C: northern route. Option C was eliminated due to impacts on flooding, area of deep soft soils to be crossed, visual amenity issues and noise impacts on residential areas at Motto Farm and Heatherbrae;
- Two feasible route options were identified (i.e. Options A & B), both of which were divided into 3 sections (Section 1, 2 and 3 in the west, central and eastern parts of the study area). The sections can be linked together to form a number of different alignment alternatives;
- Currently the preliminary environmental impacts assessed as part of the route options development process differ for each option; and
- B3 has potential impacts on the Tomago Groundwater Management Area which contributes (in part) to the potable water supply for the Newcastle area.

4 Analysis phase

The analysis phase of the VMS process was used to gain an understanding of the underlying issues and constraints affecting the two feasible route options for the F3 freeway to Raymond Terrace Project. It enabled the workshop participants to clarify objectives, express concerns and make suggestions regarding possible directions.

4.1 Value management workshop objectives

It is important that the workshop participants reach consensus regarding the purpose of the VMW and the desired outcomes. Preliminary objectives were identified prior to the session and these were discussed with the group to reach their agreement.

The participants discussed the reasons for conducting the workshop and the outcomes that were expected from the process. The objectives adopted were as follows:

- To confirm the Pacific Highway Upgrade Program and project specific objectives applicable to the F3 and Raymond Terrace project;
- To update participants on current status of the project;
- To introduce the two feasible route options under consideration;
- To test stakeholders' assumptions;
- To identify issues and concerns;
- To agree a set of selection criteria against which to evaluate the two feasible route options;
- To weight the agreed selection criteria;
- To assess the relative merits of the options against the weighted selection criteria;
- To generate ideas on how each route option could be improved;
- To develop a set of recommendations / agreements on which option or combination of options should be selected for further consideration and refinement; and
- To develop an action plan as the mechanism to progress the project, resolve key issues, achieve project milestones and implement the workshop outcomes.

4.2 Program objectives

The group was introduced to the overall Pacific Highway Upgrade Program objectives which act as the primary guidance for development / upgrading of the highway between Hexham and the Queensland border. It was recognised that these objectives had been determined as part of high-level policy initiatives and the ability to amend these objectives was outside the scope of the VMS.

The following objectives underpin the overall Pacific Highway Upgrade Program.

- Functional
  - To significantly reduce road accidents and injuries.
  - To reduce travel times and freight transport costs.
- Social
  - To develop a route that involves the community and considers their interests.
  - To select a preferred route that supports economic development.
- Environmental
  - To develop a preferred route in accordance with Ecologically Sustainable Development (ESD) principles.
- Economic
  - To maximise the effectiveness of expenditure.

It was noted that the term 'community' refers to the broader community i.e. both local and regional road users.

4.3 Project objectives

In this segment of the workshop, the participants revisited and discussed the objectives underpinning the project. Common and agreed objectives greatly enhance the likelihood that the final outcome will reflect real needs and requirements. Following lengthy discussion it was agreed that the objectives driving the project development are as follows:

Broad Objective

- To tie in with the overall program objectives for the upgrading of the Pacific Highway.

Specific Objectives

- To develop a route with a 110 km/h design speed for the vertical / horizontal alignments and controlled access;
- To maximise the use of the existing road corridor;
- To connect the F3 Freeway with the Pacific Highway in order to separate local and through traffic;
- To achieve flood immunity for a 1:20 year flood event;
- To ensure no worsening effect on existing flood behaviour and patterns;
- To minimise any potential adverse impacts on the environment (eg noise and, vibration, visual amenity, threatened flora/fauna species, water quality, drainage);
- To provide a route that supports local economic development;
- To minimise any adverse impacts on cultural heritage;
- To develop a route in accordance with ESD principles as defined under the EP&A Regulation;
- To maximise community satisfaction;
- To ensure the feasibility of any mitigation measures proposed;
- To maintain access for the local community;

- To develop a route that satisfies the RTA design guidelines and other legislative requirements; and
- To develop a route that complements existing and proposed land use

Outcomes sought

- Reduced travel and freight costs;
- Reduced road accidents and injuries; and
- Community involvement and consideration of their interests.

4.4 ESD Definition

In the context of the project objectives developed by the participants, it was necessary to define the ESD principles and raise awareness. The adopted ESD definition for this project is provided under Schedule 2 of the EP&A Regulation:

Development that meets the needs of the current generation without compromising the ability of future generations to meet their needs.

This encompasses the following four main principles:

- *Intergenerational equity;*
- *Precautionary principle;*
- *Conservation of biodiversity and ecological integrity; and*
- *Improved valuation, pricing and incentive mechanisms.*

4.5 Problems the project will address

Key issues and problems identified by the group that if resolved will contribute to the success of the project included:

- Establishing the most appropriate connection points at the F3 Freeway and north of Heatherbrae, and the interchange arrangements;
- The new bridge structure over the Hunter River and other infrastructure elements;
- Identification and management of public utilities;
- Soft soils and acid sulfate conditions;
- Flood Management;
- Identifying suitable fill material in the required volumes to implement the road design (e.g. current shortfall of fill);
- Avoiding sensitive wetlands;
- Working with the affected communities in Black Hill, Heatherbrae, Motto Farm, Tarro and Hexham;
- Management of cultural heritage issues;
- Minimising impacts on threatened flora and fauna species;
- Traffic management (particularly at interchanges and with the existing road network);
- Consideration of access roads, maintaining access to and from adjacent properties;
- Making allowances for future utility upgrades;
- Catering for residential and industrial growth in the Lower Hunter region;

- Addressing future development plans within and surrounding the study area;
- Minimising impacts on existing commercial fisheries;
- Management of legislative requirements and the approvals process;
- Management of aquatic habitats;
- Protecting native vegetation communities;
- Avoiding remnant bushland;
- Maintaining ecological function across the landscape;
- Minimising sterilisation of mineral resources;
- Minimising noise and vibration;
- Dealing with the community's lack of understanding and expectations of the project, both locally and regionally;
- Dealing with suspicion;
- Misinformation;
- Managing the potential impacts in special areas (eg water supply);
- Contaminated lands or river beds;
- Mining leases;
- Un-sewered land between Hexham and Heatherbrae (including Tarro);
- Achieving an appropriate Benefit Cost Ratio (BCR) and value for money;
- Possible mine subsidence issues;
- Protecting water quality; and
- Transmission line easements.

4.6 Assumptions

In developing any initiative it is necessary to make assumptions. Some of these are sound while others can be incorrect or ambiguous.

The group was invited to list any assumptions regarding the route options. Each item was then assessed in the light of current knowledge and prerogatives. The assumptions were categorised as being ***a Fact***, ***a Working Assumption or Desirable***. The items identified by the stakeholders are sorted into these categories below.

Facts

- Each of the options being considered has differing environmental impacts;
- Pedestrians, cyclists and horse riders will be considered as part of this project (not necessarily on roadway);
- Greenacres farm at Tarro has asbestos contamination;
- Significant regional environmental, commercial and industrial lands exist along the route;
- Hexham Wetlands is of regional, state, national and international environmental significance;
- The F3 Freeway is an internationally recognised scenic route near the Hawkesbury River crossing.

- There will be a net loss of endangered ecological communities;
- There will be a net loss of threatened species habitats;
- RTA will investigate opportunities for co-location of infrastructure, eg sewer / electricity (NSW Premier's Department);
- The area around Masonite Road interchange will be redeveloped for light industrial, with or without this project;
- The project team will identify the future plans and strategies that are in train with the affected local councils and State (NSW) Government Departments;
- Collaboration with local councils to facilitate application of the NSW Government Flood Policy and Manual as they relate to the project will continue;
- The road will be developed as a Motorway (i.e. four-lane divided carriageway with the capacity to upgrade to six-lane divided carriageway) with controlled access;
- There will be interchanges at both ends of the upgrade;
- Local Government and the community will be fully briefed on the project as it evolves;
- Property acquisition will be required along the upgrade alignment;
- Environmental mitigation measures will be included on this project;
- Both options meet minimum safety requirements;
- There will be impacts on aboriginal cultural sites;
- There will be impacts on agricultural land;
- The project will impact on one of the last two remaining areas of remnant vegetation fringing the Hexham Wetlands;
- There will be a new crossing of the Hunter River;
- The road design, safety and urban design criteria will be met;
- The upgrade is to achieve flood immunity for a minimum 1 in 20 ARI flood event on at least 1 carriageway;
- A 110 km/hr motorway standard with controlled access will be delivered
- Increasing the speed to 110 km/hr will not exacerbate existing road safety hazards;
- The Motorway will have the capacity to accommodate increased volumes of heavy vehicles, visitor and commuter traffic;
- Noise mitigation will be provided, consistent with relevant NSW Government Policy requirements;
- B2 was the preferred option identified by the Beresfield, Tarro and Hexham Community Forum; and
- Sufficient wildlife passages across the upgrade will be provided at appropriate locations.

Working assumptions

- Compensatory offsets will be provided as per RTA policy;
- Future population forecasts in the Lower Hunter will not be surpassed;

- It will be possible to maintain the utility of ground water aquifers;
- Environmental mitigation measures will function as designed;
- Environmental impacts will not be reversible;
- Cumulative environmental impacts will be considered when developing mitigation measures;
- There will be no major grade changes adjacent to residential areas;
- Measures will be implemented to minimise potential impacts on the Hunter River High School;
- Suitable access to local communities will be provided;
- All steps will be taken to minimise effects on local businesses; and
- There is a possibility of Part 3A of the EP&A Act 1979 being invoked (changes to the EP&A Act as to how projects are assessed).

Questionable

- It will be possible to provide stock passage across the route;
- The anchorage points for 'stop revive / survive' are known;
- Adequate rest areas will be provided; and
- There will be a net loss of high conservation value old growth forest;

Incorrect

- The project will not look at using the existing roads;
- People will be dead before emergency services vehicles can reach them;
- The project is irresponsible with regard to 'stop revive / survive' principles;
- All properties on the wetlands will be flooded out after this project is implemented;
- This project will integrate with the F3 Freeway to Branxton link road;
- There will be no impact on traffic patterns following construction;
- The last two areas of remnant vegetated areas remaining on the fringe of Hexham Wetlands will be protected; and

4.7 Issues and concerns

The participants were asked to consider any further concerns they held regarding the F3 to Raymond Terrace Upgrade project. The items raised are highlighted below:

- Inadequate signage / directions will be provided;
- Street lighting impacting on urban areas (too bright);
- Fish passage may not be maintained during construction;
- The spread of noxious weeds to and from Hexham Wetlands during construction (water hyacinth and alligator weed);
- Construction access;
- Effect on local construction materials (e.g. quarries);
- Insufficient resources;

- Inability to identify an appropriate location for site compound;
- Minimising impacts of grade separated interchanges (footprint); and
- Effectiveness of environmental mitigation measures may not be monitored.

4.8 Option Selection Criteria

Since a workshop objective was the recommendation of a single route option for further investigation, the workshop participants discussed the criteria that could be used to help separate the options that are available. The group agreed that the selection criteria should support the achievement of the project objectives articulated earlier in the workshop.

It was agreed that the following attributes should be considered in assessing the relative performance of the available options.

It was decided not to include cost as a criterion so that the options could be evaluated in terms of their functionality and performance. Notwithstanding this, the availability of funding and affordability will be important determinants in a decision on a preferred route.

The group discussed the various measures that could be employed to evaluate the various options. The following represents the group's initial attempt at developing appropriate criteria;

- Impact on agricultural land;
- Flooding impact;
- Community severance;
- Visual impact;
- Noise impacts;
- Constructability;
- Connectivity;
- Reduced travel times & delay;
- Maximise the use of existing road reserve;
- Compliance with ESD principles; and
- Complementary to land use.

The outcomes of the group discussion, was that these criteria were too general. A set of evaluation criteria developed by Maunsell and included in the Route Options Development Report that took into account the Pacific Highway Upgrade Program and project specific objectives, formed the basis to develop a more tailored set of criteria. The following criteria were established by the group to compare the two feasible route options:

Item	*Criteria*
Location of interchanges	• *Location of interchanges*
Use of existing road reserve	• *Area of additional land to be acquired beyond the existing road reserve boundaries*
Soft soils / flood plain	• *Length of road through soft soil / flood plain areas*
In accord with ESD principles	• *Area of native vegetation loss* • *Area of EEC and threatened species habitat loss* • *Area of SEPP 14 wetland loss* • *Extent of cultural heritage sensitive areas affected(km)* • *Extent of direct impact on waterways and potential for water quality impacts (number of waterway crossings, length of bridges)* • *Number of wildlife corridors crossed* • *Direct impact on Tomago Groundwater Management Area (GMA)* • *Number of noise affected properties* • *Number of Commonwealth listed species (matters of NES) present*
Complementary with land use	• *Extent and nature of impacts on existing businesses* • *Length of road through visually sensitive areas* • *Extent and nature of agricultural businesses affected (length)*
Community interests	• *Area of land to be acquired from non government property owners* • *Ability for key local movements to be maintained in a convenient direct manner (connectivity)* • *Ability for route not to obstruct major view corridors* • *Number of residential dwellings potentially affected by acquisition* • *Number of commercial buildings potentially affected by acquisition*
Constructability	• *Potential for impacts on the community associated with construction activities*

4.9 Criteria weighting

When the criteria had been agreed, the group decided that they should be weighted in terms of their comparative importance. The approach involved assessing the criteria with relative to each other with a numerical value between one and 100.

The criteria that the group felt to be the most important was given a high score and the others were weighted relative to this. When the exercise was complete the "first cut" weightings were discussed at some length and modified in the light of views expressed.

Weightings were divided by ten to reduce the size of the numbers generated in the analysis to follow. The result was a weight between one and ten to one decimal place.

The criteria were categorised as being either Community (C), Environmental (E) or Technical (T). The final weighted list was as follows:

Selection Criteria	Weighting	Category
Extent and nature of impacts on existing businesses	80	C
Ability for key local movements to be maintained in a convenient direct manner (connectivity)	80	C
Regional connectivity	80	C
Number of residential dwellings potentially affected by acquisition	75	C
Number of commercial buildings potentially affected by acquisition	75	C
Number of noise affected properties	75	C
Length of road through visually sensitive areas	60	C
Ability for route not to obstruct major view corridors	60	C
Visibility of businesses from highway	60	C
Extent and nature of agricultural businesses affected (length)	55	C
Potential for impacts on the community associated with construction activities	50	C
Direct impact on Tomago GMA	30	E
Area of SEPP 14 wetland loss	80	E
Extent of cultural heritage sensitive areas affected(km)	80	E
Area of EEC and threatened species habitat loss	80	E
Area of native vegetation loss	75	E
Number of Commonwealth listed species (matters of NES) present	75	E
Number of wildlife corridors crossed	70	E
Extent of direct impact on waterways and potential for water quality impacts (qualitative assessment)	65	E
Length of road through visually sensitive areas	60	T
Potential for impacts associated with construction activities	50	T
Extent of direct impact on waterways and potential for water quality impacts (number of waterway crossings, length of bridges)	65	T
Length of road through soft soil / flood plain areas	80	T

4.10 Rating the available options

The participants considered the two options for each of the three sections of the upgrade i.e. A1 and B1, A2 and B2, A3 and B3. The goal was to recommend the alignments that the group felt, on balance, were the most appropriate for each section. The advantages and disadvantages of each were analysed to assist in arriving at conclusions. The results were as follows:

4.10.1 Section 1 - Options A1 & B1

	OPTIONS COMPARED				
OPTION EVALUATION CRITERIA	WEIGHTING	ITEM RATING	OPTION A1	ITEM RATING	OPTION B1
Extent and nature of impacts on existing businesses	8	0	0	0	0
Ability for key local movements to be maintained in a convenient direct manner (connectivity)	8	0	0	0	0
Regional connectivity	8	0	0	0	0
Number of residential dwellings potentially affected by acquisition	7.5	0	0	0	0
Number of commercial buildings potentially affected by acquisition	7.5	0	0	0	0
Number of noise affected properties	7.5	8	60	6	45
Length of road through visually sensitive areas	6	8	48	6	36
Ability for route not to obstruct major view corridors	6	1	6	0	0
Visibility of businesses from highway	6	0	0	0	0
Extent and nature of agricultural businesses affected (length)	5.5	2	11	1	5.5
Potential for impacts on the community associated with construction activities	5	0	0	0	0
Direct impact on Tomago GMA	5	0	0	0	0
Area of SEPP 14 wetland loss	8	0	0	0	0
Extent of cultural heritage sensitive areas affected (km)	8	2	16	1	8
Area of EEC and threatened species habitat loss	8	2	16	3	24
Area of native vegetation loss	7.5	1	7.5	2	15
Number of Commonwealth listed species (matters of NES) present	7.5	0	0	0	0
Number of wildlife corridors crossed	7	2	14	1	7
Extent of direct impact on waterways and potential for water quality impacts (qualitative assessment)	6.5	0	0	0	0
Extent of direct impact on waterways and potential for water quality impacts (number of waterway crossings, length of bridges)	6.5	0	0	0	0
Length of road through soft soil	8	7	56	5	40
Length of road through flood plain areas	8	8	64	6	48
TOTALS			**298.5**		**228.5**

Option A1 achieved a higher level of performance than Option B1. The group discussed these findings in some detail. It was decided to undertake qualitative analysis by looking at each of the advantages and disadvantages of Option A1 compared with Option B1.

4.10.2 Option A1 – Advantages and disadvantages

Advantages

- Further away from Hexham Wetlands,
- Further away from Black Hill resident,
- Less fragmentation of wildlife corridor,
- Greater volume of cut material produced – longer cutting,
- Visually further from Black Hill community,
- Better integration with existing road network, and
- Noise generators aggregated.

Disadvantages

- More constrained for interchange options, and
- Marginally closer to Glenrowan.

In view of the above and following supplementary discussions regarding the merits of each option though this section, the group selected Option A1 as their preferred alignment within this section of the upgrade.

4.10.3 Section 2 - Options A2 & B2

	OPTIONS COMPARED				
OPTION EVALUATION CRITERIA	WEIGHTING	ITEM RATING	OPTION A2	ITEM RATING	OPTION B2
Extent and nature of impacts on existing businesses	8	3	24	5	40
Ability for key local movements to be maintained in a convenient direct manner (connectivity)	8	4	32	8	64
Regional connectivity	8	5	40	8	64
Number of residential dwellings potentially affected by acquisition	7.5	6	45	4	30
Number of commercial buildings potentially affected by acquisition	7.5	5	37.5	3	22.5
Number of noise affected properties	7.5	4	30	3	22.5
Length of road through visually sensitive areas	6	3	18	8	48
Ability for route not to obstruct major view corridors	6	3	18	8	48
Visibility of businesses from highway	6	1	6	3	18
Extent and nature of agricultural businesses affected (length)	5.5	1	5.5	2	11
Potential for impacts on the community associated with construction activities	5	4	20	2	10
Direct impact on Tomago GMA	5	0	0	0	0
Area of SEPP 14 wetland loss	8	4	32	3	24
Extent of cultural heritage sensitive areas affected (km)	8	2	16	4	32
Area of EEC and threatened species habitat loss	8	1	8	5	40
Area of native vegetation loss	7.5	3	22.5	4	30
Number of Commonwealth listed species (matters of NES) present	7.5	0	0	0	0
Number of wildlife corridors crossed	7	3	21	4	28
Extent of direct impact on waterways and potential for water quality impacts (qualitative assessment)	6.5	3	19.5	6	39
Extent of direct impact on waterways and potential for water quality impacts (number of waterway crossings, length of bridges)	6.5	4	26	6	39
Length of road through soft soil	8	4	32	7	56
Length of road through flood plain areas	8	4	32	8	64
TOTALS			**485**		**730**

This exercise indicated that Option B2 scored higher the Option A2 in relation to the criteria established. In the interest of consistency however, it was decided to list the advantages and disadvantages associated with Option B2 when compared with A2.

4.10.4 Option B2 – Advantages and disadvantages

Advantages

- Crosses less of flood plain;
- Crosses less of soft soil;
- Largely follows existing transport corridor;
- Combines the major infrastructure corridor and Hunter River crossings with one structure;
- Less native vegetation loss;
- Easier to stage construction;
- Better connectivity;
- Better visual aspects;
- Less agricultural land disturbance;
- Less environmental impact;
- Lower impact on ecological communities;
- Provides better access to Tomago and surrounding area;
- Improves access to the airport;
- Less potential for impacts on Aboriginal heritage; and
- Hunter crossing major structures contained within the same visual landscape.

Disadvantages

- Slightly greater impact on SEPP 14 wetland; and
- Business / land acquisition required

In view of the above the participants selected Option B2 in preference over Option A2 for this section of the upgrade.

4.10.5 Section 3 - Options A3 & B3

	OPTIONS COMPARED				
OPTION EVALUATION CRITERIA	WEIGHTING	ITEM RATING	OPTION A3	ITEM RATING	OPTION B3
Extent and nature of impacts on existing businesses	8	6	48	4	32
Ability for key local movements to be maintained in a convenient direct manner (connectivity)	8	4	32	6	48
Regional connectivity	8	0	0	0	0
Number of residential dwellings potentially affected by acquisition	7.5	3	22.5	6	45
Number of commercial buildings potentially affected by acquisition	7.5	4	30	3	22.5
Number of noise affected properties	7.5	4	30	6	45
Length of road through visually sensitive areas	6	6	36	4	24
Ability for route not to obstruct major view corridors	6	4	24	6	36
Visibility of businesses from upgrade route	6	7	42	1	6
Extent and nature of agricultural businesses affected (length)	5.5	0	0	0	0
Potential for impacts on the community associated with construction activities	5	1	5	7	35
Direct impact on Tomago GMA	5	6	30	2	10
Area of SEPP 14 wetland loss	8	0	0	0	0
Extent of cultural heritage sensitive areas affected (km)	8	5	40	3	24
Area of EEC and threatened species habitat loss	8	9	72	1	8
Area of native vegetation loss	7.5	9	67.5	1	7.5
Number of Commonwealth listed species (matters of NES) present	7.5	3	22.5	2	15
Number of wildlife corridors crossed	7	4	28	2	14
Extent of direct impact on waterways and potential for water quality impacts (qualitative assessment)	6.5	4	26	2	13
Extent of direct impact on waterways and potential for water quality impacts (number of waterway crossings, length of bridges)	6.5	2	13	1	6.5
Length of road through soft soil	8	2	16	1	8
Length of road through flood plain areas	8	0	0	0	0
TOTALS			**584.5**		**399.5**

This exercise indicated Option A3 scored higher than Options B3, indicating Option A3 was favourable over Option B3. However, discussion revealed the options to be closer than the raw numbers indicated. The group undertook qualitative analysis in relation to the advantages and disadvantages of Option A3 when compared with B3 as follows:

4.10.6 Option A3 – Advantages and disadvantages

Advantages

- Infrastructure consolidated;
- Less water quality impacts;
- Less impact on threatened species and migratory species;
- Greater visibility for business community;
- No new traffic noise sources;
- Lower risk to cultural heritage;
- Potential opportunity for streetscape improvement;
- Maintains more wildlife corridors;
- Less mitigation required for wildlife; and
- Less loss of vegetation.

Disadvantages

- Difficult to build;
- Extensive service relocation;
- Community severance, loss of connectivity;
- Greater number of individual people affected;
- Significant impact on community;
- Greater exposure to traffic noise;
- Greater noise / visual mitigation requirements; and
- Freeway environment through Heatherbrae.

In view of the above participants identified Option A3 as their preferred alignment through this section subject to further investigations on environmental impacts for Option B3 and Social and Community impacts on Option B3.

4.11 Technical, Community Environmental & Criteria Assessment for Section 3

The assignment of rankings and scoring of each option was queried by several participants, particularly in Section 3. As a result an assessment of the better performing option under the Technical, Community and Environmental criteria was undertaken for Option A3 and B3. The results were as follows:

4.11.1 Technical (five criteria)

			OPTIONS COMPARED		
OPTION EVALUATION CRITERIA	WEIGHTING	ITEM RATING	OPTION A3	ITEM RATING	OPTION B3
Length of road through soft soils	8	2	16	1	8
Length of road through flood plain areas	8	0	0	0	6.5
Extent of direct impact on waterways and potential for water quality impacts (number of waterway crossings, length of bridges)	6.5	2	13	1	24
Length of road through visually sensitive areas	6	6	36	4	35
Potential for impacts associated with construction activities	5	1	5	7	35
TOTALS			**70**		**108.5**

4.11.2 Community (eleven criteria))

OPTION EVALUATION CRITERIA	OPTIONS COMPARED				
	WEIGHTING	ITEM RATING	OPTION A3	ITEM RATING	OPTION B3
Extent and nature of impacts on existing businesses	8	6	48	4	32
Ability for key local movements to be maintained in a convenient direct manner (connectivity)	8	4	32	6	48
Regional connectivity	8	0	0	0	0
Number of residential dwellings potentially affected by acquisition	7.5	3	22.5	6	45
Number of commercial buildings potentially affected by acquisition	7.5	4	30	3	22.5
Number of noise affected properties	7.5	4	30	6	45
Length of road through visually sensitive areas	6	6	36	4	24
Ability for route not to obstruct major view corridors	6	4	24	6	36
Visibility of businesses from highway	6	7	42	1	6
Extent and nature of agricultural businesses affected (length)	5.5	0	0	0	0
Potential for impacts on the community associated with construction activities	5	1	5	7	35
TOTALS			**269.5**		**293.5**

4.11.3 Environmental (eight criteria)

OPTION EVALUATION CRITERIA	OPTIONS COMPARED				
	WEIGHTING	ITEM RATING	OPTION A3	ITEM RATING	OPTION B3
Area of SEPP 14 wetland loss	8	0	0	0	0
Extent of cultural heritage sensitive areas affected(km)	8	5	40	3	24
Area of EEC and threatened species habitat loss	8	9	72	1	8
Area of native vegetation loss	7.5	9	67.5	1	7.5
Number of Commonwealth listed species (matters of NES) present	7.5	3	22.5	2	15
Number of wildlife corridors crossed	7	4	28	2	14
Extent of direct impact on waterways and potential for water quality impacts (qualitative assessment)	6.5	4	26	2	13
Direct impact on Tomago GMA	3	6	18	2	6
TOTALS			**274**		**87.5**

4.11.4 Outcome

Option B3 scored marginally higher that A3 on the Community and Technical criteria, indicating that Option B3 performed slightly better than Option A3 under these criteria.

Option A3 scored higher than Option B3, indicating Option A3 performed better than option B3 under this criterion.

4.12 Current 'ball park' cost estimates

The group requested some preliminary information regarding the relative cost of the various options. The following information was tabled:

- Section 1 – both options are approximately the same in terms of cost;
- Section 2 – B2 is about 25% less than A2; and
- Section 3 – A3 is approximately 10% more expensive than B3.

It was pointed out that since no design exists for either alignment, it was not possible to be more definitive in terms of cost.

5 Creative phase

5.1 Idea generation

Sections 3 and 4 above summarise the outcomes of the Information and Analysis phases of the Value Management process. The understandings that were developed and the information shared created the platform for making sensible recommendations in respect of the most appropriate route alignment to be subject to further investigation. The information generated also facilitated the generation of ideas aimed at improving the options supported by the group, in terms of optimising and balancing the engineering, economic, traffic, social and environmental issues.

The group was encouraged to come up with ideas as to how problematic issues could be resolved or how shortcomings in the recommended alignments could be addressed.

The approach involved recording all ideas, irrespective as to whether these would be implemented or otherwise. In other words, during this phase of the process, the purpose was to collect as many ideas as possible without subjecting them to any form of screening or judgement. This occurred in the next segment of the workshop, the Judgement Phase.

The ideas generated together with the group's assessment of each are included in **Section 6**.

6 Judgement phase

6.1 Judgement of ideas

The ideas for improving the recommended route alignment generated in the Creative Phase, were assessed by the group in terms of practicality, viability and cost-effectiveness. Each idea was discussed and rated using the following categories:

- Implement;
- Good Idea - needs further investigation; or
- Not Practical.

In the interest of clarity, the ideas have been grouped according to these ratings.

"CAN WE….?"	Rating
Maximise buffers to wet lands	*Implement*
Undertake further community consultation regarding interchange locations	*Implement*
Ensure adequate safety signage is provided along the motorway	*Implement*
Rehabilitate the wetlands at Hexham as part of the construction project as part of an agreed mitigation measures package	*Implement*
Develop appropriate habitat management plans and provide compensatory offsets	*Implement*
Refine the link between A1 and B2	*Implement*
Undertake an Aboriginal archaeological assessment and a cultural assessment leading to a plan of management	*Implement*
Ensure the development of this project is consistent with the Draft Lower Hunter Regional Planning Strategy	*Implement*
Ensure motorway impacts on community are minimised (eg noise, visual, night lighting)	*Implement*
Utilise local materials as much as possible for this project	*Implement*
Utilise recycled materials as much as possible for this project	*Implement*
Incorporate a high quality urban design and landscape vision (including indigenous native plants)	*Implement*
Ensure sufficient corridor is acquired to install all required mitigation measures	*Implement*

"CAN WE….?"	Rating
Develop a route closer to John Renshaw Drive than A1 and the beginning of B2 with a view to minimising the impact on the bush block and Hexham Wetlands	*Investigate*
Separate the interchange for A1 from one single central footprint to two separate interchanges with a view to minimising the impact on the bush block	*Investigate*
Have an interchange at the junction of B2 at the New England Highway	*Investigate*
Ensure adequate business signage is provided along the motorway	*Investigate*

"CAN WE….?"	Rating
Look at the upgrading project holistically to tie in with the total project (particularly implement changes in signage policy and providing suitable access to highway services)	*Investigate*
Develop Habitat Management Plans and provide compensatory offsets in advance of impacts and in regional corridors	*Investigate*
Provide like-compensatory offsets	*Investigate*
Work with the Catchment Management Authority to understand their long term strategy for the Hexham Wetlands	*Investigate*
Work with the Planning Authorities on the town planning of Heatherbrae-Tomago Sand Bed areas	*Investigate*
Connect the New England Highway on to the new motorway	*Investigate*
Minimise the environmental impact of the B3 option	*Investigate*
Ameliorate the community impact of A3	*Investigate*
Consider the acquisition of land along the Hunter River for potential saltmarsh rehabilitation	*Investigate*
Minimise amount of noise walls required in the Heatherbrae area to ensure businesses remain visible	*Investigate*
Accommodate natural ecological function at the landscape scale as well as flood waters when developing the project design	*Investigate*
Seek clean source of fill to avoid weed infestation	*Investigate*

"CAN WE….?"	Rating
Tunnel under the ironbark forest	*Not practical*

7 Value management workshop outcomes

Through a process of analysis, discussion and assessment during the workshop there was general consensus by the group regarding the 'next steps'.

It was recommended that:

- Option A1 be investigated further, including consideration of a realignment closer to John Renshaw Drive;
- Option B2 be investigated further;
- Option A3 be investigated further subject to further consideration of environmental issues on Option B3 and social and community issues on Option A3.

In addition the group recommended that:

- Buffer zones to wetlands be maximised, where practicable;
- Further community consultation regarding interchange locations be undertaken, where appropriate;
- Adequate signage (safety and directional) be provided along the motorway;
- Rehabilitation of the wetlands at Hexham be incorporated into the construction works as part of an agreed package of mitigation measures;
- Appropriate habitat management plans be developed including compensatory offsets to minimise potential environmental impacts;
- The link between Options A1 and B2 be developed and refined;
- An Aboriginal archaeological assessment and a cultural heritage assessment be undertaken leading to the development of a plan of management;
- The development of this project be consistent with the Draft Lower Hunter Regional Planning Strategy;
- Motorway impacts on the community be minimised (e.g. noise, visual amenity, night lighting);
- Local materials be sourced and utilised as much as possible for project construction;
- Recycled materials be utilise as much as possible during construction;
- A high quality urban design and landscape vision for the project be adopted, incorporating the use of native plants endemic to the local area; and
- Sufficient corridor area be acquired to accommodate construction areas and the installation of mitigating devices / treatments.

8 Action plan

An important task undertaken in bringing the Value Management workshop to a conclusion was the preparation of an Action Plan intended to advance the project and to realise the objectives of the session.

The items included were developed from issues raised, from discussions within the group and from the recommendations made. The action plan was structured to establish the activities that require finalisation in order to achieve the milestones mentioned earlier in the workshop. The Action Plan generated was as follows:

No	*Action*	*Who*	*By When*
1	Investigate the development of a route option closer to John Renshaw Drive than outlined in Option A1. The objective being to minimise the impact on the native vegetation at Black Hill and Hexham Wetlands.	RTA / MAPL	Design Development
2	Investigate the practicality of separating the interchange in Option A1 from one single central footprint, to two separate interchanges – the purpose is to minimise the impact on the native vegetation communities at Black Hill.	RTA / MAPL	Design Development
3	Investigate the possibility of having an interchange at the junction of Option B2 at the New England Highway.	RTA / MAPL	Design Development
4	Review RTA business and advisory signage policy as it relates to this project.	RTA / Newcastle Road Freight	Design Development
5	Investigate the merits of providing compensatory offsets in advance of impacts generally and in regional corridors.	RTA / DEC / DPI	Design Development
6	Investigate the extent to which like-compensatory offsets can be provided.	RTA / DEC / DPI	Design Development
7	Liaise with Catchment Management Authority regarding catchment management action plan targets and the Hexham Wetlands rehabilitation project.	RTA / CMA	Design Development
8	Liaise with Port Stephens Council, Hunter Water Corporation and the RLMC regarding land use in Heatherbrae - Tomago Sand Beds.	RTA / MAPL	Design Development
9	Investigate options for connecting the New England Highway to the ’new’ upgrade route.	RTA / MAPL	Design Development
10	Investigate opportunities to acquire the land between Hexham Bridge and the trotting track for saltmarsh rehabilitation.	RTA	Design Development

No	*Action*	*Who*	*By When*
11	Investigate the possible locations, type and length of noise mitigation devices in the Motto Farm / Heatherbrae area.	RTA / MAPL	Design Development
12	Investigate suitable urban design measures that consider the ongoing visibility of existing businesses in the Motto Farm / Heatherbrae area.	RTA / MAPL	Design Development
13	Accommodate natural ecological function at the landscape scale as well as the passage of floodwaters when developing the project design.	RTA / MAPL	Design Development
14	Investigate sources of "clean" fill in the local area to be used for construction of the upgrade and to minimise weed infestation.	RTA / MAPL	Design Development
15	Investigate the possibility of co-location of the new sewer line.	RTA / HW	Design Development
16	Confirm overhead clearance requirements for infrastructure crossings.	RTA / MAPL	Design Development
17	Liaise with Mining Companies to understand their intentions regarding past and future mining activity under the proposed corridor.	RTA / MAPL / DPI	Design Development
18	Review RTA Pacific Highway Rest Area Strategy in relation to this project.	RTA / MAPL	Design Development

Appendices

Appendix 1
List of participants

Participants / Invitees

Organisation	Representative
RTA	❖ Greg Baird ❖ Ben Phillipson ❖ Mark Eastwood ❖ John O'Donnell ❖ Colin Nunn ❖ David Corry ❖ Leanne Thompson-Gordon
Maunsell Australia	❖ Louisa Rebec ❖ Ken Conway ❖ Willem Clasie ❖ Sigrid Sanderson ❖ Simon Tsui ❖ Jane Tyler ❖ Kara Highfield
Department of Planning	❖ Lisa Mitchell
Department of Environment and Conservation	❖ Scott Hunter ❖ Kelly Roche
NSW Road Transport Association	❖ George Wolstenholme
Department of Primary Industries	❖ Cameron Ricketts ❖ David Ward
Mindaribba Local Aboriginal Land Council	❖ Christine Dever
Hunter Water Corporation	❖ Roland Bow
Hunter Catchment Management Authority	❖ Nick Staheyeff
Newcastle City Council	❖ Natalie McCabe (Day 1 only) ❖ John Simpson (Day 2 only) ❖ Michael Osborne
Maitland City Council	❖ Scott Henderson
Port Stephens Shire Council	❖ Mike Trigar ❖ Glenys Francis

Organisation	Representative
Green Coalition	❖ Brian Purdue
Community Liaison Groups	❖ Colin Patching ❖ Helen Lynch-Foster ❖ Les Merrett
Tierney Page Kirkland (Facilitators)	❖ Declan Tierney ❖ Lucie Hedman

Workshop specialists

Biosis Research	❖ Glen Muir ❖ Jane Harrington
WBM Oceanics	❖ Mark Wainwright
Wilkinson Murray	❖ John Wasserman
Conybeare Morrison	❖ Colin Polwarth

F3 to Raymond Terrace

Upgrading the Pacific Highway

Project Team Route Selection Workshop Report

August 2006

F3 to Raymond Terrace Pacific Highway Upgrade

Project Team Route Selection Workshop

NSW Roads and Traffic Authority

May 2006

MAUNSELL | AECOM

Project Team Route Selection Workshop

Prepared for

NSW Roads and Traffic Authority

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1.0 Project Team Route Selection Workshop

1.1 Background

In February 2006, the Project Team and senior RTA representatives held a Route Selection workshop to conduct a detailed (Phase 2) Multi Criteria Analysis of the route options. The workshop considered all available information, including the additional investigations and design development that had been undertaken since the VMW. The additional investigations and design development are documented in Chapter 4.9 of the Preferred Route Report, Maunsell 2006.

1.2 Key principles

The objective of the workshop was to select the better performing route option (A or B) within Sections 1, 2 and 3.

The assessment incorporated a paired analysis to determine the relative weightings of each of the agreed Project Team workshop evaluation criterion. These criteria are based on the Pacific Highway Upgrade Program Objectives and were grouped into Social, Environmental or Technical categories. The cost of each option was considered the fourth category.

Each route option within Section 1, 2 and 3 was scored against the agreed Project Team Route Section Workshop evaluation criteria. This provided a relative assessment of the better performing option (A or B) under each of the categories within Sections 1, 2 and 3.

In each Section, the option that performed better under the majority of the four categories was selected overall as the better performing option.

1.3 Evaluation criteria

Evaluation criteria agreed with participants during the VMW and based on the Pacific Highway Upgrade Program objectives were utilised as a starting point for the Project Team Route Section Workshop evaluation criteria.

The criteria were reviewed and the revised criteria used in the Project Team Route Selection Workshop are given in **Table 1**.

Changes to the evaluation criteria when compared to the VMW criteria were:

- Area of Native Vegetation loss was modified to exclude the area of Endangered Ecological Communities (EEC's) and SEPP 14 wetland loss as this was considered double counting.
- The "Area of EEC and threatened species habitat loss" criteria was replaced with two separate criteria for:
  - Number of Endangered Ecological Communities affected.
  - Number of threatened species potentially affected.
- "Construction risk – constructability" criterion was changed from "Potential for impacts associated with construction activities"
- "Impact on sense of place" and "Landscape quality and view corridors" were changed from "Length of road through visually sensitive areas" and "Ability for route not to obstruct view corridors". The sense of place criterion was added to consider the feelings, emotions and attachments to a locality by residents. "Landscape quality and view corridors" is a qualitative measurement of the length of road through visually sensitive areas.

- "Potential to sustain businesses reliant on highway through trade" replaced "Visibility of businesses from highway". This was reflective of route options submissions indicating loss of passing trade is key local community issue.

The following criteria were added to the Project Team workshop evaluation criteria:

- Road safety.
- Total route length of construction / travel efficiency.
- Compatibility with existing and proposed land use zonings.
- Air quality receivers within 500 metres of highway.
- Non indigenous heritage sites.
- Length of road on embankment / structure. The length of road on embankment or structure is technically significant in relation to visual impact, earthwork volumes, constructability and construction duration.
- Length of carriageway situated in one per cent AEP flood area. This criterion represents the extent of floodplain traversed and is generally proportional to the extent of flood mitigation measures required, such as structure or culvert length and number.

The following criterion were used in the VMW but deleted from the Project Team workshop evaluation criteria:

- Regional connectivity. This criterion was not considered to differentiate between the route options.
- Number of Wildlife corridors crossed. This was addressed with the addition of "Number of Endangered Ecological Communities affected" and "Number of threatened species potentially affected".
- Number of commonwealth listed species (matters of NES) present. This was addressed with the addition of "Number of threatened species potentially affected".
- "Length of road in high risk ASS areas" was omitted as the length of road through Acid Sulfate Soils (ASS) is generally directly proportional to "length of road in soft soils" which is included in the evaluation criteria.

Each of the agreed criteria was placed within one of three categories as follows:

- Social (S).
- Environmental (E).
- Technical (T).

The agreed evaluation criteria for the each category and their units of measurements are provided in **Table 1.**

Table 1: Project Team Route Selection Workshop evaluation criteria

Category	Reference	Evaluation criteria	Units of measurement
Social	A	Noise sensitive properties within 500 metres of highway.	(number)
Social	B	Air quality receivers within 500 metres of highway.	(qualitative)
Social	C	Compatibility with existing and proposed land use zonings.	(qualitative)

Category	Reference	Evaluation criteria	Units of measurement
Social	D	Landscape quality and view corridors.	(qualitative)
Social	E	Extent and nature of agricultural businesses affected.	(qualitative)
Social	F	Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local community issue).	(qualitative)
Social	G	Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).	(qualitative)
Social	H	Number / area of lots requiring partial of full acquisition.	(qualitative)
Social	I	Impacts during construction	(qualitative)
Social	J	Impact on sense of place	(qualitative)
Environmental	A	Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)	(hectares)
Environmental	B	Area of SEPP 14 wetland loss	(hectares)
Environmental	C	Number of Endangered Ecological Communities affected.	(hectares)
Environmental	D	Number of threatened species potentially affected.	(number)
Environmental	E	Extent of cultural heritage sensitive areas affected.	(km)
Environmental	F	Non indigenous heritage sites affected.	(number)
Environmental	G	Extent of direct impact on waterways and potential for water quality impacts.	(number of new waterway crossings, length of bridges, qualitative assessment)
Environmental	H	Length of route in Tomago GMA.	(km)
Technical	A	Total route length of construction / travel efficiency.	(km)
Technical	B	Length of road in soft soils.	(km)
Technical	C	Length of road on embankment/structure.	(km)
Technical	D	Length of carriageway situated in one per cent AEP flood area.	(km)
Technical	E	Ability for key local movements to be maintained in a convenient direct manner.	(qualitative)
Technical	F	Construction risk – constructability.	(qualitative)
Technical	G	Road safety.	(qualitative)

1.4 Assumptions

Where a criterion has quantitatively measured, this has been undertaken for a 100 metre wide corridor for comparative purposes only. The actual route would be less than 100 metres wide. The values available in **Table 4.1** of the Preferred Route report, Maunsell 2006 were utilised in the assessment where applicable. A GIS analyst was present at the Project Team workshop to assist in any specific additional GIS information required for the assessment.

The assessment was undertaken on Options A and B as presented at the VMW. The VMW report is attached as Appendix B to the Preferred Route Report, Maunsell 2006.

Social, Environmental or Technical constraints that would prevent the project progressing have been avoided in the development of feasible route options.

1.5 Scoring and ranking process

For each group of criteria, a paired analysis was undertaken in place of the more simplified approach adopted for the VMW. The paired analysis procedure establishes a relative weighting of evaluation criteria within each group by comparing each criterion, one at a time, against all other remaining criteria.

The two criteria being compared are assessed to be of either equal, more or less importance. The relative level of importance between two criteria is indicated by a multiplier of one (nearly equal) to three (significantly more important). For example, in **Table 3,** a scoring of 3G for D against G indicates that Road Safety (G) was considered significantly more important than the length of carriageway in the one per cent Annual Exceedence Probability flood event area (D).

The assessment tables are provided below.

Table 2: Environmental evaluation criteria – paired analysis

	A	B	C	D	E	F	G	H	
A	-	2B	2C	3D	2E	A/F	1G	2H	
B	-	-	B/C	2D	2E	1B	1B	B/H	
C	-	-	-	1D	D/E	2C	2C	1C	
D	-	-	-	-	D/E	2D	2D	1D	
E	-	-	-	-	-	2E	2E	1E	
F	-	-	-	-	-	-	1G	2H	
G	-	-	-	-	-	-	-	1H	
H	-	-	-	-	-	-	-	-	Total
Totals	**0.5**	**5**	**8**	**11.5**	**10**	**0.5**	**2**	**5.5**	**43**
Relative weighting	**1%**	**12%**	**19%**	**27%**	**23%**	**1%**	**5%**	**13%**	**100**

Table 3: Technical evaluation criteria – paired analysis

	A	B	C	D	E	F	G	
A	-	2A	2A	2A	1A	2A	2G	
B	-	-	B/C	2D	2E	1F	2G	
C	-	-	-	1C	1E	1F	2G	
D	-	-	-	-	1E	1D	3G	
E	-	-	-	-	-	1E	2G	
F	-	-	-	-	-	-	2G	
G	-	-	-	-	-	-	-	Total
Totals	**9**	**0.5**	**0.5**	**3**	**7**	**2**	**12**	**34**
Relative weighting	**26%**	**1%**	**1%**	**9%**	**21%**	**6%**	**35%**	**100**

Table 4: Social evaluation criteria – paired analysis

	A	B	C	D	E	F	G	H	I	J	
A	-	2A	1A	2A	1A	1F	1A	1H	2A	A/J	
B	-	-	1B	B/D	1B	2F	1G	2H	1B	1J	
C	-	-	-	2D	2E	2F	2G	2H	1C	1J	
D	-	-	-	-	1D	2F	2G	1H	2D	1J	
E	-	-	-	-	-	2F	EG	EH	2E	EJ	
F	-	-	-	-	-	-	2F	2F	3F	1J	
G	-	-	-	-	-	-	-	1G	1G	1J	
H	-	-	-	-	-	-	-	-	1H	1J	
I	-	-	-	-	-	-	-	-	-	2J	
J	-	-	-	-	-	-	-	-	-	-	Total
Totals	**9.5**	**3.5**	**1**	**5.5**	**5.5**	**17**	**7.5**	**7.5**	**0**	**10**	**67**
Relative weighting	**14%**	**5%**	**1%**	**8%**	**8%**	**25%**	**11%**	**11%**	**0%**	**15%**	**100**

A summary of the weightings for each criterion is provided in **Table 5** below.

Table 5: Criterion weightings from paired analysis

Category	Reference	Weight %	Evaluation criteria
Social	A	14%	Noise sensitive properties within 500 metres of highway.
Social	B	5%	Air quality receivers within 500 metres of highway.
Social	C	1%	Compatibility with existing and proposed land use zonings.
Social	D	8%	Landscape quality and view corridors.
Social	E	8%	Extent and nature of agricultural businesses affected.
Social	F	25%	Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local community issue).

Category	Reference	Weight %	Evaluation criteria
Social	G	11%	Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).
Social	H	11%	Number / area of lots requiring partial of full acquisition.
Social	I	0%	Impacts during construction
Social	J	15%	Impact on sense of place
Environmental	A	1%	Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)
Environmental	B	12%	Area of SEPP 14 wetland loss
Environmental	C	19%	Number of Endangered Ecological Communities affected.
Environmental	D	27%	Number of threatened species potentially affected.
Environmental	E	23%	Extent of cultural heritage sensitive areas affected.
Environmental	F	1%	Non indigenous heritage sites affected.
Environmental	G	5%	Extent of direct impact on waterways and potential for water quality impacts.
Environmental	H	13%	Length of route in Tomago GMA.
Technical	A	26%	Total route length of construction / travel efficiency.
Technical	B	1%	Length of road in soft soils.
Technical	C	1%	Length of road on embankment/structure.
Technical	D	9%	Length of carriageway situated in one per cent AEP flood area.
Technical	E	21%	Ability for key local movements to be maintained in a convenient direct manner.
Technical	F	6%	Construction risk – constructability.
Technical	G	35%	Road safety.

It was noted that the weighting for “Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)” was determined to be one per cent. While this is low, the value of the habitat within native vegetation is noted with the criterion “Number of Endangered Ecological Communities affected” and “Number of threatened species potentially affected” returning high weightings of 17 and 28 per cent respectively.

In addition a sensitivity analysis was undertaken to determine if assigning a higher weighting to the “Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)” criterion would affect the result for the better performing option in Section 3. This analysis is provided in **Table 9.**

Following the determination of relative weightings for each group, the options in each section were scored between one (performs poorly) to five (performs very well).

The score was multiplied by the relative weighting and a numerical result produced for the Social, Environmental and Technical groups.

The results for Section 1, 2 and 3 are summarised in **Tables 6, 7 and 8** below.

Table 6: Western section – Section 1

Evaluation criteria	Group	Weight	A1 Score	B1 Score	A1 Result	B1 Result
Total route length of construction / travel efficiency	T	27	3	4	81	108
Length of road in soft soils.	T	1	3	2	3	2
Length of road on embankment/structure.	T	1	3	3	3	3
Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)	E	1	2	3	2	3
Area of SEPP 14 wetland loss	E	12	0	0	0	0
Number of Endangered Ecological Communities affected.	E	19	3	4	57	76
Number of threatened species potentially affected.	E	27	2	2	54	54
Extent of cultural heritage sensitive areas affected.	E	23	1	1	23	23
Non indigenous heritage sites affected.	E	1	0	0	0	0
Extent of direct impact on waterways and potential for water quality impacts.	E	5	2	3	10	15
Length of route in Tomago GMA.	E	13	0	0	0	0
Noise sensitive properties within 500 metres of highway.	S	14	3	3	42	42
Air quality receivers within 500 metres of highway.	S	5	3	3	15	15
Length of carriageway situated in one per cent AEP flood area.	T	9	4	3	36	27
Compatibility with existing and proposed land use zonings.	S	1	3	2	3	2
Landscape quality and view corridors	S	8	4	3	32	24
Extent and nature of agricultural businesses affected.	S	8	3	3	24	24
Ability for key local movements to be maintained in a convenient direct manner.	T	21	5	5	105	105
Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local community issue).	S	25	0	0	0	0
Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).	S	12	2	2	24	24
Number / area of lots requiring partial of full acquisition.	S	12	3	3	36	36

Evaluation criteria	Group	Weight	A1 Score	B1 Score	A1 Result	B1 Result
Construction risk - constructability	T	6	3	3	18	18
Road safety	T	35	4	4	140	140
Impacts during construction	S	0	3	3	0	0
Impact on sense of place	S	15	3	2	45	30

Table 7: Central section – Section 2

Evaluation criteria	Group	Weight	A2 Score	B2 Score	A2 Result	A2 Result
Total route length of construction / travel efficiency	T	27	4	3	108	81
Length of road in soft soils.	T	1	2	3	2	3
Length of road on embankment/structure.	T	1	4	3	4	3
Level of economic performance.	NA				0	0
Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)	E	1	3	3	3	3
Area of SEPP 14 wetland loss	E	12	3	2	36	24
Number of Endangered Ecological Communities affected.	E	19	3	2	57	38
Number of threatened species potentially affected.	E	27	2	3	54	81
Extent of cultural heritage sensitive areas affected.	E	23	3	3	69	69
Non indigenous heritage sites affected.	E	1	0	0	0	0
Extent of direct impact on waterways and potential for water quality impacts.	E	5	2	3	10	15
Length of route in Tomago GMA.	E	13	0	0	0	0
Noise sensitive properties within 500 metres of highway.	S	14	2	3	28	42
Air quality receivers within 500 metres of highway.	S	5	2	3	10	15
Length of carriageway situated in one per cent AEP flood area.	T	9	2	4	18	36
Compatibility with existing and proposed land use zonings.	S	1	2	4	2	4
Landscape quality and view corridors	S	8	1	4	8	32
Extent and nature of agricultural businesses affected.	S	8	2	4	16	32
Ability for key local movements to be maintained in a convenient direct manner.	T	21	1	4	21	84
Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local	S	25	4	2	100	50

Evaluation criteria	Group	Weight	A2 Score	B2 Score	A2 Result	A2 Result
community issue).						
Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).	S	12	3	4	36	48
Number / area of lots requiring partial of full acquisition.	S	12	3	4	36	48
Construction risk - constructability	T	6	1	4	6	24
Road safety	T	35	3	4	105	140
Impacts during construction	S	0	3	2	0	0
Impact on sense of place	S	15	2	3	30	45

Table 8: Eastern section – Section 3

Evaluation criteria	Group	Weight	A3 Score	B3 Score	A3 Result	B3 Result
Total route length of construction / travel efficiency	T	27	4	2	108	54
Length of road in soft soils.	T	1	4	3	4	3
Length of road on embankment/structure.	T	1	4	2	4	2
Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)	E	1	5	1	5	1
Area of SEPP 14 wetland loss	E	12	0	0	0	0
Number of Endangered Ecological Communities affected.	E	19	0	0	0	0
Number of threatened species potentially affected.	E	27	4	2	108	54
Extent of cultural heritage sensitive areas affected.	E	23	4	2	92	46
Non indigenous heritage sites affected.	E	1	3	5	3	5
Extent of direct impact on waterways and potential for water quality impacts.	E	5	4	3	20	15
Length of route in Tomago GMA.	E	13	4	2	52	26
Noise sensitive properties within 150 metres of highway.	S	14	1	5	14	70
Air quality receivers within 150 metres of highway.	S	5	1	5	5	25
Length of carriageway situated in one per cent AEP flood area.	T	9	3	2	27	18
Compatibility with existing and proposed land use zonings.	S	1	3	2	3	2
Landscape quality and view corridors	S	8	1	4	8	32
Extent and nature of agricultural businesses affected.	S	8	0	0	0	0

Evaluation criteria	Group	Weight	A3 Score	B3 Score	A3 Result	B3 Result
Ability for key local movements to be maintained in a convenient direct manner.	T	21	2	4	42	84
Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local community issue).	S	25	2	4	50	100
Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).	S	12	3	2	36	24
Number / area of lots requiring partial of full acquisition.	S	12	2	4	24	48
Construction risk - constructability	T	6	1	5	6	30
Road safety	T	35	2	4	70	140
Impacts during construction	S	0	2	5	0	0
Impact on sense of place	S	15	1	5	15	75

Table 9: Sensitivity in Section 3

Evaluation criteria	Group	Weight	A3 Score	B3 Score	A3 Result	B3 Result
Total route length of construction / travel efficiency	T	27	4	2	108	54
Length of road in soft soils.	T	1	4	3	4	3
Length of road on embankment/structure.	T	1	4	2	4	2
Area of native vegetation loss (exclusive of EEC's and SEPP 14 wetlands)	E	23	5	1	115	23
Area of SEPP 14 wetland loss	E	10	0	0	0	0
Number of Endangered Ecological Communities affected.	E	15	0	0	0	0
Number of threatened species potentially affected.	E	18	4	2	72	36
Extent of cultural heritage sensitive areas affected.	E	18	4	2	72	36
Non indigenous heritage sites affected.	E	1	3	5	3	5
Extent of direct impact on waterways and potential for water quality impacts.	E	5	4	3	20	15
Length of route in Tomago GMA.	E	10	4	2	40	20
Noise sensitive properties within 150 metres of highway.	S	14	1	5	14	70
Air quality receivers within 150 metres of highway.	S	5	1	5	5	25
Length of carriageway situated in one per cent AEP flood area.	T	9	3	2	27	18

Evaluation criteria	Group	Weight	A3 Score	B3 Score	A3 Result	B3 Result
Compatibility with existing and proposed land use zonings.	S	1	3	2	3	2
Landscape quality and view corridors	S	8	1	4	8	32
Extent and nature of agricultural businesses affected.	S	8	0	0	0	0
Ability for key local movements to be maintained in a convenient direct manner.	T	21	2	4	42	84
Dwellings and commercial buildings potentially affected and / or displaced by acquisition (submissions indicate loss of dwellings is a key local community issue).	S	25	2	4	50	100
Potential to sustain businesses reliant on highway through trade (submissions indicate loss of passing trade is key local community issue).	S	12	3	2	36	24
Number / area of lots requiring partial of full acquisition.	S	12	2	4	24	48
Construction risk - constructability	T	6	1	5	6	30
Road safety	T	35	2	4	70	140
Impacts during construction	S	0	2	5	0	0
Impact on sense of place	S	15	1	5	15	75

1.6 Project Team Route Selection Workshop results

Table 10 summarises the results by section and group. If the difference in results for the same section was less than the largest criteria weighting for that group, the outcome was considered equal.

Table 10: Numerical results from Project Team workshop

	A1	B1	A2	B2	A3	B3
Social	221	197	266	316	155	376
Environmental	146	171	229	230	280	147
Technical	386	403	264	371	261	331

The results of the sensitivity analysis undertaken on the Environmental criteria weightings for Section 3 are documented in **Table 11**. The sensitivity analysis did not change the outcome. A summary of the results are shown below.

Table 11: Numerical results Project Team workshop for Section 3 sensitivity

	A3	B3
Social	155	376
Environmental	322	135
Technical	261	331

The sensitivity analysis shows that A3 still performs better than B3 under the Environment category. Under the Technical and Social categories the results do not change from the initial analysis, indicating B3 performs better than A3 under these categories.

1.6.1 Section 1

Workshop participates recommended that the Option A1 be adopted as the preferred route in Section 1 because the route performs better than Option B1.

Option A1 also has other advantages over Option B1 as listed below:

- Was further from the residential area of Black Hill and would potentially better satisfy community expectations through this section.
- Minimises fragmentation in the native vegetation in Black Hill.
- Closer to John Renshaw Drive and the Chichester Pipeline. This consolidates major infrastructure into a smaller corridor.
- Provides a greater distance between Hexham Swamp and the upgrade.

1.6.2 Section 2

Workshop participates recommended that the Option B2 be adopted as the preferred route in Section 2 because the route performs better than Option A2.

Option B2 also has other advantages over Option A2 as listed below:

- Has the shortest length through deep soft soils and flood affected areas.
- Provides opportunities to connect with the existing Pacific Highway, Tomago and surrounding areas.
- Has the lowest project capital cost.
- On balance, represents the best overall value for money option.

1.6.3 Section 3

Workshop participates recommended that the Option B3 be adopted as the preferred route in Section 3 because the route performs better than Option A3.

Option B3 also has other advantages over Option A3 as listed below:

- Would better satisfy community expectations through this section.
- Allows the existing highway to be used as a local access road without the need to build any new local roads.
- Has the lowest project capital cost.
- On balance, represents the best overall value for money option.

1.7 Summary of results

Following evaluation of the options against the criteria, the relative cost performance of the options was considered and is provided below:

- In Section 1, the cost of Option A1 is approximately equal to Option B1.
- In Section 2, the cost of Option B2 is approximately 30 per cent cheaper than Option A2.
- In Section 3, the cost of Option A3 is approximately 25 per cent cheaper than Option B3.

On this basis Option B2 in Section 2 and B3 in section 3 were selected as providing the best value for money. In Section 1 the cost was not considered a differentiator between Option A1 and B1. The benefits of Option A1 over B2 are provided in **Chapter 1.6.1.**

Table 12: Project Team workshop results summary

Group	Section 1	Section 2	Section 3
Social	A1 and B1 equal	B2	B3
Environmental	A1 and B1 equal	A2 and B2 equal	A3
Technical	A1 and B1 equal	B2	B3
Cost	A1 and B1 equal	B2	B3
Overall Result	**A1**	**B2**	**B3**

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1 Introduction

1.1 Project background

The F3 Freeway to Raymond Terrace project ('the project') will provide the 'missing link' between the F3 Freeway, south of John Renshaw Drive and the Raymond Terrace bypass, north of Heatherbrae. Planning for this project is being funded by the NSW Government from its component of the $2.2 billion Pacific Highway Upgrade Program. The project will involve the construction of a new 13 km section of dual carriageway highway and include interchanges at the F3 Freeway (southern) and Raymond Terrace Bypass (northern), service roads and a new bridge structure across the Hunter River.

Initially, some 20 options and/or combinations of options were considered within the study area. However, a short list of three options was identified for further consideration. One of these options was subsequently abandoned due to the length of very soft soils it traversed, the waterway area required for flood management and its impact on land use and amenity to the northwest of Heatherbrae.

Community involvement has been integral to the route options development process since October 2004, when the Minister for Roads announced the route options for the F3 Freeway to Raymond Terrace project.

The feasible route options identified for further consideration (Option A – Green Route and Option B – Purple Route) were placed on display between Friday 21 October and Friday 2 December 2005. During this period the community were given the opportunity to provide their feedback and register their concerns/interest. Both options were divided into three sections (western, central, eastern) and the development of the preferred route will consider the best combination of these options.

This report summarises the submissions received from the community, landowners and stakeholders during the Route Options Display.

1.2 Project objectives

The F3 Freeway to Raymond Terrace project will target the objectives of the Pacific Highway Upgrade Program, which are to:

- Significantly reduce road accidents and injuries.
- 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 the principles of ecologically sustainable development.
- Maximise the effectiveness of expenditure.

As well as contributing to the Pacific Highway Upgrade Program, specific project objectives will also need to be met for road safety, geometry, access, flood immunity, environmental management, community expectations and expenditure.

2 Consultation background

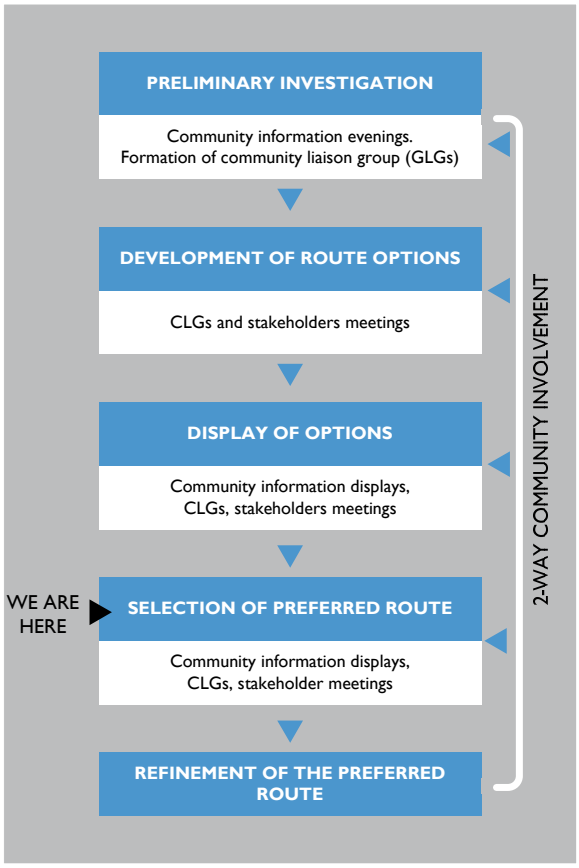
2.1 Consultation objectives

The needs and interests of the community and other key stakeholders residing within or having an interest in the study area are diverse. It is therefore paramount that effective consultation activities are implemented to maximise community involvement and the capture of views throughout all stages of project development, including the route options development process. A set of objectives, as documented in the Community Involvement Plan (Maunsell, 2005) and the Route Options Development Report (Maunsell, 2005) has been developed for this project as follows:

- To ensure an open, accountable and transparent community involvement process.
- To ensure all potentially affected property owners and interested stakeholders are provided with sufficient information about the project and the likely impacts, so that they can provide informed input.
- To ensure appropriate and direct communication with property owners and/or managers in relation to access to, and investigations on landholdings within the study area by study team members and/or RTA representatives.
- To encourage community support and involvement in the project to facilitate better and more generally accepted outcomes.
- To provide a range of accessible opportunities for stakeholders, interested groups and the wider public to contribute to the project through issues identification, information provision, and options evaluation.
- To build an ongoing relationship between the RTA, its contractors and stakeholders in order to gain long term support for the project and in particular the Preferred Route.

2.2 Community involvement process

Figure 2.1: Community involvement process



Key community involvement activities conducted during the project familiarisation and route options development stages have comprised:

- The distribution of two Community Updates in November 2004 and October 2005.
- A Community Information Session.
- A Planning Focus Meeting with representatives from various agencies and stakeholder groups.
- Establishment of a community liaison group (clg).
- Establishment of a 1800 free call number.
- Establishment of a project web page.
- Five formal meetings with the clg including a bus tour of the study area and a route options workshop.
- Individual meetings with local councils, Local Aboriginal Land Council representatives, Department of Environment and Conservation (DEC), Department of Primary Industries (DPI), Department of Planning (DoP) and Department of Natural Resources (DoNR).
- Key affected landowner interviews and local business surveys.
- Public display of feasible options.

3 Consultation approach

Consultation with the community and stakeholders has been integral to the route options development process since the project was announced October 2004. This chapter details the activities that took place during the Route Options Display from 21 October to 2 December 2005.

The community were invited to complete feedback forms which were distributed to potentially affected property owners, clg members and other residents within and immediately surrounding the study area. Hard copies of the feedback form were made available at the eight display locations and also 'on-line' on the project website.

Between Thursday 27 October and Saturday 29 October 2005, five of the eight display locations were staffed by members of the Project Team. The staffed displays provided an opportunity for members of the community and other interested parties to directly engage and discuss issues of concern with the Project Team.

The Route Options Display locations were (staffed displays are highlighted in bold):

- **Maitland City Council.**
- Maitland Motor Registry.
- **Newcastle City Council.**
- **Thornton Library.**
- Newcastle Motor Registry.
- **Port Stephens Shire Council.**
- **Heatherbrae Visitor Information Centre.**
- Raymond Terrace Motor Registry.

Potentially affected landowners were advised by letter and a follow up telephone call about the Route Options Display process, locations and timing. In addition, a series of individual meetings were arranged and have been conducted by the Project Team at various locations, including potentially affected property locations, RTA's Hunter Office and Maunsell's Sydney office to further discuss the project and key issues of concern.

In total, 1500 copies of Community Update No. 2 were printed and distributed to members of the community, relevant Government agencies, local councils and other stakeholders. Copies of the update were also enclosed within letters sent to members of the clg, potentially affected property owners and also placed at the display locations. Further copies of the update were distributed to properties and businesses within the study area on the day of the route options announcement (i.e. Friday, 21 October 2005) and in the week beginning Monday 24 October 2005, or following requests on the 1800 (toll free) Project Information Line.

Members of the clg received a copy of the Route Options Development Report, Community Update No. 2, Pacific Highway Overview brochure and a feedback form shortly after the announcement of the Route Options Display. A clg meeting was held on Thursday 3 November 2005 at the Heatherbrae Information Centre, Motto Farm to formally introduce the two short listed feasible options, explain the Route Options Display process, describe the value management process and provide an interactive question and answer session.

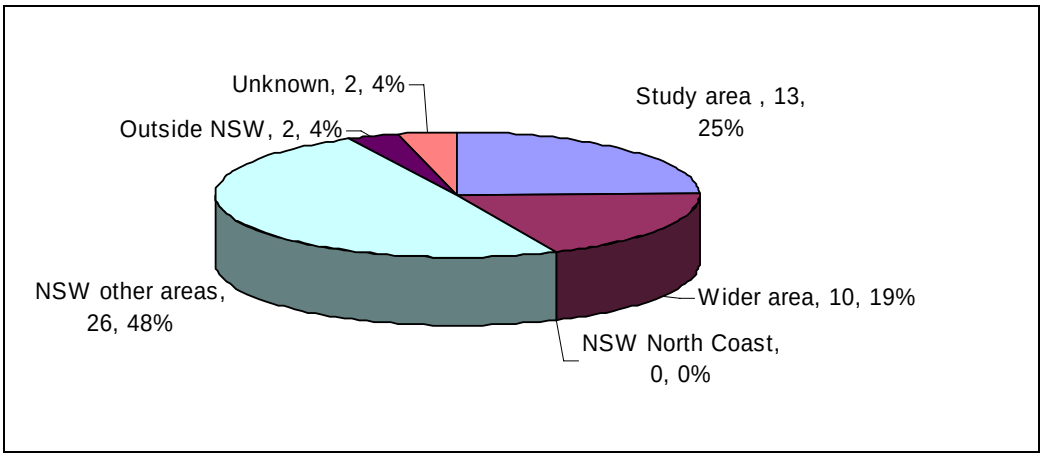
4 Consultation response during display comment period

A total of 85 completed feedback forms were received by Maunsell up until Friday 2 December 2005. During the Route Options Display staffed period (Thursday 27 October to Saturday 29 October 2005), members of the Project Team held discussions with up to 42 attendees or groups of attendees.

By Friday 2 December 2005, 24 meetings had been conducted with potentially affected property owners. This figure does not include the landowners that took part in discussions at the staffed displays or at the clg meeting held on Thursday 3 November 2005. Formal submission letters have been received from 18 property owners within the study area and stakeholders.

During the Route Options Display, 55 telephone calls were recorded on the 1800 (toll free) Project Information Line. Details of the calls received are discussed in the following sections. The geographical distribution of 1800 (toll free) Project Information Line responses is illustrated in **Figure 4.1** below.

Figure 4.1: Spatial distribution of 1800 (toll free) project information line responses



Source: Maunsell F3 Freeway to Raymond Terrace Issues Register, 2 December 2005

Note: 'Study area' represents Heatherbrae, Motto Farm, Black Hill, 'Wider area' represents Beresfield, Hexham, Tomago, Woodbury, Thornton and Raymond Terrace, 'NSW other areas' represents Sydney, Newcastle and wider regional locations.

Of the calls, 31 have been general comments and requests for additional information as opposed to registering specific issues of concern to the Project Team such as:

- Requests for further information, either about the project or the Pacific Highway Upgrade Program.
- Requests for dates and times of upcoming meetings.
- Notification of difficulties experienced with the website.
- Requests or advice on updated contact information.
- Requests for individual property owner meetings.

Key issues raised in written or verbal submissions received up until Friday 2 December 2005 have been collated and reviewed, and these are described in **Section 4.1**.

4.1 Summary of issues register

A summary of the issues registered by interested stakeholders is presented in **Table 4.1**, recorded from the following sources:

- The 1800 (toll free) Project Information Line (up until Friday 2 December 2005).
- Meetings with potentially affected property owners.
- Discussions at staffed displays.
- Feedback Forms and written submissions (received by Maunsell up until Friday 2 December 2005).

Table 4.1: Issues recorded during feedback process

Option	Issue	Frequency	Option sub total
A1	Land/ property acquisition	1	
	Property/ local access	1	
	Terrestrial ecology/ flora and flora	4	
	Hydrology and flooding	3	
	Social and business effects	1	
	Noise and vibration	1	
	Safety	1	
	European and Aboriginal heritage	1	13
A2	Land/ property acquisition	5	
	Social and business effects	1	
	Property/ local access	2	
	Terrestrial ecology/ flora and flora	1	
	Noise and vibration	2	
	Visual and urban design	3	
	Hydrology and flooding	7	
	Safety	1	22
A3	Land/ property acquisition	13	
	Social and business effects	29	
	Property/ local access	22	
	Terrestrial ecology/ flora and flora	2	
	Noise and vibration	23	
	Visual and urban design	3	
	Hydrology and flooding	1	
	Safety	6	
	Construction	2	101

Option	Issue	Frequency	Option sub total
B1	Property/ local access	1	
	Terrestrial ecology/ flora and flora	2	
	Safety	4	
	Social and business effects	1	
	Noise and vibration	1	
	European and Aboriginal heritage	1	10
B2	Land/ property acquisition	5	
	Engineering design	1	
	Social and business effects	1	
	Noise and vibration	1	
	Visual and urban design	1	
	Construction	1	10
B3	Social and business effects	34	
	Property/ local access	4	
	Terrestrial ecology/ flora and flora	5	
	Noise and vibration	2	
	Visual and urban design	1	
	Land/ property acquisition	2	48

Source: Maunsell F3 Freeway to Raymond Terrace Issues Register 21 October to 2 December 2005

Other issues recorded but not necessarily relating to a specific option (Option A or B) or section of an option (e.g. Option A1 or B1) include:

- Concerns about the number of crashes on the existing Pacific Highway network.
- Safety issues at the intersection of Tomago Road and the Pacific Highway.
- Flood management issues.
- Timing of project, impacts on business and residential long term planning.
- Road safety.
- Signage to local facilities required.
- Property acquisition and access concerns.
- Concern that the highway is not a bottleneck for holiday travel and that the funding should be spent on something else.
- Likelihood that the project will be tolled.
- Construction concerns.

Table 4.2 provides examples of the feedback submitted during the Route Options Display. All comments have been given due consideration by the Project Team. Key issues and responses are detailed in **Table 4.5**.

Table 4.2: Feedback comments

Option	Issue comment
A1	Concerns on whether or not property would be directly affected, and exact location and arrangement of interchange.
	Would noise mitigation measures be incorporated into road design or would these be dependent on residents requesting them.
	If acquisition from property is necessary, there must be sufficient land parcels remaining to move stock to higher ground during floods.
	Height of the roadway.
	Property access must be maintained to Lenaghans Drive.
	Cuts through areas of Spotted Gum and Ironbark forest – build upgrade closer to the existing traffic route.
A2	A bush fire setback must be maintained adjacent to the Hunter Region Botanic Gardens.
	Runs close to a residential property on Woodlands Close.
	Property access must be maintained to Woodlands Close.
	Will affect views across the floodplain for local residences.
	Flooding impact.
A3	Whether property acquisition would be required.
	Concerns about impacts on local businesses as Option A3 passes directly through the centre of Motto Farm / Heatherbrae. Difficult to determine the potential magnitude of impact from the Community Update No. 2.
	Option A3 would impact on amenity (particularly noise, emissions, and urban design) and also business viability.
	Upgrade footprint will require land acquisition.
	Exposure/ visibility for businesses in Heatherbrae/ Motto Farm to enable passing trade.
	Travel from interchange to local facilities may be significant.
	Noise impact.
	Visual amenity of noise wall placement.
	Safety concerns with regards to motorway through town.
	If land acquisition is necessary, there must be sufficient land parcels remaining to move stock to higher ground during floods.
	Property access must be maintained.
	Local traffic movements must be maintained.
	Impacts on property value of freeway passing nearby.
	Connectivity between east and west parts of Heatherbrae/ Motto Farm.
	Signage to local facilities required.
	Removal of access to southbound service stations and facilities would mean drivers would have to travel further between rest stops therefore increasing risk of

Option	Issue comment
	accidents.
B1	Concerns on whether or not property would be directly affected, and exact location of interchange.
	Would noise mitigation measures be included in road design or would these be dependent on residents requesting them.
	If land acquisition is necessary, there must be sufficient land parcels remaining to move stock to higher ground during floods.
	Height of the roadway.
	Property access must be maintained to Lenaghans Drive.
	Cuts through Spotted Gum and Ironbark forest communities at Black Hill.
B2	Concerned that proximity of this option section could render businesses unviable.
	A bush fire setback must be maintained adjacent to the Hunter Region Botanic Gardens.
	Potential for direct access to Tomago and Newcastle Airport.
	Roadway must be 50 metres from Dairy Farmers plant effluent irrigation area.
	May have a less dramatic effect on landscape.
	Land severance would restrict business operations.
B3	Would property acquisition required.
	Concerns about the impact on business at Heatherbrae as Option B3 passes directly in front. Cannot determine the degree of impact from brochure.
	This option would not be a problem for business currently fronting the Pacific Highway at Motto Farm and Heatherbrae.
	This upgrade section would not remove a high proportion of traffic as it is mostly local and therefore, this would not affect businesses too much.
	Exposure/ visibility for businesses in Heatherbrae/ Motto Farm.
	Travel from interchange to local facilities may be significant.
	Reduced noise in Heatherbrae a benefit.
	Route passes over shed structure and over effluent irrigation area of Weathertex factory operations.
	Concern that B3 will force closure of the Weathertex factory.
	Signage to local facilities required.
	A bypass of Heatherbrae is needed.

Source: Maunsell F3 Freeway to Raymond Terrace Issues Register, Wednesday, 2 December 2005

4.2 Feedback form: analysis of importance ranking

The feedback form presented a range of issues and invited respondent(s) to indicate the importance of each issue. The issues have been ranked as 'Very Important', 'Somewhat Important' or 'Not Important'. Those recording the highest number of 'Very Important' rankings included:

- Improvements to road safety (43).
- Impact on properties (39).
- Impact on businesses in Motto Farm and Heatherbrae (39).
- Connectivity and interchange locations (36).

The issues that recorded the highest number of 'Not Important' rankings included:

- Loss of views (36).
- Construction cost (30).
- Travel times on the Pacific Highway (29).

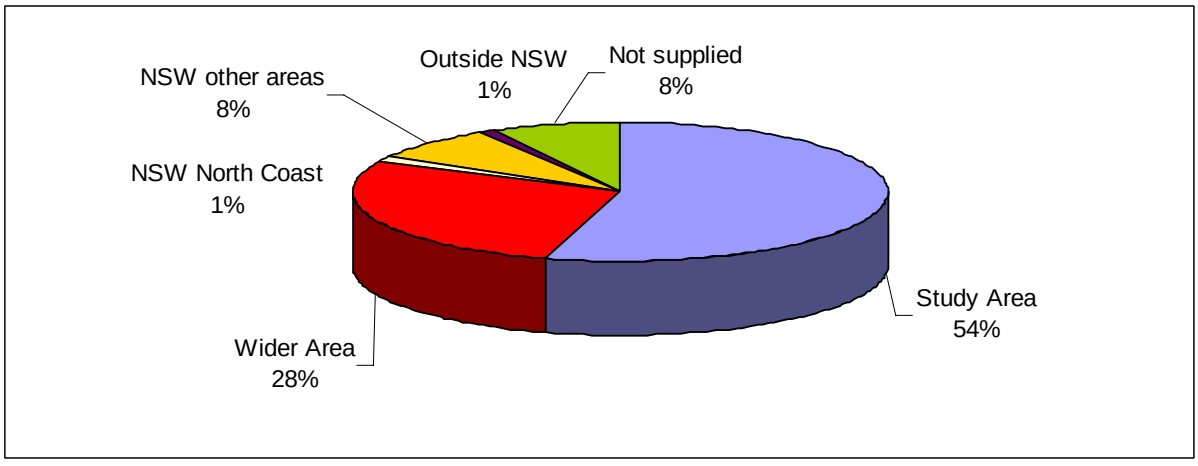
Other issues that recorded an even spread of importance rankings included:

- Impact on agricultural land.
- Local flooding issues.

This even spread of importance rankings indicates that these issues are likely to represent the most contentious between the respondents.

The feedback forms received by Maunsell are predominantly from respondents located within the study area (54 per cent). A further 28 per cent were received from the wider area, such as Beresfield, Hexham, Tomago, Woodbury, Thornton and Raymond Terrace. Location details were not supplied by eight per cent of respondents. This is illustrated in **Figure 4.2** below.

Figure 4.2: Spatial distribution of respondents completing feedback forms



Source: Feedback forms submitted, 2 December 2005

Note: 'Study area' represents Heatherbrae, Motto Farm, Black Hill, 'Wider area' represents Beresfield, Hexham, Tomago, Woodbury, Thornton and Raymond Terrace, 'NSW other areas' represents Sydney, Newcastle and wider regional locations.

A favoured combination of route sections was selected by most respondents. The variety of combinations produced is not conducive for a simple analysis of the responses as some respondents did not offer a preference. In the western part of the study area there does not

appear to be a clear preference for either Section A1 or B1. Those respondents living in parts of NSW outside of the local area appear to favour Option B in its entirety.

Within the study area there seems to be an even divide between Option A and B, especially at the eastern end (i.e. Masonite Road). Sixteen responses were received from Weathertex factory employees whom favoured Section A3 due to a perceived lower level of impact on the Weathertex factory operations.

Responses received were dominated by those relating to Sections A3 and B3 at the eastern end of the study area, whilst a lesser number of preferences were specified between A1 and B1, and A2 and B2.

4.3 Government agency submissions

A submission was received from the NSW Department of Environment and Conservation (DEC) on Friday 2 December 2005. The issues contained within the submission are presented in **Table 4.3**, which includes responses to each issue.

Table 4.3: Submission issues and responses

Issue	Issue details	Response	Ref no.
Mitigation	It is critical that the feasibility of mitigation measures to address specific issues and impacts is addressed and the results of this assessment considered through the route selection process.	The corridor adopted for refinement of the preferred option provides adequate space for mitigation measures. Feasible mitigation measures will be developed during refinement of the preferred route and concept design and during the formal environmental assessment phase of the project.	1
Biodiversity	Both Options A and B have the potential to impact: • Hunter River estuary wetlands (RAMSAR site). • Hexham Swamp Nature Reserve (NR). • Five endangered Ecological Communities (EECs). • SEPP14 wetlands. • Threatened fauna and fauna species. • High conservation value habitats (eg SEPP14 Koala habitat). • Remnant eucalypt forest/woodland (Sections A1, B1 and B3).	The RTA is aware of the significance of these protected items and areas. The alignment of route options has been developed to minimise both direct and indirect impacts on these sites. Further ecological assessment will be undertaken during selection of the preferred route.	2
	Route selection should reflect the need to have the least potential to	The Preferred Route minimises the fragmentation of native	3

Issue	Issue details	Response	Ref no.
	adversely impact on the ecological integrity, persistence and long-term survival of threatened and protected flora and fauna and their habitat within the local and regional landscape. At the southern end of option A the opportunity exists to locate the proposed route partly within the Chichester pipeline easement thereby reducing impacts on EEC bushland.	vegetation through Black Hill as far as possible. Options further north are constrained by geometry for connection to the F3 Freeway, interchange arrangements and proximity to the John Renshaw Drive roundabout. An alignment further to the north of Option A, crossing the Chichester pipeline was investigated following a recommendation from the Value Management Workshop, but was found to do little to reduce the environmental impact.	
	Care in the project planning and construction phases will be required to minimise the potential for disturbance to the RAMSAR site (A2).	Substantial environmental investigation has been undertaken to identify significant environmental areas. Core Koala habitat has been avoided. SEPP 14 wetlands have been avoided where possible. Where contact is unavoidable, suitable mitigation measures will be employed. A formal environmental assessment will be undertaken. This assessment will identify the potential impacts on flora and fauna in more detail, and the measures proposed to manage these. The mitigation measures identified to manage the impacts would be incorporated into the Environmental Management Plan. The Preferred Route does not directly impact Hexham Swamp.	4
	Both the SEPP14 wetlands and the Koala habitat should be avoided. If this is not feasible, then spanning structures and fauna underpasses should be incorporated into the design phase. Potential for the use of compensatory habitat also needs consideration.		
	The route options should seek to avoid Hexham Swamp NR and lands recently acquired by the Hunter Central Coast Catchment Management Authority as part of the Hexham Swamp Rehabilitation Project.		
	The RODR provides a generally thin treatment of the terrestrial, aquatic and landscape ecology of the study area. Little detail is provided in the RODR on the structure, distribution and condition of native vegetation communities (especially EECs and HCV bushland) and faunal assemblages both in the study area and the surrounding landscape. A map of the vegetation communities	Additional ecological studies were undertaken to assist with the selection of the preferred route. A formal environmental assessment will be undertaken following announcement of the preferred route. This assessment will identify the potential impacts on flora and fauna in more detail,	5

Issue	Issue details	Response	Ref no.
	as described in Table 5.3, with greater detail than provided in Figure 5.6, would be beneficial in assessing the potential impact of each option on the EECs.	and the measures proposed to manage these. The mitigation measures identified to manage the impacts would be incorporated into the Environmental Management Plan	
	A consideration of the location and potential for disturbance of local regional habitat linkages such as vegetated corridors is also an important element not included within the report.	Further investigation into wildlife corridors and regional habitat linkages were undertaken before the preferred route was determined. Structures and culverts provided for waterway area across the floodplain will also provide for fauna movements.	6
	Appendix B is missing Table B.1 that presumably lists all threatened fauna and flora recorded or known to occur in or near the study area.	Table B.1 was added to the Route Options Development Report.	7
	Reference to lists of threatened species of flora and fauna, populations and ecological communities contained in the Working Paper needs to be made in the RODR.	The reference list can be issued as requested.	8
	There is a need to evaluate the overall ecological impact of the proposed route options at a total landscape scale. That is, potential impacts of the development need to be considered within the context of other development occurring within the local and regional landscape, including the other sections of the Pacific Highway Upgrade Project. Of key importance to the protection of ecological integrity (ecosystem structure and functioning) at a regional scale is the degree to which the F3 RT project is likely to contribute to the cumulative effects of development within the region. Consideration needs to be given to appropriate planning and mitigation measures to reduce the cumulative ecological impact of this project.	Future developments within the Hunter Region were considered in the development of route options. Key items included Industrial developments within the study area, Newcastle Port and Airport expansions, residential expansion at Thornton and the F3 to Branxton Freeway extension. The Project Team has consulted with key government agencies including the Department of Planning and Local Government to ensure project awareness for integration with other significant developments within the region.	9

Issue	Issue details	Response	Ref no.
Aboriginal cultural heritage	The potential impact on Aboriginal cultural heritage is not fully identified in the RODR. The discussion is limited to recorded archaeological sites in AHIMS with passing mention to the social and cultural significance of the study area to the Aboriginal community. As the Preliminary Aboriginal Archaeology Options and Constraints Working Paper notes, a full archaeological assessment will be essential in the preferred route selection phase of investigation and should address this deficiency. Particular attention needs to be given to the Aboriginal cultural and social significance of Black Hill Precinct and the Tomago Sand Beds.	Investigations to date have been undertaken to identify areas of cultural and archaeological significance in consultation with traditional land owners. Contact is being maintained with Mindaribba and Worimi Local Aboriginal Land Councils. Further studies and consultation will be undertaken with Local Aboriginal Land Councils (LALC's) to further define and assess cultural and archaeological significance.	10
	Ongoing involvement with DEC's Cultural Heritage Division is essential, along with the two relevant Local Aboriginal Land Councils and other indigenous bodies such as Elders Groups.	Contact is being maintained with the LALCs and DEC.	11
	There needs to be recognition of a community request to reclassify the Hunter River Floodplain Precinct Community from that of a low archaeological potential and cultural sensitivity to a high classification level.	Further studies and consultation will be undertaken with Local Aboriginal Land Councils (LALC's) to further define and assess cultural and archaeological significance.	12
Air	The conclusions made with regard to air quality in Table A.1 Draft Evaluation Criteria are overly simplistic and not necessarily indicative of the impacts that the two route options may have on air quality.	An assessment of the impact on air quality will be undertaken during the formal Environmental Assessment phase.	13
Noise	Whilst in section three, option B impacts on significantly fewer receivers than option A, these impacts are on receivers who currently experience low background and low local traffic noise levels. The impacts of increased noise levels on these receivers and the extent at which they can be effectively mitigated should be carefully considered when	A preliminary noise assessment for both route options was undertaken. The ECRTN noise guidelines have a number of different tolerances for noise depending on for example, if the new road is the upgrade of an existing road, a new route or if the current noise limits are already exceeded.	14

Issue	Issue details	Response	Ref no.
	determining the suitability of this option.	Further assessment will be undertaken during the preferred route and formal Environmental Impact Assessment.	
Water	Both options require culverts and bridges over areas of soft soils, these structures will require significant engineering works during construction to ensure their stability. The engineering and bridge designs for all bridges and culverts must fully consider all environmental impacts associated with their construction and operation, the feasibility of such should be provided to better differentiate between the proposed options.	Appropriate mitigation measures will be integrated in design and construction. The feasibility of implementing these mitigation measures for each option was considered in the selection of the preferred route.	15
	In section 8.2.4, the RODR reveals that further investigations are required to determine the mitigation measures required to control spills and other pollution from the highway in option B. Details of such measures have not been provided for option A in the RODR. The DEC suggests that the feasibility of any mitigation or pollution control measures is an important issues and one that could be important in differentiating between the two route options.	Control of spills and other pollution is a key consideration, particular for the length of both options that traverse the Tomago Sand Beds and the Hunter River floodplain. Consultation is ongoing with relevant agencies to determine what mitigation options are appropriate. The feasibility of implementing these mitigation measures for each option was considered in the selection of the preferred route.	16
Space for mitigation measures	An important factor in differentiating between the route options is ensuring that sufficient corridor areas can be acquired to permit the installation and maintenance of appropriate mitigation measures for noise, water quality and fauna during both construction and operation. This information is not provided in the RODR.	A sufficient corridor area will be acquired to ensure that the upgrade boundaries accommodate construction requirements and both construction and operational mitigation measures.	17

4.4 Local council submissions

Submissions from Maitland and Newcastle City Councils and responses are presented in **Table 4.4**. A submission has not yet been received from Port Stephens Shire Council.

Table 4.4: Local council submission issues and responses

Issue	Issue Details	Response	Ref no.
Maitland City Council			
Accessibility	Maintain accessibility to the Pacific Highway within similar proximity to the existing access points at John Renshaw Drive. Ideally a proposed interchange would be a full one.	Interchanges would be provided at the F3 Freeway and with the Raymond Terrace Bypass. The viability of providing additional interchanges will depend on a range of issues including engineering, environmental, traffic, social and economic considerations.	18
Flooding	Ensure that the flood management issues associated with the upgrading of the Pacific Highway are addressed in the environmental assessment to the extent that upgrading the highway does not cause additional flood plain impact in the Maitland LGA. It is noted that Route Option A could result in flood management issues specifically for Woodberry and Thornton, especially with road construction and an additional crossing of the Hunter River.	A numerical flood model has been constructed which extends from Green Rocks to Newcastle Harbour. The model has been calibrated against real flood events and will be utilised to determine the magnitude and location of openings required for the passage of floodwaters without adversely affecting the existing flow depths, velocities and inundation duration. By varying the magnitude and location of openings, both route options were shown to provide viable alternatives.	19
Newcastle City Council			
Aboriginal archaeology	There is little discussion in the RODR of outcomes achieved through consultation by the RTA with representatives from the Maaiangal Clan, and the Mindaribba, Worimi and Awabakal Land Councils. Council would expect continuing consultation with appropriate representative groups by the RTA to minimise impacts on this culturally sensitive area.	Investigations to date have been undertaken to identify areas of cultural and archaeological significance in consultation with traditional land owners. Contact is being maintained with Mindaribba and Worimi Local Aboriginal Land Councils. Studies and consultation will continue to be undertaken with Local Aboriginal Land Councils (LALC's) to further define and assess cultural and archaeological significance.	20

Issue	Issue Details	Response	Ref no.
Freight hub	The RTA should make allowances within any considered options for increased freight movement in the area and linkages between the intermodal freight facility (identified within the Draft Lower Hunter Regional Strategy) and the new link.	Full interchanges would be provided at the F3 Freeway. There are opportunities for additional interchanges and connections with the existing highway and these will be investigated during refinement of the preferred route. The existing road network will continue to function to provide connections to Newcastle or the New England Highway, with the addition of the proposed Weakleys Drive interchange.	21
Pedestrians and Cyclists	Pedestrian and cyclist movements should be considered at appropriate locations, given the numerous roads that may result from the options, in addition to crossing and movement along the highway.	Where the preferred route interrupts or separates existing bicycle or pedestrian routes, alternative routes would be provided.	22
Visual amenity	The RODR indicates that both options require the construction of major structures to cross the Hunter River, existing Pacific Highway and Main Northern Railway. The vertical clearances required and the length of these structures indicates either option will have considerable impact upon the visual amenity of the area. In particular, there are concerns on how Section B2 through Hexham can be designed to minimise impacts on visual and amenity issues. A new crossing on the floodplain west of the river (Section A2) would also be expected to impact significantly on visual and amenity issues.	The Preferred Route requires a new bridge over the Hunter River. The structure would extend to the east and west of the river to accommodate the passage of floodwaters. The new structure would be in close proximity to the existing Hexham bridges and the urban design and integration of this structure with the existing built environment will require consideration. Urban design and visual assessment is an integral part of the project development and will continue through to the formal environmental assessment stages of the project.	23
Noise and vibration	Given the potential elevation of the F3 extension significant measures will be required to mitigate noise and vibration. These impacts are potentially significant in the consideration	A preliminary noise assessment for both route options has been undertaken. The ECRTN noise guidelines have a number of different tolerances for increase in noise depending on for	24

Issue	Issue Details	Response	Ref no.
	of a preferred option to the amenity of this semi-rural environment.	example, if the new road is the upgrade of an existing road, if the new road is a new route or if the current noise limits are already exceeded. Further environmental assessment will be undertaken for the preferred route.	
Community impacts	Council notes that a number of properties will be affected by either route option, including Council owned land in the western section of the study area. The level of detail provided is limited and comments on how either route will affect these properties are not possible at this stage.	Further investigation into the community impacts of A3 and B3 were undertaken before the preferred route was selected. Concept design will be carried out and further refinements will aim to reduce the extent of property impact. At that time, the exact quantity and location of property acquisition would become known.	25
Air pollution	There is little discussion on what measures will be used to mitigate the effects of increased air pollution and what properties are likely to be affected. In particular, it is envisaged that the impact of air quality for Hexham would be significant given the predicted future growth in traffic.	The predicted future growth in traffic does not include any latent demand or traffic attracted to the new route that does not already pass through the study area. Therefore, residences and business would only experience increased air pollution if the link is located closer to their property than the existing route. The upgrade would enable vehicles to travel at a constant speed, which is more efficient than operating in a changing speed environment. The increase in efficiency should result in an overall reduction in vehicle emissions when compared to the 'do nothing' case. Potential air quality impacts will be considered during the environmental assessment of the preferred route. This assessment will consider impacts in more detail and suggest measures to mitigate impacts.	26
Flood management	The continuation of the collaborative arrangements that give access to full supporting information and rationales is requested.	The project team will continue to collaborate with Newcastle City Council on flood management issues.	27

Issue	Issue Details	Response	Ref no.
Hydraulics and hydrology	It is unclear at this stage how the road would be constructed across the floodplain however locating the road on the western side of the river would require a new infrastructure corridor across the floodplain, with associated impacts. The style of construction will have a substantial bearing, and therefore potential impact, on floodplain hydrology. Located it on the eastern side of the corridor would presumably require widening of the corridor but would also contain impacts within or near the existing corridor and would limit hydrological impacts.	A numerical flood model has been constructed which extends from Green Rocks to Newcastle Harbour. The model has been calibrated against real flood events and will be utilised to determine the magnitude and location of openings required for the passage of floodwaters without adversely affecting the existing flow depths, velocities and inundation duration. By varying the magnitude and location of openings, both route options were shown to provide viable alternatives.	28
Biodiversity and threatened species	Location of the road as far away as possible from Hexham Swamp would ensure best possible retention and management of biodiversity values.	The project team is aware of the importance of these sites. The alignment of route options has been developed to minimise encroachment on these sites. The potential indirect impacts were considered during the assessment of the feasible route options. Option A1, selected for the Preferred Route provides a greater buffer than Option B1.	29
Wetlands	The location of the road as far away as possible from the northern side of Hexham Swamp would facilitate maximum buffer width and opportunities for future natural resource management around the swamp margin, which would be preferred.		
Tomago Sand Beds	It is recognised that while the proposed Section B3 is located close to the edge of the Tomago Sand Beds, it will still remove a significant area of high quality and recognised regionally significant habitat. It is appreciated that options to avoid this are limited, however if this option is selected there should be no further ribbon development to the east of the new road to enable retention of these regional values.	A proportion of the vegetated land to the east of Heatherbrae is zoned 4a Industrial and is likely to be developed in the future. The preferred route has been modified to reduce impact on the Tomago Sand Beds and this habitat. Appropriate mitigation methods will be developed.	30

Issue	Issue Details	Response	Ref no.
Remnant Bushland	It is considered that the alignment of Section A1 should be moved further to the north, adjacent to John Renshaw Drive to protect remnant bushland with significant environmental values.	An alignment to the north of Section A1 was considered during the route options investigation. This route did not decrease the actual area of clearing, presented a number of engineering difficulties and substantially increased cost.	31
Compensation	Whichever option is chosen, it will affect remnant bushland. Council's Asset Manager will need to be consulted on this issue, which may present opportunities for compensation, such as purchase of other strategic lands buffering Hexham Swamp for biodiversity and other values.	RTA will consult with the relevant Council representative if and when acquisition of council land is required.	32
Preferred routes	Due to the lack of detailed investigations undertaken within the RODR concerning ecological, archaeological, visual and environmental impacts, Council is unable to make an informed decision on a preferred option.	The route options development phase involved various studies including engineering, environmental, social and economic at a suitable level to enable differentiation between the two options in the three sections. Further studies will be undertaken to further quantify key issues such as ecology, social and community, urban design and visual impacts, noise, traffic, and engineering. These studies will further inform the selection of a preferred route.	33

4.5 Community submissions

Issues arising from community submissions received during the Route Options Display from Friday 21 October to Friday 2 December 2005 are presented in **Table 4.5**. The table includes brief responses to each issue. More details, including the results of further investigations, included in the **Preferred Route Report**, completed in August 2006.

Table 4.5: Community submission issues and responses

Issue	Issue Details	Response	Ref no.
Property acquisition and land use	An alignment through Heatherbrae would require acquisition of flood free private land.	The Preferred Route would require the acquisition of flood free private land. Concept design will be carried out and further refinements will aim to reduce the extent of property impact.	34
	The central section of the		

Issue	Issue Details	Response	Ref no.
	alignment should consider the Dairy Farmers operational requirements.	The Project Team will work with Dairy Farmers to address their operational requirements.	
	Industrial land is more expensive to acquire than other land and is being avoided.	Industrial land was not avoided per se. The preferred route was selected to provide the best overall balance between functional, environment, social and economic considerations.	35
	In section two, both alignments traverse undisturbed floodplain.	Both options traversed the Hunter River flood plain. A series of bridges and culverts would be utilised to provide for the passage of floodwaters, fauna movements and local drainage. Where the Preferred Route alignment would be constructed on embankment, shallow batter angles would be utilised to blend the upgrade with the existing environment.	36
Socio economic	Strip acquisition through Heatherbrae would diminish our business viability.	Further investigation was carried out into the socio economic, community and environmental impacts of both Option A3 and B3 and these issues were taken into account before the Preferred Route was selected. Concept design will now be undertaken and further refinements will aim to reduce the extent of property impact. Provision of partial interchanges at either end of Heatherbrae will allow traffic from the upgrade to access Heatherbrae Services.	37
	An alignment through Heatherbrae would sever the community.		
	An alignment through Heatherbrae would reduce property values in Heatherbrae.		
	Businesses will lose passing trade due to limited access and noise walls obstructing visibility if the highway goes through Heatherbrae.		
	Bypassing Heatherbrae will result in less impact to business and residents.		
	Businesses will suffer if Heatherbrae is bypassed due to loss of passing trade.		
	It is best to use the existing highway infrastructure corridor for the upgrade through Heatherbrae.		
	A through town route would bring roads closer to our homes.		

Issue	Issue Details	Response	Ref no.
	The bypass option would pass through the Weathertex Factory or areas required for its operation resulting in the factory shutting down and loss of a significant employment centre.	The Preferred Route passes through land owned by the Weathertex Factory. Consultation is ongoing between the Project Team and the Weathertex Factory owners to refine the alignment through this area to avoid key operational infrastructure and to avoid closure of the factory.	38
	RTA has made up their minds on an alignment.	All feasible route options and combinations were considered in the development of route options and the selection of the Preferred Route. The Preferred Route was selected to provide the best overall balance between functional, environment, social and economic considerations.	39
Access and connectivity	Access to property via service roads would be difficult under a through town option.	Local traffic connectivity could have been maintained under the schemes that were developed for Option A3.	40
	Connectivity to the expanding Port and Newcastle Airport is vital and should be maintained through a new connection to Tomago Road and or Masonite Road.	The expansion and subsequent increase in traffic volumes to Newcastle Port and Airport through Masonite and Tomago Road is acknowledged. The viability of providing additional interchanges will depend on a range of issues including engineering, environmental, traffic, social and economic considerations.	41
	Under A3, Pedestrians need to cross the highway. Bus routes need to be maintained. This is an issue particularly for school students.	Under option A3, a pedestrian overpass or underpass would have been provided to maintain connectivity. Bus routes would have utilised the service roads. Direct access to the highway would not have been provided. Service roads would have connected to the upgrade at interchange locations only.	42
	Existing access to property needs to be maintained.	For either option, access to existing properties would be maintained although direct access to the highway would not be provided. Service roads would connect to the upgrade at interchange locations only. If an underpass or overpass is required to maintain the access, this will be	43

Issue	Issue Details	Response	Ref no.
		considered during the concept design stage on a property by property basis.	
	Service roads under the through town option will make the journey to our destination in Heatherbrae longer.	Under Option A3, the length and time of the journey to local destinations may have increased. Service roads would have connected to the upgrade at interchange locations only.	44
Urban design and visual impact	Noise walls required for the through town option would be visually offensive.	The potential visual impact of a through town route was one of the factors considered in choosing the Preferred Route. Had the through town route been chosen, urban design and landscaping strategies and noise mitigation measures would have been utilised to reduce the impact.	45
	An alignment through Heatherbrae would have a significant visual impact.		
Construction	An alignment through Heatherbrae would result in noise, dust, and reduced access to property.	Mitigation measures during construction would be developed and documented in the Construction Environmental Management Plan.	46
	Business would not survive the construction period if the alignment passes through Heatherbrae.	Access to businesses would be maintained during construction by routing traffic through service roads.	47
	The bypass option could be constructed while the existing highway services traffic.	The Preferred Route could be constructed while the existing highway provides an alternate traffic route.	48
	Construction vibration will damage my house.	A dilapidation survey would be undertaken before construction. Damage to buildings resulting from construction would be rectified.	49
Flora and fauna	The Botanical Gardens should be avoided.	Substantial environmental investigation has been undertaken to identify significant environmental areas. Port Stephens Council's Koala Management Plan has also been consulted. All areas of core and supplementary Koala habitat have been identified. Core areas have been avoided. Where contact with supplementary areas is unavoidable, suitable mitigation measures will be employed. Wetlands and the Botanic Gardens have been identified as areas that should be avoided. Option A would have required some acquisition of the	50
	Wetlands should be avoided.		
	In section one both alignments pass through the ironbark forest and impact flora and fauna. The alignment should be moved further north.		
	Koala habitat needs to be protected.		
	The native vegetation and ground water reserves in the Tomago Sand Beds should be protected.		

Issue	Issue Details	Response	Ref no.
	People are more important than the flora and fauna and the alignment should bypass Heatherbrae.	cleared fire break area fronting the existing Pacific Highway. The Preferred Route requires acquisition of degraded land from the north east corner. Concept design will be carried out and further refinements will aim to reduce the extent of impacts on flora and fauna. A formal environmental assessment will now be undertaken following announcement of the preferred route. This assessment will identify the potential impacts on flora and fauna in more detail, and the measures proposed to manage these. The mitigation measures identified to manage the impacts would be incorporated into the Environmental Management Plan.	
Noise and vibration	Noise and vibration issues are already significant in Heatherbrae. Increasing the speed of traffic to 110 km/h through Heatherbrae will increase noise and vibration reducing our amenity.	A preliminary noise assessment was undertaken for both route options. The ECRTN noise guidelines have a number of different tolerances for increase in noise depending on for example, if the new road is the upgrade of an existing road, if the new road is a new route or if the current noise limits are already exceeded. Further environmental assessment will be undertaken for the preferred route.	51
	Noise barriers would block the visibility of businesses through Heatherbrae.	Noise walls were unlikely to be required to meet ECTRN guidelines for commercial buildings on the eastern side of the existing Pacific Highway. Further environmental assessment will be undertaken for the preferred route.	52
Air quality	A through town option will result in more vehicle emissions and resulting pollution fall out. Children at the Hunter River High School would be affected.	The predicted future growth in traffic does not include any latent demand or traffic attracted to the new route that does not already pass through the study area. Therefore, residences and business would only experience increased air pollution if the link is located closer to their property than	53

Issue	Issue Details	Response	Ref no.
		the existing route. The upgrade would enable vehicles to travel at a constant speed, which is more efficient than operating in a changing speed environment. The increase in efficiency should result in an overall reduction in vehicle emissions when compared to the 'do nothing' case. Potential air quality impacts would be considered during the environmental assessment of the preferred route. This assessment would consider impacts in more detail and suggest measures to mitigate impacts.	
Flooding	Flood levels upstream will increase when the upgrade is built. The alignment across the floodplain will block the passage of floodwaters. Flood impacts should not be underestimated.	A numerical flood model has been constructed which extends from Green Rocks to Newcastle Harbour. The model has been calibrated against real flood events and will be utilised to determine the magnitude and location of openings required for the passage of floodwaters without adversely affecting the existing flow depths, velocities and inundation duration. By varying the magnitude and location of openings, both route options have been shown to provide viable alternatives.	54
Service centres / rest areas	Existing service facilities should be maintained.	Access to Beresfield Highway Service Centre will be maintained through a full interchange at Black Hill. For the Preferred Route partial interchanges are proposed to the east and west of Heatherbrae to enable north or southbound traffic on the upgrade to pass through Heatherbrae. Under Option A3 access to service facilities would have been via service roads. Further investigations into interchanges arrangements will consider access to service facilities in Heatherbrae.	55

5 Submissions received since the Route Options Display period

Following the route options display, consultation activities continued within the study area, with a focus on the Heatherbrae community. Meetings with property owners and stakeholders are ongoing.

This chapter documents the consultation that occurred between Friday 2 December 2005 and Friday 17 March 2006.

The clg met on Tuesday, 17 January to discuss the Value Management Workshop and resultant further investigations.

In total, nine feedback forms have been received since Friday 2 December 2005, when the route options display closed. Four of the six forms were from residents of the Heatherbrae area, who suggested B3 was a better route option than A3 on the basis of construction impacts and the impact on properties and businesses.

In addition, 18 letters have been received since Friday 2 December 2005. The majority of these are from Heatherbrae residents to Port Stephens Council which were forwarded to the Project Team. The letters included issues related to construction, access, safety and property impacts.

A petition sent to John Bartlett, MP which was forwarded to the Minister for Roads contains approximately 200 signatures in support of the Option B3.

The project information line has remained active and 21 calls have been logged since the end of the route options display period

5.1 B3 Option Group

The residents of Kingston Parade and Elkin Avenue formed a community action group (the B3 Option Group) to support Option B3 over Option A3.

The Project Team met with the B3 Option Group in Heatherbrae on Tuesday 28 February 2006 to discuss the route options and to listen to the concerns and key issues that the group have in relation to option A3. These issues were:

- Vibration.
- Quality of vegetation in B3 area, referred to as 'bush'.
- How much noise would be generated and how it would affect residents.
- The connection between Raymond Terrace and Kingston Parade is essential.
- There will be long term impacts from the project.
- The project will affect property values.
- There is potential to relocate vegetation before disturbance.
- People's homes are valuable.
- Business will be impacted more with A3.
- Concern about short term impacts during construction relating to time, people and businesses.
- Air pollution.
- Bus stops for the high school.
- Pedestrian crossings.
- Some bushland is zoned industrial.

6 Next steps

6.1 Value Management process

The Value Management process included a workshop held on Thursday 8 and Friday 9 December 2005 with representatives from a range of government agencies, councils and the community. These included:

Government

- Department of Environment and Conservation (DEC).
- Department of Planning (DoP).
- Department of Natural Resources (DNR).
- Department of Primary Industries (DPI).
- RTA (including the Maunsell project team).

Councils

- Newcastle City.
- Maitland City.
- Port Stephens Shire.

Community Interests

- Clg (three representatives).
- Mindaribba Local Aboriginal Land Council.
- Green Coalition.

A Value Management Workshop Report has been prepared.

6.2 Preferred route announcement

The information provided by the community following the Route Options Display, along with specialist technical investigations undertaken to date and the recommendations of the Value Management Workshop, has assisted in the selection of a preferred route.

The preferred route has been announced and affected property owners have been notified by letter and meetings have been offered to provide additional information on the implications and timing of acquisitions.

The preferred route announcement is being advertised and community displays provide detailed information on the preferred route and the reasons why it was preferred over the other feasible route option combinations.

Information is provided on the project website and a community update has been prepared to provide additional information. All people registered on the project database will receive a copy of the community update and it will be made widely available to enable the general community to be informed. Briefings will be undertaken with councils, the clg and other interest groups and individuals requiring further information.

Information will be provided on the next steps of the project focusing on the refinement of the preferred route road alignment and concept design and the preparation of an environmental impact assessment.

6.3 Further consultation

The Project Team will continue to consider the issues raised by the community and stakeholders through the next stages of the project (refinement of preferred route, development of the concept design and preparation of an environmental impact assessment).

The 1800 (toll free) Project Information Line was established in November 2004 and will continue to operate throughout the next phases of the project. The project website will also continue to be progressively updated throughout all stages of project development.

Regular Community Updates are proposed to provide ongoing information to the wider community.

The environmental impact assessment and supporting specialist studies will be publicly exhibited.

Appendix A – Submissions identification and issues

This table summarises the key issues from feedback forms and written submissions and provides a link through the reference number, to responses provided in Table 4.3, 4.4 and 4.5 of the main report.

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Akers	Kevin	N/A	Prefers Route A	33
AWD Lifts	N/A	N/A	Option A preferable as it is most direct A major road should be of best quality to reduce travel times Need motorways not highways The amount of cars will increase	33
Bailey	Doreen	110S	Access impacts of A3 Noise impacts of A3 Social impacts of A3 Business impacts of A3 B3 route already damaged	37, 41, 43, 40, 51, 52, 45
Bailey	Jen	110S	Noise impact from A3 Social and business effects from A3	37, 42, 51
Bailey	J	NA	A1, B2, B3 Least impact to industrial areas B3 least impact to residents and business	33, 55
Bailey	Doreen	110S	Prefer Option B Less impact on businesses Less impact on wetlands Noise impact arising from A3 Widening and acquisition impact arising from A3	34, 37, 51, 29
Battle	Suzanne	110G	Construction impacts of A3 Noise impacts of A3 Safety impacts of A3 Social and business effects of A3 The Pacific Highway will only get busier and belongs in the bush	37, 51, 46, 47, 48, 49
Battle	Ian	110D	Noise and vibration impact Access Prefer Option B	43, 51, 40, 44
Bell	Ian	9C	Prefer A1, B2 and B3 Less noise problems to house with A1 B2 more direct	33, 51
Benacquista	Frank	116	Noise and Vibration issues arising from A3 CLG representatives are biased Upgrade should use land zoned industrial	51
Benacquista	Tracey	116	Opposed to A3 Pedestrian access arising from A3 Bus routes under A3 Local connectivity impacts arising from A3 Community severance arising from A3 Construction impacts arising from A3	37, 42, 43, 46, 49, 44, 48

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Berry	Walter	135B	Engineering feasibility and cost should decide sections 1 and 2 Option B3 is favourable Doesn't believe impact of B3 to flora is significant Koala habitat is to the east of B3 Heatherbrae, Motto Farm and the high school would benefit from reduced traffic (B3) B3 impact to industrial area minor Construction noise and vibration arising from A3 Local access and connectivity impacts arising from A3	33, 50, 37, 43, 46, 49, 40
Billington	Linda	ID 266, 267	Intention to develop land means B is preferred (B3 specifically)	NA
Bott	A.W.	ID 80, 81, 83, 84, 85, 86, 90 Motto Farm Stud	Impacts to front of property seriously impact business A3/B3 Concern about noise/visual impact on business A3/B3 Less impact on residents and high school B Easier integration of Tomago Industrial Area B Least impact on traffic during construction	37, 51, 52, 41, 48
Bourke	David	NA	Cannot support that option that will close businesses and threaten livelihoods	37, 47
Stante	B	188	Prefers A3 if no land acquisition occurs and access roads are provided	34, 40, 43
Brain	Warren	NA	B3 will disadvantage businesses A3 will reuse the existing infrastructure corridor	37, 41
Brock	Ray	N/A	Prefers B1, B2, A3 Reduced access to commercial area from A3 B2 could include interchange at Tomago A1, A2 create pavement on floodplain - flood risk Concerned that ribbon development no longer being restricted in Heatherbrae	37, 41, 54, 36
Brooker	Fiona	Raymond Terrace Parks, Reserves and Tidy Towns Committee	B2 as less construction over floodplain A3 as less impact to bushland and botanic gardens Need to minimise impact to wetland at Windeyer's Creek. Ramps should be vegetated	29, 36, 50

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Buckingham	Ken	NA	Less impact on environment B1 Cost effective B2 Uses existing highway where possible B2 Best access to Newcastle Airport B2 Uses existing highway A3 Retains visibility for businesses A3	31, 41, 37, 55, 36, 50
Buckley	J	89	Noise impact from A3 Land acquisition, especially flood free land, from A3 Social and business effects from A3 B3 would not inconvenience the residents of Heatherbrae and Motto Farm	34, 37, 51, 40, 43
Budd	Graeme	DEC	Least effect on biodiversity of study area important Location of A1 along Chichester pipeline reduce impacts to bushland Threatened and significant flora and fauna impacted B3 Spanning structures and underpasses may be required Least impact on new noise receivers A	1 to 17
Burke	F	NA	B is best route Many ecological issues B B less impact on existing traffic	33, 50, 55, 44
Burton	Joan	2J	A is best route Both routes will have significant impacts Improving safety most important Limiting noise impacts important Impacts to fauna also need consideration	33, 1, 51, 50
Busch	Robert & Teresa	123	Supports B Increases of flooding incidents result from A Huge cost to mitigate impacts of A Increased noise and traffic hazard at high school A3	33, 15, 19, 51, 2, 42
Campbell	John	NA	Weathertex Factory - loss of employment centre, prefer A3	38
Cate	Faehrmann	Nature Conservation Council of NSW	Supports Option A Least environmental impact A Does not increase social and economic impacts A	50, 33
Chandler	Jim	N/A	Prefers Option B for superior access to Tomago Both options will increase safety and decrease travel time	41
Chapman	Doris	132	Noise effect of A3 Social effect of A3	37, 51

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Christie	Gary	ID 48, 72S, Dairy Farmers	Potential to significantly impact operations B2 Construction likely to impact on business B2 Generally against B2	46, 47, 37
Clark	S and F	110L	Pedestrian access / safety Bus routes Business viability Accessibility Prefer A1 A2 B3	37, 42, 40
Cleal	Mark J		Weathertex employee - impact on jobs and business viability B3	38
Cox	Russell	ID 184 Heatherbrae's Pies	Supports A3 to ensure survival of Heatherbrae's Pies	37, 55, 48
Crossley	Natalie	NA	Petition with 128 signatures supporting B3	NA
Diesel Pro		NA	A is best route	33
Doris	Chapman	132	Noise and vibration impact	51
Dowling	E	1M	Supports A1, B2, B3 B would have more significant construction impacts to traffic	33, 47
Eastern Tomaree Precinct		NA	Access to Tomago Road must be provided In section 3, the route should pass to the west of Heatherbrae	41
Edwards	Susan	NA	Supports B Least disruptive B3 Least impact on flooding B3 People should be considered before flora and fauna	33, 50, 46, 48
Etheridge	Peter	N/A	Prefers Option A3 - less impact on environment Flood risk should not be underestimated Koala habitat is a priority Noise should not be a problem to residents River navigation should be considered	50, 54, 51
Fenwick	T	NA	Weathertex employee - impact on jobs and business viability B3	38
Fidler	Steve	N/A	B2/ A3 do not separate local and highway traffic	40
Green	Gloria June	NA	Supports Option A Potential impacts to farming as could increase flood incidence A	54
Green	Selby	NA	Flooding - embankment impeding flows Loss of business / employer	38, 54
Green	Gloria	NA	Flooding - embankment impeding flows and effect on farm land	54
Greig	David	110P	Property impacts arising from A3 Noise impact arising from A3	37, 41, 51, 40

Surname	First name	Stakeholder ID	Issue summary	Reference no.
			Land value impact arising from A3 Community severance arising from A3 Need a connection to Newcastle Port / Airport / Tomago Traffic safety on existing route at Hexham	
Greig	David	110P	Safety impacts of A3 Social impacts of A3 Business impacts of A3 Heatherbrae would benefit as a rest and refreshment stop	37, 45, 55
Haidar	Malik	239	Prefers A3 Access essential to allow businesses to continue operations and employment	43, 37, 40
Harbrow	Paula	NA	Weathertex Factory - loss of employment centre, prefer A3	38
Harris	R	62, 63, 64, 65, 67, 72	Prefer Option B Accessibility Ease of construction B3 Connectivity to Tomago B2 Road safety B3 Flooding issues on A2	54, 48, 36, 40, 41
Hawin	Jane	NA	Community severance arising from A3 Reduction in property values arising from A3 Prefer Option B	37
Hayman	G and R	122	Object to A3 Noise walls Local access	43, 45, 52, 40
Henderson	Scott	Maitland City Council	Both options improve traffic flow and safety A could result in flood issues for Woodberry and Thornton	54
Hendriks	Tracie	NA	Supports B as avoids high school Ease of construction B Although B impacts environmental areas, avoids the most pristine Impacts to previously untouched land A2 Large impact on residents A3 B avoids excess exposure to electromagnetic radiation	33, 37, 50, 48, 25
Henty	Arianna	ID 188 BP	Maintain use of existing highway services A3	37, 55
Hughes	Paul	NAL	Option A2 and A3 may limit access to airport B2 could provide access but interchange is not specified	41
Jennings	Trevor	192	Access to bus depot must be maintained or improved Access roads are essential Option A3 is preferred over B3	43, 40, 18

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Jones	Steve	NA	Weathertex employee - impact on jobs and business viability B3	38
Kelly	John & Janice	110K	B is best route - less disruption to people	33, 37, 48
King	Peter	110H	Supports B B is safer Construction of B would have less impact to traffic Noise impacts to properties A	33, 51, 52, 55, 48
Lacey	Douglas	NA	Weathertex employee - impact on jobs and business viability B3	38
Lowe	James. F.	112	Supports B Impacts to residents of Heatherbrae A3 Most expensive due to major river crossing A Worst impact to flooding A Land acquisition from A3 Social and business effects from A3 Access effects from A3	19, 33, 34, 37, 43, 52, 54
Lowe	James	112	On behalf on B3 option group: Property impact arising from A3 Accessibility issues with A3 Noise impact arising from A3 Loss of vegetation arising from A3 Reduction in property values arising from A3 Acquisition of properties arising from A3	34, 37, 43, 50, 51, 52, 40, 45
Lubrano	P	NA	First class diversion is essential A more disadvantages than B B3 would enhance and be compatible with the industrial area Williamtown Airport upgrade not impacted by B Coal reserves under industrial area would no longer be quarantined and would be able to mine in that area	33
Lynch-Foster	Helen	55	Supports B Impacts to house and views A2 Noise and dust increases A2 Loss of grazing land A2 A2 would be complete disaster 1800 number is hopeless - just a recording	33, 22, 51, 34
MacDonald	Wendy	ID 38-43,51,52 Queensland Rail	Compensation would need to be agreed for any land take A2/B2 Structures would need to accommodate future expansion of rail tracks B2 Need height clearance B2 Support Option B as better access to land for development	34
Manning	G	NA	Road safety Businesses in Heatherbrae	37, 43, 45

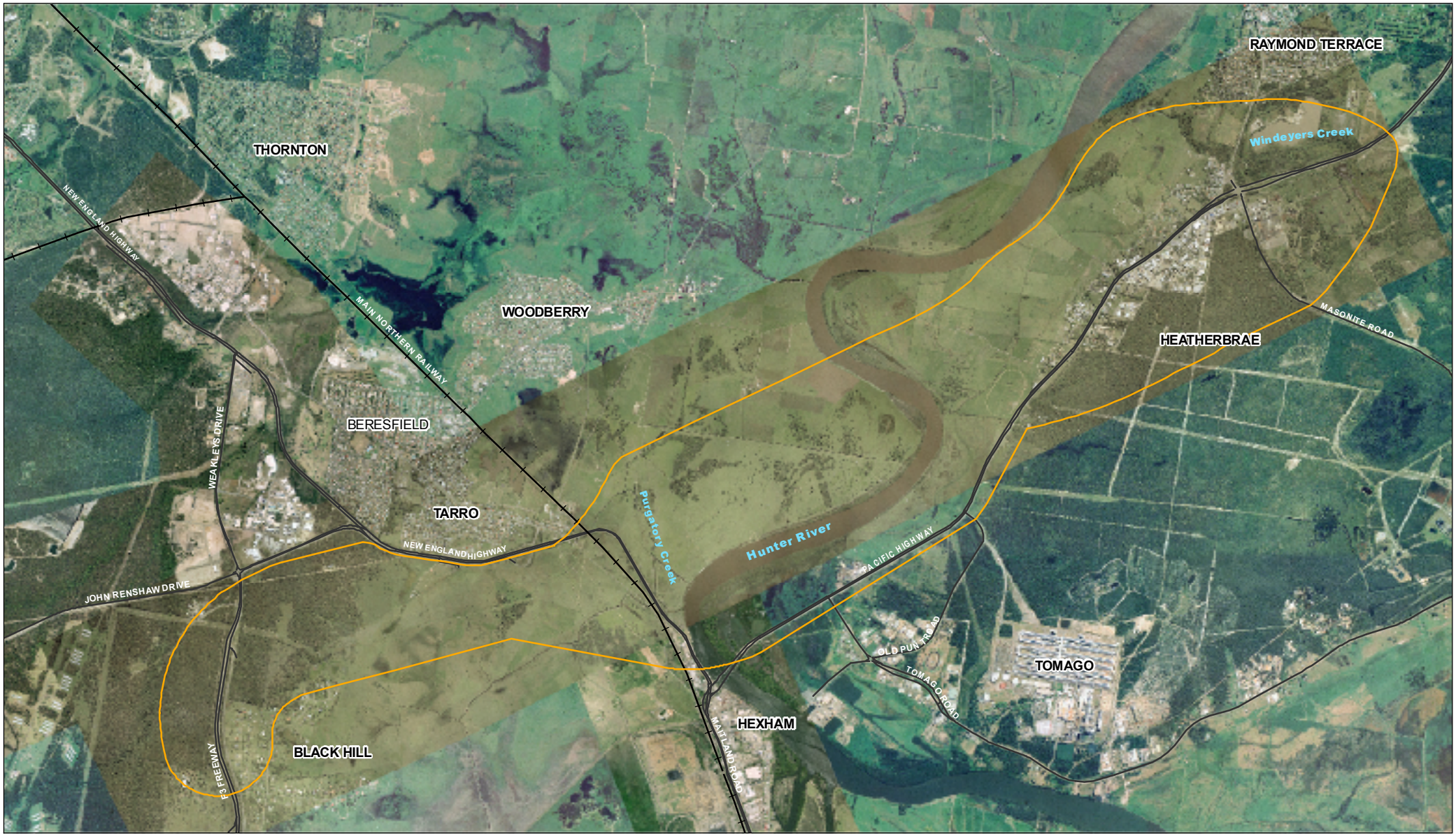
Surname	First name	Stakeholder ID	Issue summary	Reference no.
Marshall	M	NA	Supports A1, A2, B3 Construction would have less impact on traffic Less environmental impact A1, A2, B3	33, 46, 48, 50
Maxon		NA	Flooding - embankment impeding flows, upstream water levels	54
McGloin	Phil & Linda	N/A	Option A3 may retain visibility and access Option B3 would have negative business impact	37, 43, 45, 48
McMahon	Stephen	ID 186 Hungry Jack's	Maintain use of existing highway services A3 Options would result in no services between Bulahdelah and Wyong	55
Meredith	William	NA	Supports B Least impact on residents B Minimum traffic delays during construction B3	33, 37, 46, 48
Miller	Craig	On behalf of Tomago Aluminium Company Pty Ltd	Support B2 Improve access to Tomago Industrial Area B2 Less environmental impact B2 Severe visual impact A2 Significant impact to agricultural land A2	34, 45, 41
Morris	Cleeve	NA	Weathertex employee - impact on jobs and business viability B3	38
N/A	IDO Angels	Weathertex	Potential loss of employer	38
Not provided	Not provided	NA	Prefer Option B Noise and vibration arising from A3 Visual impact arising from A3 Air Quality impact arising from A3	45, 51, 53
Not provided	Not provided	NA	Weathertex Factory - loss of employment centre, prefer A3	38
Padmos	Peter	177,190	Prefers A3 to retain benefit of through traffic to business Negative impact on business from B3	37
Parr	J	NA	Noise impact arising from A3 Accessibility Prefer B3	43, 51, 41
Price	Leslie	88	Support B Community severance A3	37, 43
Randall	Denis	NA	Weathertex employee - impact on jobs and business viability B3	38
Raw	Ron	NA	Weathertex employee - impact on jobs and business viability	38
Rennie	Jim	3C	Severance of wetlands in section 2 The alignment in section 2 should be collocated with the existing highway, remaining on the northern side of the 330kV transmission lines Prefer option B3	50

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Richards	Alan	N/A	Little difference in Options Agricultural land is poor Impact on wetlands minimal	33,29
Russell	Alan	NA	Black Hill Interchange, Leneghans Drive turn off	43,18
Ryan	Steve	NA	Weathertex Factory - loss of employment centre, prefer A3	38
Searl	M.C.	225	Supports B3 A3 would soon be outgrown and no room for new lanes	33
Selim	Mohammed	NA	Concerned about Shell service station viability Reduction in passing trade Prefer A1 A2 B3	37
Sheather	John	262, 263, 264	Access to Tomago and Nelson Bay Prefer option B	41
Shepherd	Tony	118	Prefer B3 Lower cost for B3 Ease of construction B3 Less community impact B3 Road safety B3 Lack of detail at Route Options Display Native vegetation area is used for rubbish dumping, 4WD tracks Option A3 lacks future vision Not all businesses in Heatherbrae rely on passing trade Option A3 would degrade amenity Access impacts of A3 Land acquisition of A3 Noise impacts of A3 Safety impacts of A3 Social impacts of A3 Business impacts of A3	34, 37, 40, 50, 51, 52, 55, 33
Simpson	Robyn	N/A	Prefers Option B Underpass or overpass at Tomago essential for safety reasons	41
Simpson & Woodfull	Carol & Chris	3E	Support A1, A2, B3 Noise, during construction and after A1 and B1 impact rare Spotted Gum Ironbark Forest B1 alignment curves too sharply for 110 kph	33, 46, 51
Sims	Heather	Weathertex	Potential loss of employer Prefers Option A3	38
Smith	Ron	N/A	Option B preferable as will reduce journey times and heavy vehicle numbers	51
Smith	Danielle	135D	Prefers B3 Noise and air pollution impacts of A3 Social impacts of A3	37, 51, 53

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Smith	Belinda	ID 1AA, 1B, 3Q, 3R, 6, 6A, 7, 9, 11, 46, 53, 54, 60, Newcastle City Council	Both routes impact archaeologically and culturally significant areas Concern about how visual issues will be addressed B2 A2 west of the river would also have significant visual impact Locating new crossing adjacent to existing infrastructure positive B2 B3 will result in removal of regionally significant habitat Impacts to remnant bushland A1	45, 50
Smith	Stephen	135D	Supports Option B Noise and pollution A3 Improvements to road safety as further from residences B3 Less impact to high school B3 Negative impacts to property values (A3)	33, 37, 51, 55, 53
Snow	Anthony & Tina	120	Least disruption to residents and business B Increase access to local road A	37, 48
Statham	G	NA	Air quality impact arising from A3 Noise and vibration impact arising from A3 Access to property arising from A3 Reduction in property values arising from A3 Option B is favourable	37, 43, 51, 53, 40
Tompson	Kaye	ID240 - McDonalds	Use of existing facilities reduces the cost A3 Community benefit A3	55, 37
Unicomb	Stephen & Julie	Unknown	Construction impacts of A3 Pedestrian access impacts of A3 Option B3 would be cheaper B3 route already degraded	42, 46, 49
Unicomb	Julie & Stephen	NA	Opposed to A3 Air quality issues arising from A3 Noise issues arising from A3 Construction impacts arising from A3 Road safety Pedestrian safety Project cost, B3 is cheaper	42, 46, 51, 53, 48
Unknown	Lyle	Unknown	Either Option is better than existing situation	33
Wagner	Oscar & Joan	95,96	Prefer Option B3 Land acquisition of flood free land arising from A3 Social and community impact of A3 Visual impact of A3 Construction impacts of A3 Noise and vibration impacts of A3 Option B3 would be cheaper Option A1 and A2 alleviate pressure on road to Tomago area	34, 37, 45, 46, 51, 52, 48
Walker	Gary	NA	Weathertex employee - impact on jobs and business viability B3	38

Surname	First name	Stakeholder ID	Issue summary	Reference no.
Webster	Don	NA	Weathertex employee - impact on jobs and business viability B3	38
Wheeler	Wallace	N/A	Bridge structure over soft soils required to reduce repair costs Pylons should be protected from flood	54
Whittaker	B.E. & C.A.	134	RTA will make decision regardless of community opinions Noise and vibration resulting from construction A3 Believe noise would from A3 would make the sale of property very difficult Want compensation A3	39, 46, 51
Whittaker	Carol	134	Noise and vibration impacts of A3 Construction impacts of A3 Social impacts of A3 B3 has minimal impact on residents and businesses	37, 46, 49, 51
Williams	John	117	Supports A1/B1, B2, B3 Existing Pacific Highway could be service road Construction difficult A2 Disruption to traffic during construction should be minimised	33, 55, 48, 46
Woods	Glen	3L	A is best route - no interference with housing and industry	37
Wright	S	NA	B1, B2 and A3 preferred as use existing road where possible This option has least impact on flora and fauna Business have chance to survive with road options RTA will chose route regardless of community opinion	50, 37, 39, 55
Young	Daryl	N/A	Option A3 preferred for safety improvement in Heatherbrae Is it proposed to connect Route 123 Jesmond to Sandgate to the F3 connection to Raymond Terrace bypassing Maitland Road Hexham? Is it planned to connect Route 123 Jesmond roundabout with the Charlestown bypass west of John Hunter hospital?	33
-	-	NA	B is best route Construction impacts on residents A3	33, 46, 49
-	-	NA	Supports B B uses existing alignment where possible Least impact to environment and property B	33, 55
-	-	NA	Supports A1, A2, B3 Direct route for smoother traffic flow A1 and A2 A2 and B3 less impact on business	33, 37

Surname	First name	Stakeholder ID	Issue summary	Reference no.
			Environmental impact not significant long term B3	
-	-	ID 184, 185, 186, 188 BP, Hungry Jacks, KFC, Heatherbrae Pies	Maintain use of existing highway services A3	37, 55
-	-	ID 188 Rampage National Pty Ltd	Maintain use of existing highway services A3	37, 55
-	-	CAPB Group Pty Ltd	Concerned about impact on the Weathertex Factory irrigation area and operations arising from Option B3	38



LEGEND

- Study Area
- Major Roads
- Main Northen Railway Line

N

0 1 2 3 4

km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 1.1: STUDY AREA

Source: Maunsell, 2005; RTA, 2005; Sensis, 2005

LEGEND

- Major Roads
- Main Northen Railway Line
- 1% AEP Flood Extent

N

0 1 2 3 4

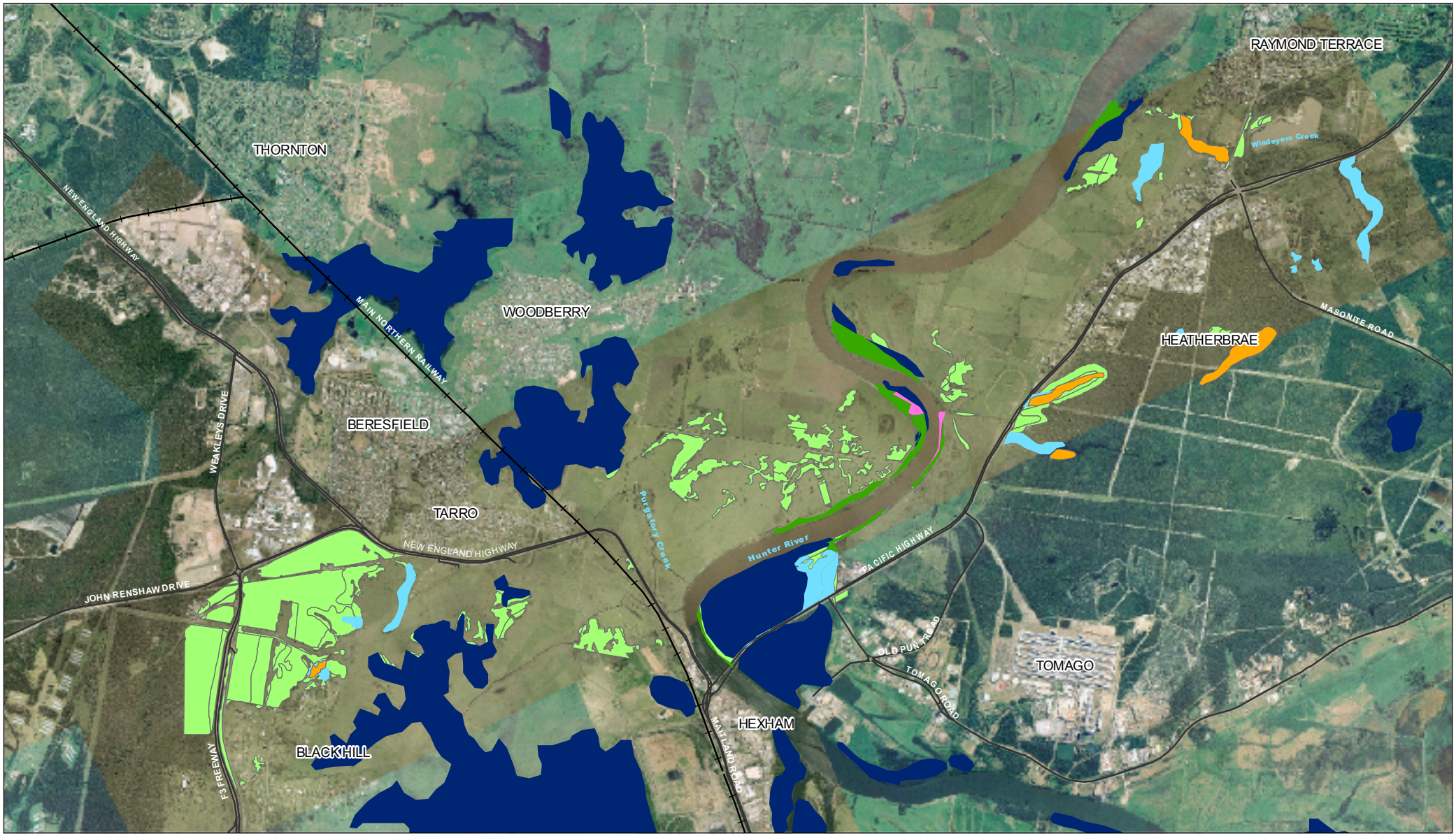
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 2.1: KEY CONSTRAINTS - FLOODING

Source: Maunsell, 2005; RTA, 2005; Sensis 2005; WBM, 2005



LEGEND

- Major Roads
- Main Northen Railway Line
- Endangered Ecological Communities
- SEPP 14 Wetlands
- Freshwater Wetlands (EECs)
- Mangrove
- Coastal saltmarsh
- SEPP 44 core Koala habitat

N

0 1 2 3 4

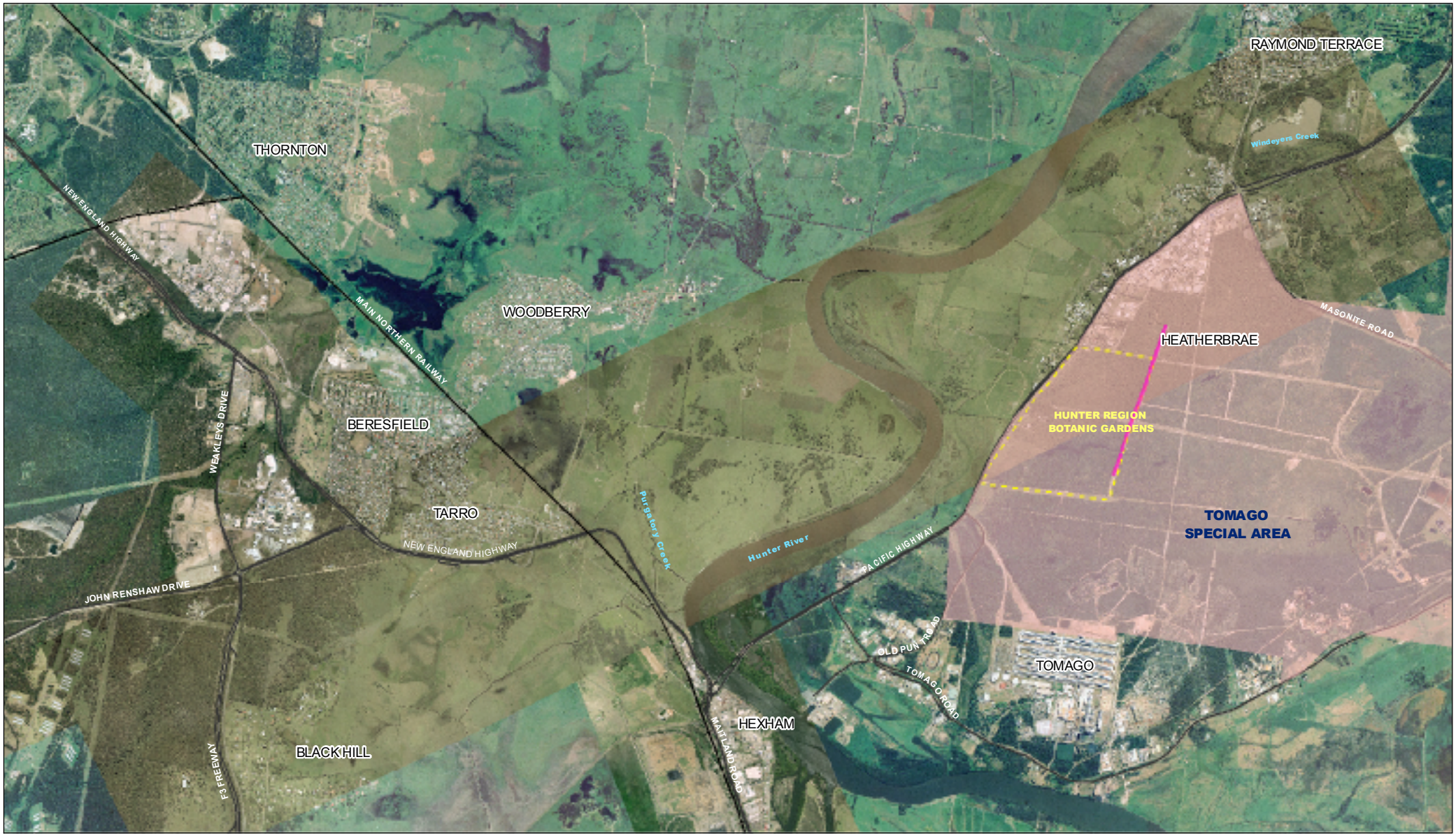
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 2.2: KEY CONSTRAINTS - ECOLOGICAL

Source: Biosis, 2006; Maunsell, 2005; RTA, 2005; Sensis 2005; WBM, 2005



LEGEND

- Major Roads
- Main Northen Railway Line
- Tomago Special Area
- Hunter Region Botanic Gardens
- Hunter Water Corporation boreline

N

0 1 2 3 4

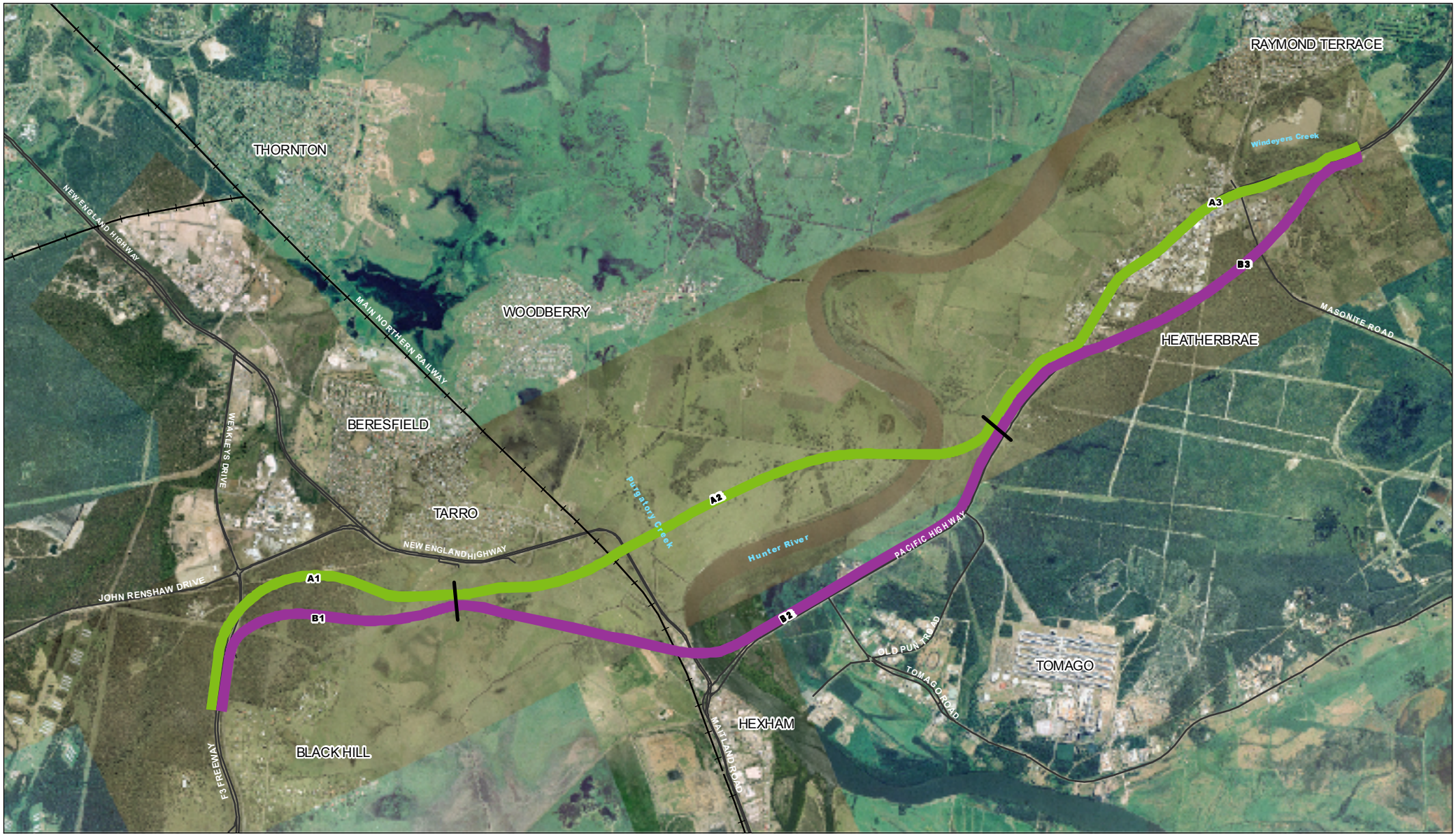
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 2.3: KEY CONSTRAINTS - TOMAGO SPECIAL AREA

Source: Biosis, 2006; Maunsell, 2005; RTA, 2005; Sensis 2005; WBM, 2005



LEGEND

- Option A (100m)
- Option B (100m)
- Major Roads
- Main Northen Railway Line

N

0 1 2 3 4

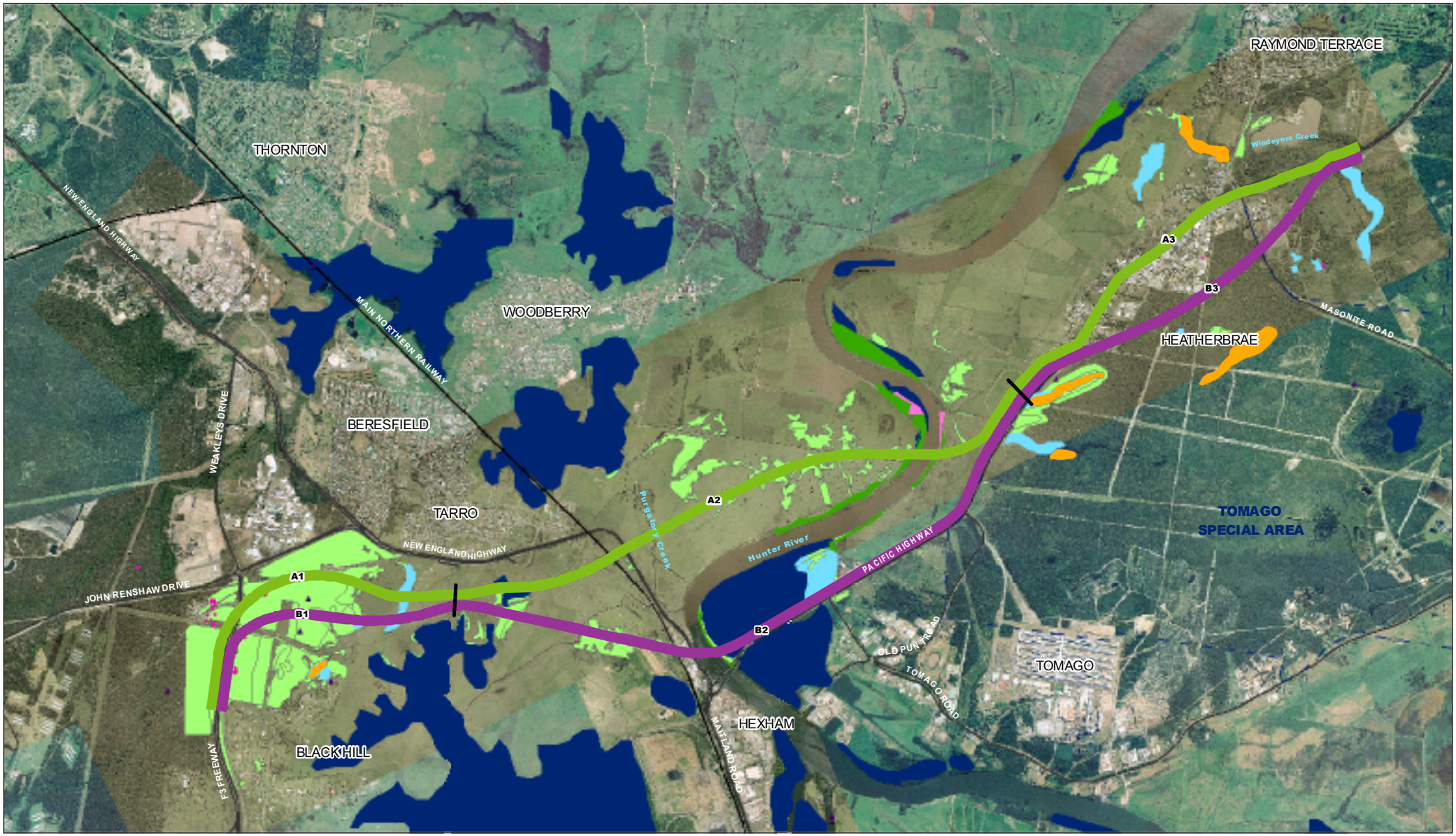
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 4.2: ROUTE OPTIONS DISPLAYED FOR PUBLIC COMMENT

Source: LPI 2004, Maunsell 2005, RTA 2005; Sensis 2005



LEGEND

- Option A (100m)
- Option B (100m)
- Major Roads
- Main Northen Railway Line
- SEPP 14 Wetlands
- Endangered Ecological Communities
- SEPP 44 core Koala habitat
- Freshwater wetland (EECs)
- Mangrove
- Coastal saltmarsh
- Tomago Special Area
- Threatened flora sighting
- Threatened fauna sighting

N

0 1 2 3 4

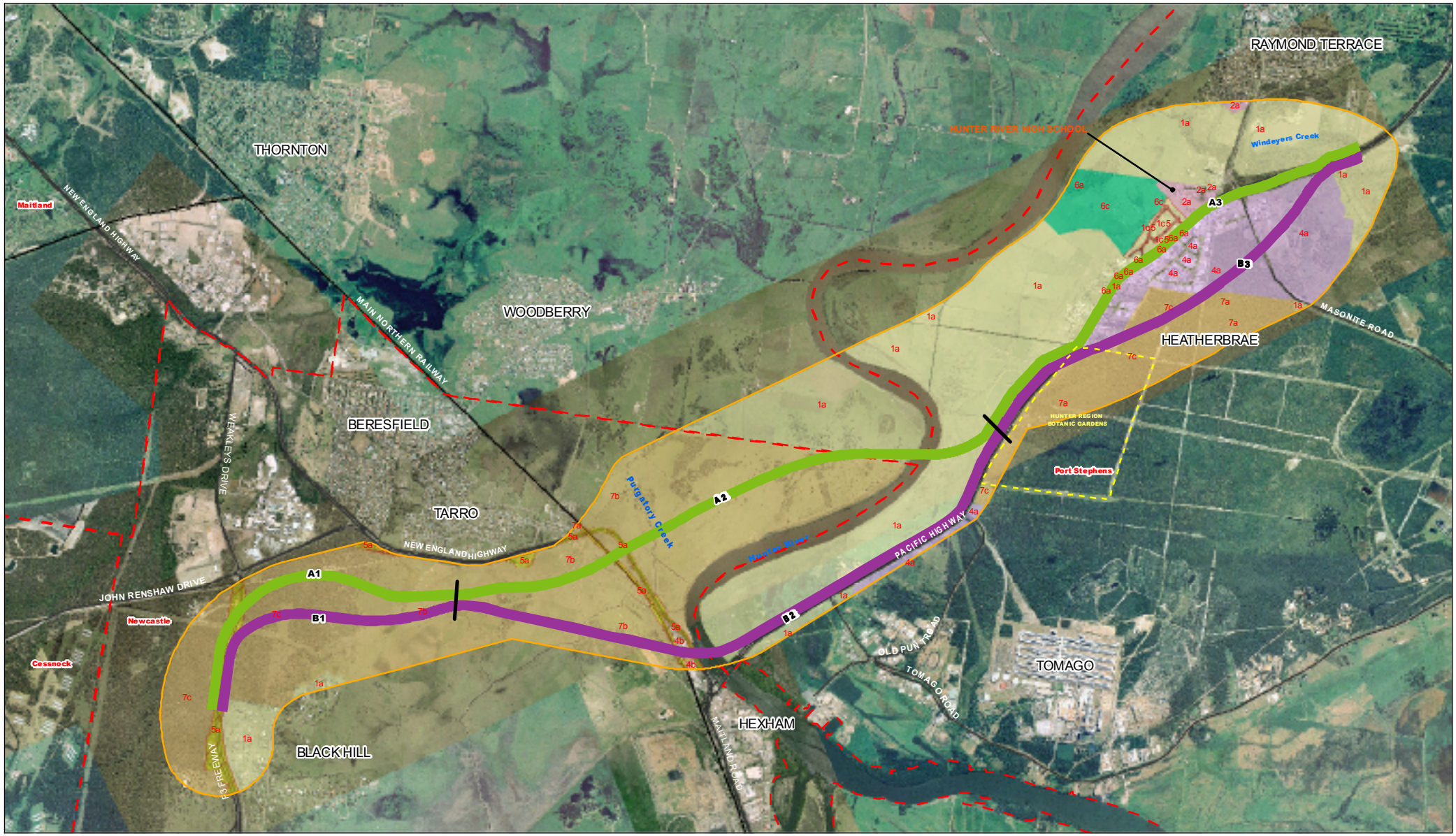
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 4.3: ECOLOGICAL CONSTRAINTS IN RELATION TO ROUTE OPTIONS DISPLAYED FOR PUBLIC COMMENT

Source: Maunsell (2005), LPI (2004), RTA (2004)



LEGEND

- Option A (100m)
- Option B (100m)
- Study Area
- Major Roads
- Main Northen Railway Line
- LGA Boundaries
- Hunter Region Botanic Gardens
- Residential
- Rural residential
- Business
- Industrial
- Special uses
- Recreation / open space
- Environmental protection
- National Park

N

0 1 2 3 4

km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 4.4: PLANNING CONSTRAINTS IN RELATION TO ROUTE OPTIONS DISPLAYED FOR PUBLIC COMMENT

Source: Maunsell 2005, RTA 2004, Port Stephens Shire Council 2004, Maitland City Council 2004, Newcastle City Council 2004, Sensis 2005

LEGEND

- Preferred Route
- Corridor
- Major Roads
- Main Northen Railway Line

N

0 1 2 3 4

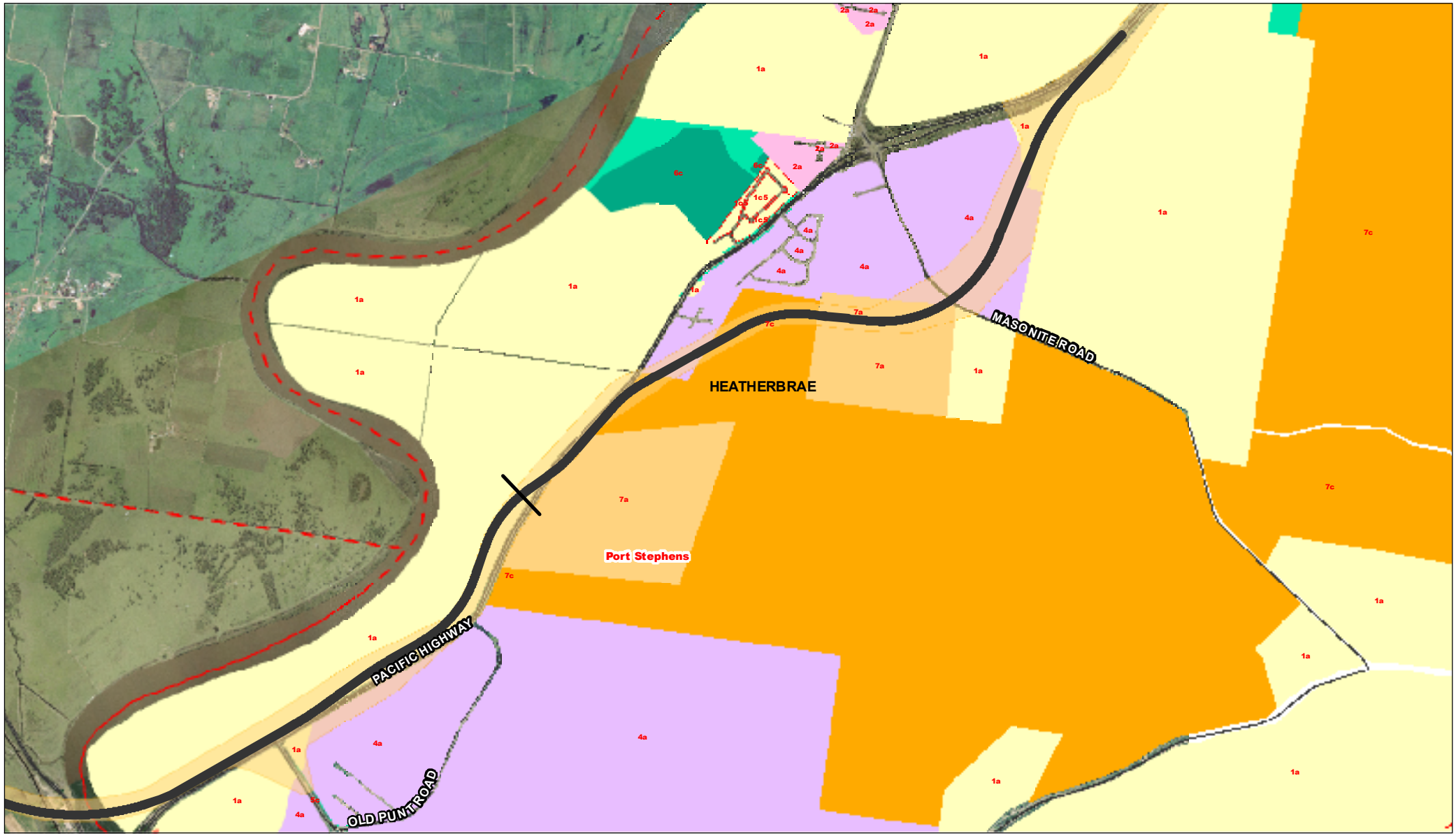
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 5.1: PREFERRED ROUTE

Source: LPI 2004, Maunsell 2005 & 2006, RTA 2004, Sensis 2005



LEGEND

- Preferred Route
- Corridor
- LGA Boundaries
- Preferred route corridor
- Major Roads
- Main Northen Railway Line
- Rural Agriculture "A"
- Rural Small Holdings 2000 Square Meters
- Residential "A"
- Industrial General "A"
- Recreation General "A"
- Recreation Special "A"
- Environment Protection "A"
- Environment Protection "C" (Water Catchment)

N

0 0.5 1 1.5 2

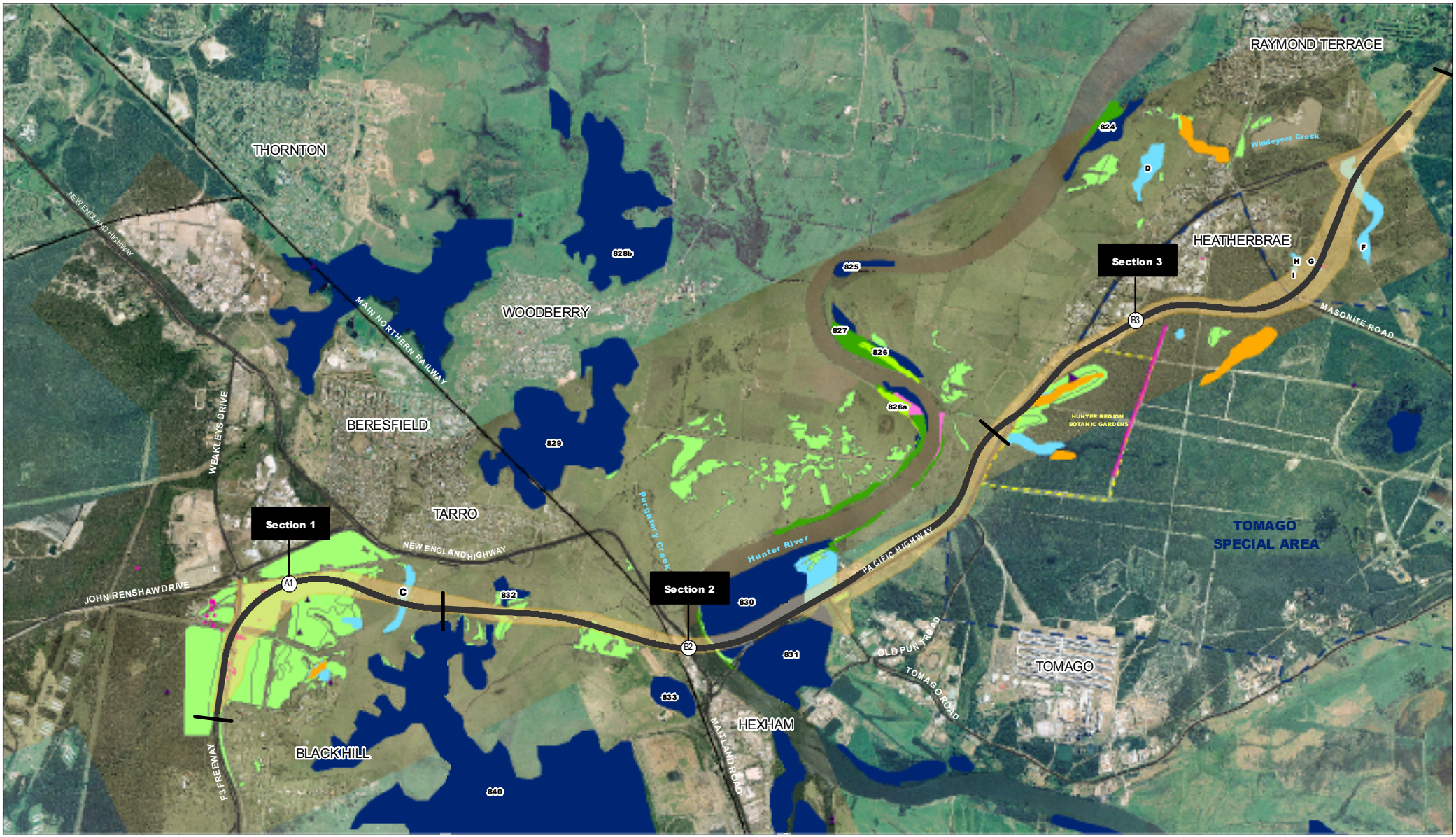
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 5.4: PLANNING CONSTRAINTS IN RELATION TO PREFERRED ROUTE - PORT STEPHENS COUNCIL

Source: Maunsell (2005), LPI (2004), RTA (2004), Port Stephens Shire Council (2004)



LEGEND

- Preferred Route
- Corridor
- Major Roads
- Main Northen Railway Line
- SEPP 14 Wetlands
- Sepp 44 core Koala habitat
- Hunter Region Botanic Gardens
- Endangered Ecological Communities
- Freshwater wetland (EECs)
- Mangrove
- Coastal saltmarsh
- Threatened flora sighting
- Threatened fauna sighting
- Tomago Special Area
- Hunter Water Corporation boreline

N

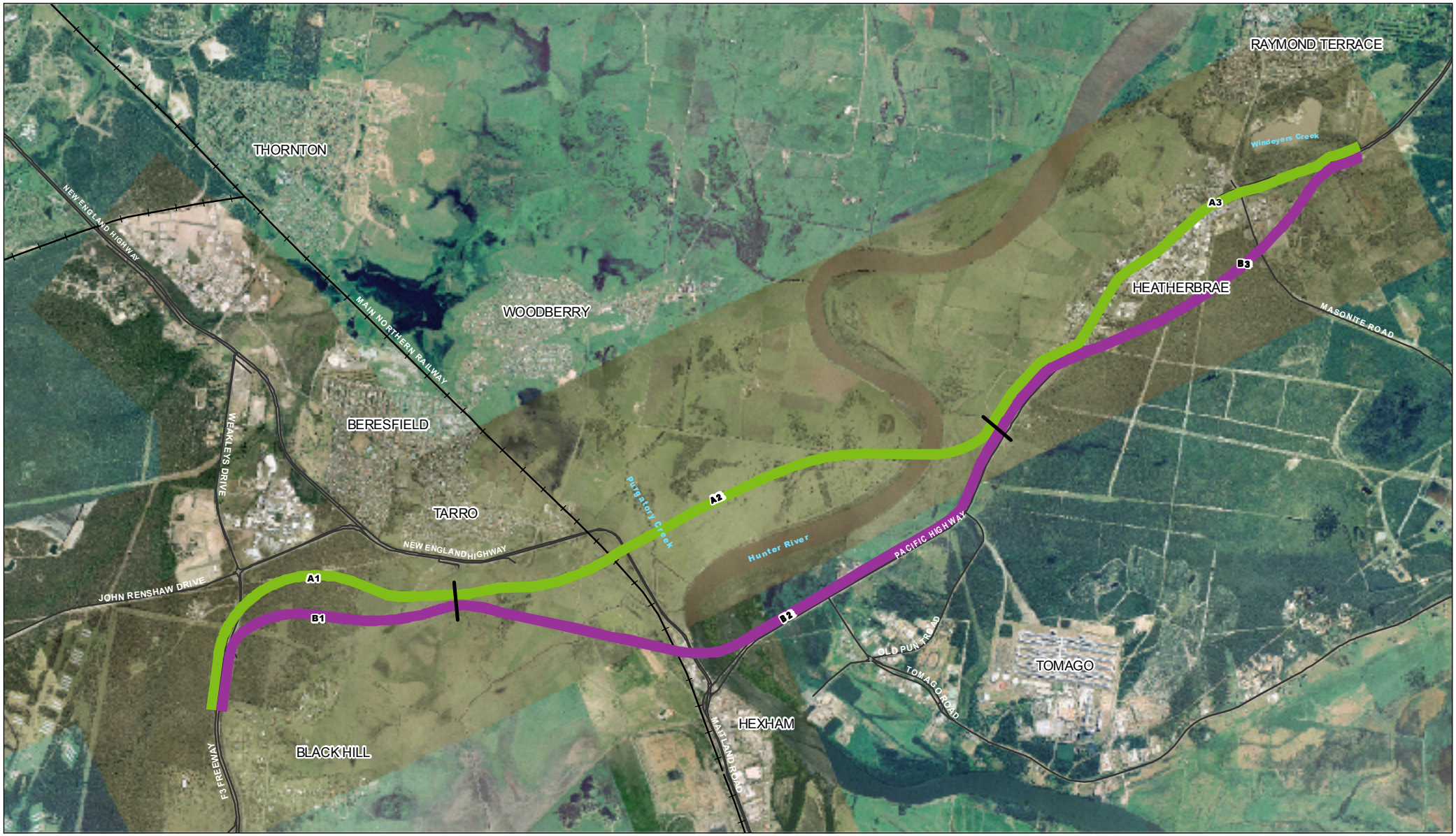
0 1 2 3 4
km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE 5.5: KEY CONSTRAINTS IN RELATION TO PREFERRED ROUTE

Source: Biosis (2005, 2006); Maunsell (2005), RTA (2004),



LEGEND

- Option A (100m)
- Option B (100m)
- Major Roads
- Main Northen Railway Line

N

0 1 2 3 4

km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE ES1.2: ROUTE OPTIONS

DISPLAYED FOR PUBLIC COMMENT

Source: LPI 2004, Maunsell 2005, RTA 2005; Sensis 2005

LEGEND

- Preferred Route
- Corridor
- Cadastre
- Major Roads
- Main Northen Railway Line

N

0 1 2 3 4

km

NSW ROADS AND TRAFFIC AUTHORITY

F3 TO RAYMOND TERRACE

FIGURE ES1.3: PREFERRED ROUTE

Source: LPI 2004, Maunsell 2005 & 2006, RTA 2004, Sensis 2005