Review of Environmental Factors

Newcastle inner city bypass – Shortland to Sandgate

June 2006

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Version 1

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Executive Summary

The Proposal

The Proposal is located approximately 8km northwest of Newcastle CBD and crosses the boundary between the suburbs of Shortland and Sandgate. The Proposal would be 1.8km in length and involve construction of a dual carriageway extension to the existing Jesmond to Shortland H23 connection. The main features of the Proposal would include:

- Dual carriageways including 3.5m lane widths, 1m inner shoulders, 2m outer shoulders and a variable width median up to 5m;
- Three bridges: Sandgate Road Overpass (60m in length); Deepbridge Creek and access road crossing (240m in length); and Main Northern Railway crossing (52.5m in length);
- Sedimentation basins to control runoff during construction and operation and provide additional habitat for the Green and Golden Bell Frog;
- An at grade signalised intersection between the Proposal and H10;
- A grade separated interchange at Sandgate Road; and
- Adjustments to power, water/sewer, telecommunication and gas utilities.

Statutory Position and Approvals

The Proposal involves the construction and operation of a public road. As the RTA would be undertaking these works, it is considered that the Proposal and associated activities are covered by Clause 13 and Schedule 4 of the Newcastle Local Environmental Plan 2003 (LEP).

Under zones 5(a), 5(b) and 7(a) of the Newcastle LEP, development identified in Clause 13 is permitted without consent. Clause 13 states that:

"Except as otherwise provided by this plan, the following do not require consent:
(b) utility undertakings described in Schedule 4 when carried out by a public utility…"

Schedule 4, Item 6 “Road Construction, maintenance etc”, goes on to state:

“The carrying out of any development required in connection with the construction, reconstruction, improvement, maintenance, repair or operation of any public road."

Therefore development consent from Newcastle City Council would not be required, and assessment of the Proposal may proceed under Part 5 of the Environmental Planning and Assessment Act 1979.

Need for the Proposal

Action for Transport 2010 - An Integrated Transport Plan for NSW was released in December 1998 and it outlines the transport system and road network improvements that are seen as necessary to cater for a growing and changing population, as well as expanding tourism and freight markets.

An integral part of the Government’s plan is a focus on strategic road network initiatives in
Sydney and the various regions of the State. The Proposal forms an integral part of the Newcastle Inner City Bypass and would contribute to the provision of access between the developing areas of western Newcastle, regional produce markets and Newcastle port. The Proposal is the remaining component of H23 that has provision for only one lane of traffic in each direction. As a result, the existing road is substantially congested, and does not provide efficient access to the wider road network.

**Other Options Considered**

A number of options have been considered as part of the project development process, which has included undertaking a route selection study and workshop in June of 1998. Though there have been numerous iterations, the following options have been considered more closely since 1998:

- **Option 1**: Involves utilisation of the existing corridor reservation between Shortland and Sandgate. The road design concept for Option 1 was developed using an alignment previously designed by the RTA, but with two alternative connection options where Option 1 rejoins the Pacific Highway (H10). These sub-options are as follows:
  - **Option 1A**: Full (grade separated) interchange connection.
  - **Option 1B**: Signalised (at grade) t-intersection connection.

- **Option 2**: Would involve a major upgrade of the Wallsend Road Corridor, including a grade separated interchange at the intersection of H10 and Wallsend Road and additional works at Wallsend Road / Rural Drive and Wallsend Road / Jersey Street intersection.

- **Option 3**: Would involve a new corridor through the area north of the BHP Research Laboratories, passing through the Shortland Waters Golf Course, bridging the Main Northern Railway and wetland area and requiring major signalised intersections with H23/Sandgate Road and H10.

The **County Route 14 (CR14) Option** commences in the south at University Drive and continues in a northerly direction before intersecting with Maitland Road and tying into Industrial Drive. This option includes bridging of the Main Northern Railway Line and Angophora Drive, grade separation of the Maitland Road intersection with ramps to CR14 passing under H10 and direct connection to Industrial Drive.

**Option 1** with a signalised (at grade) t-intersection connection at H10 (**Option 1B**) was chosen as the preferred option as it combines to provide the best solution in terms of design, economic, environmental and social outcomes.

**Community and Stakeholder Involvement**

Community and stakeholder involvement in relation to this Proposal was initially sought in 1998 as part of a route selection study and route selection workshop and provided key stakeholders with an opportunity to raise matters of concern regarding various alignment options. There was a public display of the preferred option (developed as a result of the route selection study) in September and October of 2002 which resulted in the receipt of fourteen (14) written submissions. Issues raised related to potential wetland impacts (including to the Green and Golden Bell Frog), social impacts (mainly road traffic noise), and concerns relating to operational impacts (intersection layouts, cyclist / pedestrian / property
access issues and public transport issues).

As part of this environmental assessment, the following relevant government agencies were contacted by letter (in January 2006) and provided with the opportunity to comment on the Proposal:

- Newcastle City Council;
- Hunter Water Corporation;
- The Department of Environment and Conservation (DEC);
- The Department of Primary Industries (Fisheries);
- Hunter-Central Rivers Catchment Management Authority;
- Australian Rail Track Corporation (ARTC);
- The Wetland Centre Australia;
- The (Commonwealth) Department of the Environment and Heritage (DEH);
- The Department of Natural Resources (DNR);
- The Department of Planning (DoP); and
- Various utility providers (Telstra, AGL, Energy Australia).

In summary, the issues raised by the various government agencies in response to the consultation letter related to:

- identification and assessment of wetland related issues;
- assessment and management of significant flora and fauna and vegetation communities that may occur in and around the study area;
- assessment and management of Potential Acid Sulphate Soils (PASS) and contaminated lands;
- ensure management of utility relocations / adjustments;
- appropriate archaeological assessment and consideration;
- assessment and management of other environmental issues including noise and water pollution and works in the vicinity of waterways;
- management of crossing of Deepbridge Creek (design and construction issues); and
- ensure consideration of existing and future rail configurations and rail access requirements.

**Environmental Impacts**

The REF assesses the potential impact of the Proposal on a variety of environmental aspects. Included is a consideration of the potential impact(s) of the Proposal on:

- Landform, Geology and Soils;
- Water Quality and Hydrology;
- Biodiversity;
- Indigenous and Non-Indigenous Heritage;
- Noise and Vibration; and
- Visual Amenity and Landscape

The following identifies and discusses the more substantial environmental issues identified by
the REF and associated specialist studies.

**Acid Sulfate Soils**
There is a high potential for acid sulfate soils (ASS) to be located within the Hexham Swamp soil type which is described as being well distributed in the local area and more specifically as occurring in the low lying areas adjacent to Wetlands Centre Australia and north of the Main Northern Railway.

The Proposal would be constructed largely on fill embankments and there is limited opportunity for erosion of in-situ soils to occur as a result of the Proposal. Piling works associated with the bridge over Deepbridge Creek would, however, have the potential to expose areas of high acid sulfate soil potential. These areas, while limited in extent, should they be disturbed and inadequately managed have the potential to contribute to a local reduction in aquatic habitat (water) quality.

Site specific management measures include the requirement to manage all in-situ soils excavated as part of the Proposal in accordance with the RTA’s *Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze 2005*.

**Biodiversity**
A specialist consultant was engaged to undertake a flora and fauna assessment of the study area. A total of 145 native and exotic plant species were identified within the study area that make up seven distinct vegetation communities including Reedland, Swamp Oak Forest, Paperbark/Hard Quandong Forest and Eucalypt Forest.

The remnant wetlands of Hexham Swamp, Newcastle Wetlands Reserve and Market Swamp are located near the study area and are listed under *State Environmental Planning Policy 14* (SEPP 14). The wetlands have been disturbed and modified by previous development in the area. Remnant wetlands within the study area are not defined as SEPP 14 but are considered to provide habitat for significant species and therefore are considered to have local importance.

The ecological assessment identified two threatened plant species and four Endangered Ecological Communities (EECs) within and/or adjacent to the investigation area, these being the Magenta Lillypilly, *Zannichellia palustris*, Swamp Oak Floodplain Forest, Freshwater Wetlands on Coastal Floodplains, River-flat Eucalypt Forest and Subtropical Coastal Floodplain Forest.

The study area contains areas that are considered as key habitat for twenty seven significant species (one amphibian species, nineteen bird species and seven mammal species). Ten significant fauna (bird) species were identified during field surveys of the study area; all are listed as migratory species under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A consultant was also engaged to undertake a specialist Green and Golden Bell Frog (GGBF) assessment. The assessment found that core GGBF habitat is present in the northern part of the study area however, no individuals were heard calling and no individuals were observed during intensive surveys undertaken as part of the assessment. Though no positive identifications were obtained, the GGBF assessment concludes that the GGBF is extant within the 2HD Swamp.

An assessment of the potential impacts of the Proposal pursuant to s.5A of the *Environmental Planning and Assessment Act 1979* was conducted for 14 Threatened Species.
and 4 EEC’s. The assessment concluded that the Proposal is unlikely to have a significant impact on the species and communities identified. The assessment also concluded that the Proposal would have a minor ecological impact on species and communities listed as threatened in NSW pursuant to the Threatened Species Conservation Act 1995 (TSC Act).

Assessment of the potential impacts of the Proposal pursuant to the EPBC Act was conducted for 17 Matters of National Environmental Significance consisting of 2 threatened fauna species and 15 migratory birds. It was concluded that the Proposal was unlikely to have a significant impact on those species.

A variety of measures have been provided within the REF to ameliorate the potential impacts of the Proposal on the flora and fauna species identified. The ameliorative measures include the preparation and implementation of a variety of management plans (flora / fauna, soil and water, weed management) by suitably qualified specialists, as well as provision of protective fencing around sensitive areas and establishment of permanent GGBF habitat post construction. Frog exclusion fencing would also be incorporated into the final design of the Proposal to reduce the incidence of roadkill particularly of GGBF individuals.

**Noise and Vibration**

A specialist consultant was engaged to undertake a Noise and Vibration assessment of the study area for consideration in this REF. As part of the assessment, noise data was obtained (through long term noise monitoring) that allows for the determination of existing noise levels at sensitive receptors along the proposed alignment, as well as for the prediction of the likely construction and operational noise environment as a result of the Proposal.

The investigation determined that construction noise levels at all representative receptors along the proposed alignment would likely be higher than the daytime criteria set by the Department of Environment and Conservation (DEC) in their Environmental Noise Control Manual (ENCM). As such, a variety of measures would be implemented to minimise construction noise levels and continued and targeted consultation with affected residents would be undertaken during the construction phase should the Proposal be approved. Construction vibration was also considered as part of the assessment. It was found that vibration levels would be well within relevant criteria (5mm/s peak particle velocity (PPV)) at most locations (the exception to this could be from piling during bridge works where levels of up to 6mm/s ppv could be experienced).

Road traffic noise levels (noise levels at receptors with introduction of Proposal) were calculated for all residences from the proposed H23 extension with surfaces of dense and open grade asphalt, and, concrete. Also modelled were results for traffic noise from Sandgate Road and H10 for the existing road network and following construction of the H23 extension.

The Proposal, where cost effective and feasible, is required to meet the night time criterion (L_{Aeq(9hr)}) of 50dB for a “new freeway or arterial road corridor”, as identified within the DEC document Environmental Criteria for Road Traffic Noise (ECRTN). Noise modelling results indicate that at receptors along the proposed alignment, the 50dB L_{Aeq(9hr)} criterion is exceeded. In meeting this criterion, the RTA would meet all other operational noise criteria for the Proposal. Therefore, during detailed design, the RTA would investigate a combination of treatment options to optimise road traffic noise mitigation and satisfy project objectives. These treatment options may include, but not be limited to quieter pavement surfaces, noise barriers and architectural (at house) treatments.
Visual Amenity and Landscape

The visual amenity of the local area is considered moderate, owing to a mixture of built and natural landscape features that while common in the local area, are regionally unique. The Hunter River flood plain, which includes a combination of open grass lands, and temporary and permanently inundated wetlands, is the dominant feature of the study area. In addition to the suburbs of Shortland and Sandgate, which include pockets of residential and commercial properties, notable built elements within the study area include the Main Northern Railway, Shortland Railway Station, and Sandgate Cemetery.

A specialist visual assessment and urban design strategy was developed for the Proposal, which identifies a general capacity of the landscape within the study area to accommodate the Proposal. The visual assessment and urban design strategy proposes an urban design framework that would incorporate the Proposal into its built and landscape context and avoid or minimise impacts on the local community and public space.

Socio-economic Considerations

During construction it is anticipated that the Proposal would cause delays to traffic along the existing alignment and has the potential to introduce a dust nuisance as well as visual and noise related impacts for residential properties (mainly to the east) of the Proposal corridor. During operation of the Proposal, there is the potential for a reduction in the amenity and outlook for residents adjacent to the proposed alignment due to operational noise, light spill and the physical scale of the elevated formation. The Proposal would also result in a number of positive socio-economic outcomes for the local and wider area, namely, the improved provision for cyclists, improved traffic (and freight transport) efficiency and safer intersection and corridor operation. Socio-economic impacts attributable to the Proposal would be managed through the implementation of safeguards outlined throughout the REF.

The early identification of the potential network alignment, and the subsequent reservation of this land by the local authority for this purpose, has ensured that development in the local area has been sympathetic to any proposed future road network development within this corridor. Highway 23 and the adjoining roads in this area serve to connect the suburbs of Jesmond, Wallsend, North Lambton, Birmingham Gardens and also the University of Newcastle.
Exhibition of the REF

This Review of Environmental Factors (REF) will be on public exhibition for comment during June and July 2006. You can access the REF in the following ways:

Internet: The REF will be available for full viewing from the RTA website at www.rta.nsw.gov.au.

Exhibition: Copies of the REF can be viewed at the following locations:

- **Wallsend Motor Registry** *
  Wallsend Plaza
  Kokera Street, Wallsend

- **Newcastle City Council**
  City Administration Centre
  282 King Street, Newcastle

- **RTA Regional Office** *
  59 Darby Street
  Newcastle

Purchase: Copies of the REF are available for purchase in hard copy ($25.00) or CD ($10.00) at locations marked with a * above or by calling the following person:

Philip Davidson
Phone: (02) 4924 0332

How can I make a submission?

To comment on the Proposal, please send your written comments to:

RTA Project Manager
Philip Davidson
Locked Bag 30
NEWCASTLE NSW 2300

Submissions close on 28 July 2006.

Please ensure that your submission is either typed or in clear handwriting. To make it easier to analyse and record your issues correctly, it would help if you could:

- List your comments in dot points where possible;
- Refer specifically to sections, including page numbers, of the REF;
- Include your name and address if you would like your submission acknowledged; and
- Indicate if you would like your name withheld from publication.

All information included in submissions is collected for the sole purpose of assisting in the assessment of this Proposal. The information may be used during the environmental impact assessment process by relevant staff and contractors, including the RTA’s Project Manager, RTA Planning and Environmental staff and/or the RTA’s REF contractor.
Where the supplier indicates at the time of supply of information that their submission should be kept confidential, the RTA will attempt to keep it confidential but there may be legislative or legal justification for the release of the information, for example under the Freedom of Information Act 1989 or under subpoena or statutory instrument.

The supply of this information is voluntary. Each respondent has free access at all times to the information provided by that respondent but not to any information provided by other respondents if a respondent has indicated that the representation should be kept confidential. Any respondent may make a correction to the information that they have provided by providing the correction in writing to the same address where original submissions were sent.

What happens next?
Following the close of submissions, the RTA will collate all submissions and send an acknowledgement letter to each respondent. The REF and comments received will then be considered and assessed by the RTA’s Environmental Advisor, Hunter Region.

The RTA will then determine whether the Proposal should proceed and subject to what conditions of approval. The community would be kept informed regarding RTA determination.

If you have any queries, please contact the RTA’s Project Manager:

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I  Introduction and Methodology

1.1  Name of the Proposed Activity

Newcastle inner city bypass – Shortland to Sandgate.

1.2  Local Government Area

Newcastle City Council.

1.3  RTA Region

Hunter Region.

1.4  Introduction

The NSW Roads and Traffic Authority (RTA) proposes to construct a new dual carriageway extension to Highway 23 (H23) between Shortland and Sandgate (the Proposal).

This Proforma 2 Review of Environmental Factors (REF) has been prepared by RTA Environmental Technology on behalf of RTA Operations and Services, Hunter Region. For the purposes of these works, the RTA is the proponent and the determining authority under Part 5 of the Environmental Planning and Assessment (EP&A) Act 1979.

The purpose of the REF is to describe the Proposal, to document the likely impacts of the Proposal on the environment, and to detail protective measures to be implemented.

The description of the proposed works and associated environmental impacts have been undertaken in context of Clause 228 of the Environmental Planning and Assessment Regulation 2000, the Threatened Species Conservation (TSC) Act 1995, the Fisheries Management (FM) Act 1994, and the (Commonwealth) Environment Protection and Biodiversity Conservation (EPBC) Act 1999. In doing so, the REF helps to fulfil the requirements of Section 111 of the EP&A Act, that the RTA examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

This REF has been prepared in accordance with the RTA’s Proforma 2 REF as presented in the RTA’s Environmental Impact Assessment Policy, Guidelines and Procedures, Version 4 (RTA 2001).

The findings of the REF will be considered when assessing:

- Whether the Proposal is likely to have a significant impact on the environment, the necessity for an Environmental Impact Statement (EIS) under Section 112 of the EP&A Act and consequently the possible application of Part 3A of the EP&A Act.
- The significance of any impact on threatened species as defined by the TSC Act, in Section 5A of the EP&A Act and the requirement for a Species Impact Statement (SIS).
- The potential for the Proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Commonwealth Environment Minister in accordance with the EPBC Act.
1.5 **Methodology**

The method in which this document has been prepared is as follows:

1. A discussion was held with the Project Manager to consider the Proposal.

2. RTA Environmental Technology representatives undertook a site visit on 17 March 2005 to attain an overview of the Proposal and to identify any issues relevant to the completion of the REF.

3. The following agencies and RTA personnel were notified and/or consulted:
   - RTA’s Aboriginal Program Consultant, Hunter Region;
   - Newcastle City Council;
   - Hunter Water Corporation;
   - Telstra;
   - AGL;
   - Energy Australia;
   - NSW Department of Natural Resources;
   - NSW Department of Planning;
   - NSW Department of Primary Industries – Fisheries;
   - NSW Department of Environment and Conservation – EPA;
   - NSW Department of Environment and Conservation – National Parks;
   - Hunter-Central Rivers Catchment Management Authority;
   - Australian Rail Track Corporation;
   - The Wetland Centre of Australia;
   - The Commonwealth Department of Environment and Heritage.

4. A desktop search was conducted on the following databases to identify any potential issues:
   - Australian Heritage Database;
   - NSW Heritage Office State Heritage Register and Inventory;
   - RTA s170 Register;
   - DEH Protected Matters (EPBC Act) Database;
   - DEC Contaminated Land Records;
   - DEC Air Quality Records;
   - DIPNR Acid Sulfate Soils Risk Map; and
   - National Pollutant Inventory.

5. As part of the environmental assessment undertaken for this REF, a series of specialist studies were undertaken to identify Proposal constraints and to provide environmental safeguards. The following specialist investigations were undertaken during the preparation of the REF:
   - Noise and vibration assessment;
   - Preliminary Aboriginal Archaeological survey and assessment;
   - Ecological assessment; and
   - Targeted Green and Golden Bell Frog survey.
6. A literature review and review of documentation was undertaken with regards to the following:

- Landform, geology, and soils;
- Potential acid sulfate soils;
- Groundwater;
- Local Environment Plans;
- Regional Environmental Plans;
- State Environmental Planning Policies; and
- Catchment Blue Prints and Catchment Management Plans.
1.6 The Planning and Decision Making Process

The decision making process for the Shortland to Sandgate Proposal is as follows:

- **Options Developed**
- Development of Preferred Option
- Specialist Environmental Studies commenced (Biodiversity, Noise and Vibration, Indigenous Heritage, Visual Assessment)
- Consultation with Government and relevant stakeholders
- REF and specialist studies prepared with regard to Preferred Option
- Exhibition of REF for public comment
- Submissions received and considered
- Assessment of REF by RTA and decision whether further EA and SIS are required or not
- If no further EA or SIS is required, the RTA determines whether the Proposal will proceed or not
- Public notification of the RTA’s determination of the REF
- If decision is to proceed tenders can be called for construction
2 Proposal Description

2.1 Location

The Proposal is located approximately 8km northwest of Newcastle CBD and crosses the boundary between the suburbs of Shortland and Sandgate. For the purposes of this REF, the Proposal site is defined as the ‘footprint’ of the proposed works including ancillary activities such as the proposed location of the stockpile and compound site. The study area is defined as the Proposal site with an additional buffer of approximately 500m to cover the potential environmental impacts resulting from the proposed works. Figure 2-1 and Figure 2-2 show the location of the Proposal site within a regional and local context respectively.

Various land uses are represented in the study area. Pockets of residential accommodation are located on either side of Sandgate Road at the southern extent of the Proposal, adjacent and south of Sandgate Railway station, and a further cluster at the northern extent of the Proposal north of H10. Immediately adjacent to the west of the southern extent of the Proposal is the Wetlands Centre Australia which comprises part of the Hunter Estuary Wetlands site. Further north, also located west of the Proposal, is the site of a former Newcastle City Council landfill site now established and operating as a golf driving range. Traversing the Proposal corridor is the Main Northern Railway which connects the western reaches of the Hunter Valley and northern NSW, with Newcastle, Sydney and the south coast. North and to the east of the Main Northern Railway is Sandgate Cemetery covering an area of approximately 28 hectares. To the west of the cemetery is a mixture of industrial land use activities, swamp land and St Josephs aged care facility.

A detailed description of the existing environment is provided in Chapter 8 of this REF and Appendix A provides photographs of the Proposal site and study area.

2.2 General Features

The Proposal would involve construction of a dual carriageway extension to the existing Jesmond to Shortland H23 connection, between Shortland and Sandgate over a distance of 1.8km. The Proposal crosses Sandgate Road and proceeds in a northerly direction, passing through a narrow but well defined corridor as follows:

- Commencing east of the Wetlands Centre Australia;
- Continuing across the major drainage channel between the Lorna Street wetlands and Ironbark Creek;
- Between the houses in Astra Street Shortland and the former Newcastle Council landfill site;
- Crossing the Main Northern Railway Line with a bridge between 8m high embankments, for which the southern approach embankment is already in place for pre-loading purposes;
- Traversing the western boundary of Sandgate Cemetery; and
- Joining H10 where the existing carriageways are separated by a wide median adjacent to the St Josephs Nursing Home at Sandgate.

The extension to H23 is a continuation of the Newcastle Inner City Bypass that would contribute to providing access between the developing western parts of Newcastle, the Regional Produce Markets and the Port of Newcastle. The main features of the Proposal would include:
• Dual carriageways including 3.5m lane widths, 1m inner shoulders, 2m outer shoulders and a variable width median up to 5m;

• Three bridges consist of: Sandgate Road Overpass (60m in length); Deepbridge Creek and access road crossing (240m in length); and Main Northern Railway crossing (52.5m in length). The detailed development of the Deepbridge Creek crossing would seek to avoid piles either in or directly adjacent to the waterway;

• Sedimentation basins to control runoff during construction and following commissioning of the road. There would likely be two basins located either side of the Proposal on the southern side of the Deepcreek Bridge, and another basin located between the Proposal and Sandgate Cemetery. These are indicative locations and may be subject to change during detailed design;

• An at grade signalised intersection between the Proposal and H10;

• A grade separated interchange at Sandgate Road; and

• Adjustments to power, water/sewer, telecommunication and gas utilities.

Chapter 7 provides a detailed description of the Proposal, including design parameters and construction activities. A copy of the concept design is provided in Appendix B.

2.3 Cost and Source of Funds

The Proposal is anticipated to cost approximately $60M with funding to be sourced from State funds.

2.4 Timing

Subject to funding it is anticipated that the works for the Proposal could commence in the 2007-2008 financial year, and would be open to traffic at the end of 2011.
Figure 2-1: Locality Map – Regional Features (map extract courtesy of Sensis Pty Ltd).
Figure 2-2: Locality Map – Local Features (map extract courtesy of Department of Lands).
### 3 Statutory Position

#### 3.1 Local Environmental Plans

The Proposal is located within the Newcastle LGA. Newcastle City Council regulates land use within this LGA through the *Newcastle Local Environment Plan 2003* (Newcastle LEP). The Proposal site is located within 5(a) Special Uses Zone, 5(b) Special Uses Reservation Zone and 7(a) Conservation Zone.

Under zones 5(a), 5(b) and 7(a) of Newcastle LEP, development identified in Clause 13 is permitted without consent. Clause 13 states that:

"Except as otherwise provided by this plan, the following do not require consent:
(a)…
(b) utility undertakings described in Schedule 4 when carried out by a public utility…”

Schedule 4, Item 6 “Road Construction, maintenance etc”, goes on to state:

“The carrying out of any development required in connection with the construction, reconstruction, improvement, maintenance, repair or operation of any public road.”

The Proposal involves the construction and operation of a public road. As the RTA would be undertaking these works, it is considered that the Proposal and associated activities are covered by Clause 13 and Schedule 4 of the Newcastle LEP. Therefore development consent from Newcastle City Council would not be required for the Proposal and the Proposal can be assessed under Part 5 of the EP&A Act.

#### 3.2 Regional Environmental Plans

*Hunter Regional Environmental Plan 1989*

Newcastle is listed in Clause 3 of the Hunter REP as a LGA to which the REP applies. Clause 7 of the REP sets out duties of certain public authorities in relation to plan preparation and development consents. Part (e) of that clause states that:

...an environmental planning instrument applying to the region or a part of the region provides that development specified in the instrument may be carried out without the consent of the council... and that development, being development that is an activity within the meaning of Part 5 of the Act, is proposed to be carried out,

...then a determining authority (as the case may be) should, in carrying out its or his or her function under the Act or under the instrument concerned, and for the purpose of advancing the aims and objectives of this plan enumerated in Clause 2, consider the content of the background report and the objectives, policies and principles contained in this plan and relevant to the matter.

The objectives of the Hunter REP in relation to roads, railways and public transport are set out in Clause 32:

*The objectives of this plan in relation to planning strategies concerning roads, railways and public transport are to maximise accessibility and facilitate the movement of people and goods throughout the region in a manner which has regard to social, economic,*
environmental and safety considerations and, in particular:

(a) to ensure that the use of public transport is facilitated,

(b) to ensure traffic management techniques are utilised to optimise the use of the existing road system,

(c) to ensure that new or upgraded roads and railways are constructed to meet identified demands including provision of bicycle facilities, and that their impact on the natural environment is minimised,

(d) to maintain an appropriate acoustical environment in line with criteria established by the State Pollution Control Commission in its Environmental Noise Control Manual, and

(e) to encourage the transport of goods, especially coal and other bulk materials, by rail or other non-road modes where practicable.

The Proposal is consistent with the objectives of the Hunter REP, specifically in that the construction of the H23 extension would facilitate the movement of people and goods throughout the region. In addition, the REF and development of the concept has considered the Background Report to ensure that the Proposal is undertaken in a manner which has regard for social, economic, environmental and safety factors.

The Hunter Regional Environmental Plan 1989 (Heritage) does not apply to land in the city of Newcastle (as set out in Clause 3 of the REP) and would not be applicable to the Proposal.

3.3 State Environmental Planning Policies

State Environmental Planning Policy No 44 – Koala Habitat Protection

While the requirements of Part 2 of SEPP 44 (Development control of Koala Habitats) do not technically apply to the Proposal, as it is not subject to Council consent, it is the RTA’s practice to consider SEPP 44 criteria in its EIA process. These criteria relate to the percentages of feed tree cover, particularly trees listed under Schedule 2 – Known Feed Trees. The assessment criteria consider the percentage cover of known feed trees, and whether these are greater or less than 15% of the total tree canopy.

Assessment of the study area identified 2 tree species Eucalyptus robusta and Eucalyptus tereticornis which are listed as “feed tree species” under Schedule 2 of SEPP 44. Quantitative assessment of the investigation area indicates that these species do not constitute greater than 15% of the canopy and as such the investigation area would not be considered Potential Koala Habitat under SEPP 44.

State Environmental Planning Policy No 14 – Coastal Wetlands

The aim of this policy is to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of the State. The nearest SEPP 14 wetland is located approximately 100m to the southeast of the Proposal site (see section 8.6 and Appendix E). Sediment runoff and pollutants generated by the Proposal would have the potential to affect SEPP 14 wetlands within the area. Consent from Newcastle City Council and the concurrence of the Director of Department of Planning (DoP) would not be required, as the Proposal would not clear SEPP 14 land, construct a levee on SEPP 14 land, drain or fill SEPP 14 land. The site specific safeguards outlined in Section 9.1 would reduce the potential for the Proposal to affect the SEPP 14 wetlands located downstream of the Proposal site.
3.4 Confirmation of Part 5 Position

All relevant statutory planning instruments have been examined for the Proposal. It is concluded that by operation of Clause 13 of the Newcastle LEP development consent is not required and that assessment of the Proposal may proceed under Part 5 of the EP&A Act.
4 Consultation

4.1 Community Involvement

In June 1998, the RTA engaged a consultant to undertake a route selection study, including an assessment of impacts and opportunities for the road network in the area. A range of key stakeholders were identified by the RTA in conjunction with Newcastle City Council. A workshop was held in July 1998 during the early route selection stage to provide key stakeholders with an opportunity to raise matters of concern. In addition, a letterbox drop of approximately 1000 homes and businesses in Shortland, Sandgate, Callaghan, Waratah and Mayfield area was undertaken to notify other interested groups that the study had commenced. A number of issue categories were nominated by the study team during the workshop which included:

- Timing and Funding of Construction;
- Land-use Impacts;
- Community Amenity;
- Traffic Management;
- Access and Road Safety;
- Business/Economic Impacts;
- Natural Environment (Noise, Air, Water Quality, Flora/Fauna); and
- Public Transport.

These nominated issues would, among other objectives, go on to form the basis of discussions within the context of a Value Management Study that was held over two days in September 1998.

The final consultative activity in the Route Selection Study was a public display of the Preferred Option. The display was held over a three week period in September and October 2002.

A total of fourteen (14) written submissions were received from a variety of private citizens, environmental groups and business interests, as well as Newcastle City Council. The issues raised in these submissions can be put into three broad categories as follows:

- Potential environmental impact on substantial wetlands in the area and the need for protection of endangered fauna (specifically the Green and Golden Bell Frog (Litoria aurea));
- Potential impact on the social environment in relation to road traffic noise and the proximity of the southbound unloading ramp to private residences on Sandgate Road; and
- Concern for operational impacts of the proposed highway in relation to intersection layouts, public transport, cyclists, pedestrian crossings, property accesses, highway access and signposting.

4.2 Government Agency and Stakeholder Consultation

Since the public display of the Preferred Option in 2002, further development and refinement of the design has been undertaken to address the issues highlighted during the series of consultative activities. These activities have culminated in the now Preferred
Option which forms the basis of this REF. As part of this environmental assessment, relevant
government agencies were contacted by letter and provided with the opportunity to
comment on the Proposal. Table 4.1 lists the government agencies and other groups that
were invited to comment on the Proposal for this REF. Responses received are summarised
in column 1, while column 2 identifies the section in the REF where the issues are addressed.
A copy of all correspondence is provided in Appendix C.

Table 4.1: Summary of issues raised by government agencies.

<table>
<thead>
<tr>
<th>Summary</th>
<th>Section where addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newcastle City Council</strong></td>
<td></td>
</tr>
<tr>
<td>A response to the consultation letter dated 4 January 2006 was received on 20 January 2006. The Newcastle City Council had the following comments to make with regard to the proposed works and the environmental assessment documentation:</td>
<td></td>
</tr>
<tr>
<td>• Adherence to the principles outlined in the NSW Floodplain and Estuary Management Manuals;</td>
<td>Section 8.4</td>
</tr>
<tr>
<td>• Recognition of significant wetland values in and around the study area, identification &amp; assessment of wetland related issues and how to manage these (eg. Ramsar listed wetlands &amp; associated habitats containing significant biota, hydrology regimes, economic importance of fishery production &amp; tourism);</td>
<td>Section 8.6</td>
</tr>
<tr>
<td>• Assessment &amp; management of significant biota occurring in and around the study area, including listed Threatened species and ecological communities, and species protected under international treaties. Examples include significant Green and Golden Bell Frog habitat and population known from the northern part of the study area, presence of freshwater wetlands and coastal floodplain forest in or in the near vicinity of the proposed road, the presence of migratory and other significant bird species in the near vicinity.</td>
<td>Section 8.6</td>
</tr>
<tr>
<td>• Assessment and management of floodplain and wetland hydrology, hydraulic and drainage issues, particularly including management of drainage in and around high value wetlands and sensitive habitats such as for Green &amp; Golden Bell Frogs in the northern part of the study area. It is noted that a 240m bridge is proposed for crossing the wetland/ drainage system;</td>
<td>Section 8.4 &amp; Section 8.6</td>
</tr>
<tr>
<td>• Assessment and management of soil materials and sediments, particularly including Potential Acid Sulphate Soils;</td>
<td>Section 8.2</td>
</tr>
<tr>
<td>• Assessment &amp; management of indigenous cultural heritage values associated with the estuary.</td>
<td>Section 8.8 &amp; Section 8.9</td>
</tr>
<tr>
<td>• Asset Management staff have indicated that they have no specific comments. I am not sure if, or to what extent, Council assets might be affected and what management measures might be required if that is the case. Possible impacts could include altered drainage patterns in upstream lands/ wetlands due to the road construction. Changes to site access are acknowledged.</td>
<td>Section 8.4 &amp; Section 7.7</td>
</tr>
</tbody>
</table>
A second letter from Newcastle City Council was received on 20 January 2006. The subsequent letter had the following comments with regard to the Proposal:

- Although Council may not possess contaminated land reports specifically relating to the land in question, Council is aware of contaminated sites adjacent to the proposed land, which may have some impact on the land in question. In addition, the land in question may have been filled in the past with material that may contain contaminants. As such, the REF should consider this issue and address OH&S or environmental issues that arise as a result, including the appropriate assessment and reuse or disposal of any excavated material.

### Hunter Water Corporation

A response to the consultation letter dated 4 January 2006 was received on 1 February 2006. The Hunter Water Corporation (HWC) had the following comment to make with regard to the proposed works:

- Hunter Water operates two large diameter water mains (900mm diameter and 1350mm diameter) that roughly parallel and cross over the route of the proposed road. These will eventually need to be replaced or duplicated. There would likely be a range of smaller services that would also be affected by the proposed roadworks. While none of these would present any issues that cannot be overcome it would be necessary to take account of these in the concept design phase and for RTA to liaise closely with HWC to ensure that the road works are designed to suitably allow for the operation and maintenance of HWC assets and for the planned future works.

### Telstra

- There are four possible sites where there [would] be some conflict between the proposed road works and existing Telstra network. [There does not appear to be] any major cable conflicts to solve, but there [would] be some relocation works required. [During development of the detailed design further consultation with Telstra would be required to arrange a suitable resolution to the identified conflicts].

### AGL

- No correspondence received

### Energy Australia

- No correspondence received
- Considering the Proposal would likely require the relocation of some Energy Australia assets, further consultation would be undertaken with Energy Australia, during the detailed design of the Proposal.
**Department of Environment and Conservation (DEC)**

A response to the consultation letter dated 4 January 2006 was received on 18 January 2006. The DEC had the following comments to make with regard to the proposed works and suggested that the REF demonstrate that:

- The Proposal is not likely to cause impacts on areas of native vegetation, with special reference to threatened or regionally significant flora and fauna species, populations and ecological communities.
  - Section 8.6

- The proposed development is consistent with relevant provisions of the *Threatened Species Conservation Act 1995, State Environmental Planning Policy (SEPP) 44 – Koala Habitat Protection, SEPP 71 – Coastal Protection and Native Vegetation Conservation Act 1997.*
  - Section 8.6 & Section 3

- An appropriate level of archaeological assessment has been undertaken, and that the Proposal is not likely to impact on areas of cultural significance to the Aboriginal community.
  - Section 8.8

- Potential direct and indirect impacts on DEC estate, wilderness areas and recognised areas of high conservation value have been adequately considered.
  - Section 8.2, Section 8.4 & Section 8.6

- The requirements of the Commonwealth legislation, the *Environmental Protection and Biodiversity Conservation Act 1999,* have been met. If the Proposal affects any species requiring consideration under this legislation then approval may be required from the Department of Environment and Heritage (formerly Environment Australia).
  - Section 8.6 & Section 11.2

- The requirements of the NSW *Protection of the Environment Operations Act 1997* have been adequately considered. Based on the information provided, the Proposal will require an Environmental Protection Licence (EPL). The REF should contain all information required to accompany an application for an EPL.
  - Section 9.2

- All issues relating to the following have been addressed:
  - Water Pollution
  - Noise Pollution
  - Land Pollution
  - Waste Management
  - Section 8.4, Section 8.9 & Section 8.12

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**Department of Primary Industries (Fisheries)**

A response to the consultation letter dated 4 January 2006 was received on 30 January 2006. The Department of Primary Industries had the following comments to make with regard to the proposed works and the environmental assessment documentation. In addition, an attachment was provided detailing the authorities general requirements which can be found in Appendix C of the REF.

- The Department has particular concerns with the crossing over Deepbridge Creek and the potential impacts of any pile or supports constructed in the vicinity of the creek and its floodways. This is of particular concern as there are potential plans to carry out rehabilitation works in the creek to assist in the reinstatement
  - Section 7.4, Section 8.4 & Section 8.2
of substantial fisheries habitat in the creek. Consequently any
design proposals should ensure the creek and its floodplain area is
left as intact as possible.

### Hunter-Central Rivers Catchment Management Authority

- No Correspondence received

### Australian Rail Track Corporation (ARTC)

A response to the consultation letter dated 4 January 2006 was received on 14 February 2006. Comments provided by the ARTC are “commercial in confidence” and are therefore not for publication. ARTC comments are on file and have been considered for the REF. In summary the comments address:

- Design features. **Section 7**
- Future and existing rail configurations. **Section 8.4**
- Stormwater. **Section 8.6**
- Biodiversity. **Section 7.4.3**
- Access requirements. **Section 8.4**
- Works in and above the rail corridor. **Section 7**

### The Wetland Centre Australia

A response to the consultation letter dated 4 January 2006 was received on 30 January 2006. The Wetland Centre Australia had the following comments to make regarding the Proposal, with particular reference to the Ramsar listed Shortland Wetlands:

**During Construction**

- Minimise impacts from road works on the operations of the Hunter Wetlands Centre. Impacts could include dust, noise and visitor access to the Hunter Wetlands Centre. **Section 7.4.3, Section 8.5, Section 8.9 & Section 1.6 (further consultation to continue)**
- Do not impede natural water flows into the wetlands and ensure that water quality is maintained (e.g. no sediment loading). **Section 8.6 & Section 8.4**
- Note that water pumped from the creek draining the market site and used as inflow to our BHP Pond runs via pipe from the other side of the proposed highway. Thus an under highway pipe would be required. **Section 7**
- Ensure best practice environmental management during construction. In particular in the vicinity of Deepbridge Creek: **Section 9.1**
- Minimise clearing of established or establishing native vegetation and habitats, such as Swamp Oak trees and reed beds, in the construction area; **Section 8.4, Section 8.6 & Section 8.2**
- Minimise disturbance of alluvial and wetland soils during construction and use of geotextile materials where relevant; and
- Minimise disturbance of potential acid sulphate soils in establishing foundations for the road.
<table>
<thead>
<tr>
<th>Summary</th>
<th>Section where addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Features that would aid biodiversity and/or tourism values could include:</td>
<td></td>
</tr>
<tr>
<td>• Recognition of the significant values of wetlands in the area and their interconnections. The proposed long span bridge over Deepbridge Creek is acknowledged. The opportunity to discuss and comment on the bridge design including adequacy, noise and visual impacts would be valued.</td>
<td>Section 7, &amp; Section 1.6 (further consultation to continue)</td>
</tr>
<tr>
<td>• Water management structures to minimise impacts on wetlands, control and treat run-off from the road.</td>
<td>Section 8.13</td>
</tr>
<tr>
<td>• Small constructed wetlands to handle above, with opportunities to incorporate their design and function in the educational program at the Hunter Wetlands Centre.</td>
<td>Section 1.6 (further consultation to continue)</td>
</tr>
<tr>
<td>• Methods to maintain the hydraulic connections between the Hunter Wetlands Centre land and the adjacent wetlands and to minimise impacts on the local hydrology (maintain wetland species movement including the endangered Green and Golden Bell Frog, surface water hydraulics, groundwater interactions, local catchment drainage and flooding issues etc.) in the surrounding wetlands.</td>
<td>Section 8.4 and Section 8.6</td>
</tr>
<tr>
<td>• Environmental assessment to consider the implications for the canoe channel of the road construction and the opening of the Ironbark Creek floodgates.</td>
<td>Section 8.4 &amp; Section 8.11</td>
</tr>
<tr>
<td>• Good screening of the road from the Centre so that the sight of vehicles does not detract from the amenity of the place and disturb the wildlife. At this stage we believe visual impacts can be best managed through mass plantings of suitable local species (advice from Hunter Wetlands Centre Site Management Committee on species is available).</td>
<td>Section 8.6 &amp; Section 8.10</td>
</tr>
<tr>
<td>• Plantings should be combined with sound barriers (designed to provide glimpses of the wetlands to passing motorists) to manage noise pollution.</td>
<td>Section 8.9 &amp; Section 8.10</td>
</tr>
<tr>
<td>• Use wetland fauna for relief features on concrete sound walls and possible incorporation of other art work using native species in the road design.</td>
<td>Section 1.6 (further consultation to continue)</td>
</tr>
<tr>
<td>• Management of significant habitats and species that occur in the vicinity of the planned road so there is no net loss of biodiversity values and if possible, a net gain. The Hunter Wetlands Centre must maintain it's connectivity to surrounding wetlands and natural habitats.</td>
<td>Section 8.6</td>
</tr>
</tbody>
</table>

**The Department of the Environment and Heritage**

A response to the consultation letter dated 4 January 2006 was received on 30 January 2006. There were no project specific issues raised in the letter. A copy of the complete letter is provided in Appendix C of this REF.
The Department of Natural Resources (DNR)

A response to the consultation letter dated 4 January 2006 was received on 19 January 2006. The DNR had the following comments to make with regarding the Proposal for consideration in the REF.

- If any proposed works intercept the groundwater table, a licence under Part 5 of the Water Act 1912 will be required. In order to assist determination of any application for a licence, the REF should include:
  - Details of any proposed works likely to intercept groundwater
  - Details of the predicted highest groundwater table at the development site
  - Details of proposed method of disposal of tail or waste water
  - Details of the predicted impacts of any final landform on the groundwater regime

- Provided the works are carried out under the authority of the RTA a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948 (RFIA) is not required for the proposed activity. However, DNR requests that the RTA consider the following in planning and undertaking the works:
  - The works should not damage or interfere in any way with: vegetation outside the area of the works; the stability of any adjacent or nearby watercourse bank or bed; and the quality of water in any watercourse.
  - Any displaced materials should be stabilised or relocated and made secure so that these materials will not detrimentally affect any watercourse or riparian area.
  - No materials should be used that may pollute any watercourse.
  - Works should be designed and constructed such that there is no detrimental change in hydraulic behaviour, causing sedimentation, erosion, reduction in waterway or permanent diversion or pollution of any watercourse.

Department of Planning

- No correspondence received
5 Strategic Stage

5.1 Background and Need for the Proposal

The H23 route was first planned in the 1950’s to connect Windale and Sandgate (referred to as the historical corridor). It was approved in 1957 and subsequently incorporated in the Northumberland County Planning Scheme. The road corridor between Shortland and Sandgate has been identified for some time and is generally known by the community.

Action for Transport 2010 - An Integrated Transport Plan for NSW was released in December 1998 and it outlines the transport system and road network improvements that are seen as necessary to cater for a growing and changing population, as well as expanding tourism and freight markets. The document also nominates a 12 point action plan for improving the transport system and cites current initiatives within the respective points.

The Action for Transport 12 point action plan consists of:
1. Meeting the needs of our growing and changing population
2. Safeguarding our environment
3. Improving air quality
4. Reducing car dependency
5. Getting more people on public transport
6. Improving access for rural communities
7. Making freight more competitive
8. Keeping the network in good order
9. Getting the best out of our system
10. Giving the community value for money
11. Making space for cyclists and walkers
12. Preventing accidents and saving lives

An integral part of the action plan is a focus on strategic road network initiatives in Sydney and the various regions of the State. In the Newcastle and Lower Hunter, work is progressing on a number of major road projects. These are a combination of Federal and State Government funded road network developments that are intended to fulfil the strategic objectives of both Governments at a regional, state and national level. Works that are recently completed, either under construction or in a formal planning phase are as follows:

- Extension of the F3 Sydney - Newcastle Freeway to Beresfield.
- The Raymond Terrace Bypass and duplication between Raymond Terrace and Karuah.
- Planning for a major new National Highway Link between the F3 Sydney - Newcastle Freeway and the New England Highway at Branxton.
- Planning for the F3 Sydney - Newcastle Freeway to Raymond Terrace.
- Staged implementation of the Newcastle Inner City Bypass between Windale and Sandgate.

The section between Shortland and Sandgate forms an integral part of the Newcastle Inner City Bypass and would contribute to provide access between the developing western parts of Newcastle, the regional produce markets and the port. The Proposal is the remaining component of H23 that is yet to be upgraded. As a result, the existing road is substantially congested, and does not provide efficient access to the wider road network. The Proposal provides the opportunity to enhance and improve the existing vertical and horizontal road alignments, and thereby increase the levels of road safety relative to the current situation.
6 Concept Stage

6.1 Proposal Objectives

The objectives of the Proposal are to:

• Continue the construction of the Newcastle Inner City Bypass and relieve a heavily congested section of the state road network;
• Contribute to providing access between the developing western parts of Newcastle, the Regional Produce Markets and the Port;
• Improve road safety for all road users;
• Minimise adverse environmental impacts; and
• Improve access to the wider road network.

6.2 Options Considered

6.2.1 Do Nothing

The ‘do nothing’ option involves retention of the current route between the intersection of Sandgate Road and Wallsend Road, a continuation along Wallsend Road before intersecting with H10 to the north. The current route provides less than the desirable horizontal and vertical alignment, an elevated accident rate and poor traffic efficiency on account of this section of H23 being the last remaining section with single lane capacity in both directions. The ‘do nothing’ option was not considered an acceptable solution to the existing situation and was excluded from further consideration during the early planning phase.

6.2.2 H23 Option 1 - Construction within Existing Corridor

Option 1 involves utilisation of the existing corridor reservation between Shortland and Sandgate and would be a continuation of the high standard alignment between Jesmond and Shortland. The alignment and general features of Option 1 have been outlined in Section 2.2.

The road design concept for Option 1 was developed using an alignment previously designed by the RTA, but with two alternative connection options where Option 1 rejoins H10. These sub-options are as follows:

• Option 1A - Full interchange connection.
• Option 1B - Signalised t-intersection connection.

Features of the road design concept common to both sub-options are as follows:

• Completion of the Sandgate Road interchange to provide bridging over H23 and southbound right turn access from Shortland;
• Provision of northbound loading and southbound unloading facilities;
• Major (7 span) bridging of the drainage channel/wetland area and the access road to the disused land-fill site.
• High approach embankments for bridging of the Main Northern Railway Line.
• Continuation of the alignment past the railway bridge to connect with H10 at Sandgate (Connell Wagner 2002).
**Option 1A**
The principal sub-option would involve a direct grade separated connection between H23 and H10. The northbound carriageways would effectively merge with no cross-overs on the existing right hand curve approaching the Old Maitland Road intersection. The southbound carriageway of H10 would be unchanged but the southbound carriageway for H23 would diverge from this and pass under the northbound for H10 (Connell Wagner, 2002).

**Option 1B (Preferred Option)**
This sub-option would involve construction of a signalised t-intersection with H10. It would require a dual right-turn facility in the existing median of the southbound carriageway (Connell Wagner 2002, See Appendix B).

Option 1B would allow early construction and operation of an H23 continuation with minimal disruption to traffic. In the future this Proposal would allow continued operation of H23 with limited disruption to traffic while a full grade separated interchange with H10 could be constructed.

**6.2.3 H23 Option 2 - Major Upgrade of Wallsend Road**
Option 2 would involve a major upgrade of the Wallsend Road Corridor and would involve:

- A 1000m radius curve to swing the alignment around toward the existing railway bridge on Sandgate Road.
- A shorter length bridge over the wetland/drainage channel and Astra Street.
- Both carriageways converging to provide for close bridging of the railway near Sandgate Station.
- A major retaining wall 10m in front of the houses in Astra Street to support the railway bridge approaches.
- Construction of the northbound railway bridge clear of the existing bridge to allow for suitable staging.
- Widening of Wallsend Road to six lanes to provide four travel lanes, a parking lane adjacent the cemetery and an access lane for residual businesses and properties opposite the cemetery.
- Construction of a central median barrier over the full length of Wallsend Road.

Option 2 would also provide a grade separated interchange at the intersection of H10 and Wallsend Road. This option would also include four travel lanes on H10 to be bridged over the intersection, allowing the substantial turning movements to be more effectively managed free of highway flows.

This option would require additional changes that would include:

- Conversion of the Rural Drive intersection to left in / left out status because of the central median construction on Wallsend Road;
- Simultaneous opening of the Jersey Street intersection with H10 to left in / left out operation; and
- Provision of a u-turn facility under the new railway bridges for the remaining business on Wallsend Road (Connell Wagner 2002).

This option was disregarded during the early planning phase due to access issues with residential and business areas on the river side of the Highway, substantial disruption to traffic during construction and high cost.
6.2.4 **H23 Option 3 - New Route north of BHP Research Laboratories**
Option 3 would involve a new corridor through the area north of the BHP Research Laboratories and would include the following alignment and design features:

- Right angled intersection with H23 (likely signalised intersection) at the Shortland Waters Golf Course;
- A continuation east-northeast through golf course;
- A bridge over the Main Northern Railway, the wetland area within the railway embankment areas and the eastern branch railway line up to 500m in length;
- Bridging of major transmission tower and associated lines;
- ‘Threaded’ alignment to allow clearance of a second and third transmission tower within the western part of Warabrook; and
- Major signalised intersections with H23/Sandgate Road and H10.

This option was disregarded early during the planning phase due to impacts on the Shortland Waters Golf Course, major utility adjustments, impact on SEPP 14 wetland, property acquisition and associated cost (Connell Wagner 2002).

6.2.5 **County Route 14 - Construction through Warabrook Estate**
The County Route 14 (CR14) Option commences in the south at University Drive and continues in a northerly direction before intersecting with Maitland Road and tying into Industrial Drive. This option would include the following design and alignment features:

- A signalised intersection with University Drive near the Wirra Crescent entry to the Transgrid complex adjacent the University;
- Bridging of the Main Northern Railway Line;
- An at-grade roundabout where CR14 meets Warabrook Boulevard;
- Bridging of Angophora Drive over the top of CR14 with no connectivity;
- Grade separation of the Maitland Road intersection with ramps to CR14 passing under H10; and
- A direct connection with a relatively tight radius (280m) curve suitable for 80km/hr travel to Industrial Drive.

This option was disregarded during the early planning phase due to substantial property acquisition requirements and associated impact on the relatively new Warabrook housing estate (Connell Wagner 2002).
7 Design Considerations

7.1 Existing Roads

7.1.1 H23 – Shortland to Jesmond
The existing section of H23 south of the Proposal site was completed and opened to traffic in June 1993. It comprises a high standard dual carriageway with a grade separated interchange at University Drive and bridged crossings of other streets such as Janet Street and the road to the BHP Research Laboratories at Shortland. Highway 23 commences at a large radius roundabout at its southern junction with Newcastle Road. At the northern end it currently meets Sandgate Road at temporary intersection facilities involving a small radius roundabout for northbound off-loading traffic and a left turn only ramp for southbound loading traffic. South of University Drive the highway is six lanes wide but north of the interchange it reduces to four lanes before tapering to the single lane exit/entry configuration.

The total length of H23 is 3.2km of which 1km is south of University Drive and 2.2km is on the northern section. As such it represents a small but strategic component of the total road network (Connell Wagner 2002).

7.1.2 Sandgate Road and Wallsend Road
Sandgate Road between the northern extremity of the existing H23 and the railway overbridge includes less than desirable reverse curves (one signposted as 55 km/hr) featuring warning signs and hazard markers. In conjunction with the overbridge the alignment creates relatively poor traffic efficiency in comparison to H23 in the south and H10 to the north. An intersection with Astra Street provides access to the Newcastle City Golf Driving Range (formerly disused Newcastle Council Landfill site), about 20 houses in Astra Street and Sandgate Railway Station. The pavement condition, although poor, is managed and the alignment, though curvy, is signposted. The result is that the existing road is generally suitable but certainly not in a preferred condition.

Wallsend Road is a four lane road along the southern boundary of Sandgate Cemetery and is lined by both residential and light industrial properties on the opposite side. The pavement is generally in reasonable condition but the carriageway is narrow and the numerous accesses can cause disruptions for both directions of travel (Connell Wagner 2002).

7.1.3 Maitland Road (the Pacific Highway (H10))
The Pacific Highway is the most dominant road in the existing network and carries large volumes of traffic between Newcastle and the Lower Hunter towns of Raymond Terrace, Maitland and Cessnock. Within the study area it is a dual carriageway road, featuring a variety of intersections, adjacent development and access conditions. At Mayfield West in the south-eastern part of the study area, H10 is better known locally as Maitland Road.

Key features of this major road are as follows:
- A variety of light industrial development adjacent to the highway at Sandgate with access control on the western side (via Rural Drive off Wallsend Road), but ribbon type development and access on the eastern side.
- A major signalised intersection with Wallsend Road featuring substantial right turning facilities to that road from the southbound lanes.
- A 600 metre frontage of Sandgate Cemetery which has numerous access points.
• A general widening of the median between the carriageway in the vicinity of St Josephs nursing home to cater for the originally planned connection of H23 to H10 (Connell Wagner 2002).

7.2 Existing and Forecast Traffic

Existing and forecast traffic for the road network in the vicinity of the Proposal is provided below in Table 7.1.

<table>
<thead>
<tr>
<th>Table 7.1: AADT Existing and forecast traffic volumes.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>Sandgate-H23 (Sandgate Road sth of H10)</td>
</tr>
<tr>
<td>Shortland-H23 Off/R nth + On/R nth</td>
</tr>
<tr>
<td>Sandgate-H10 sth of H23, Wallsend Rd</td>
</tr>
<tr>
<td>Hexham sth of SH9, New England Hwy</td>
</tr>
</tbody>
</table>

7.3 Design Parameters

7.3.1 Constraints
A number of constraints have required consideration in the development of the Proposal. The key constraints include:
• Corridor traverses areas of medium to high range acid sulfate soils requiring a combination of embankment and bridge construction;
• Design of the Sandgate intersection at the northern end of the Project;
• Flora and fauna;
• Clearance requirements over the Northern Railway Line;
• Proximity of Proposed route to: Sandgate Cemetery, Wetlands, Council Disused Landfill Site, St Joseph’s Aged Care Facility.

7.3.2 Traffic Management
The Proposal would involve construction under traffic on high volume roads such as H10 and H23 and on the low volume road, Astra Street. Construction away from traffic would also be implemented with minimal disruption.

Disruption to traffic would be minimised and avoided where possible by prior planning and by preparation of a Traffic Management Plan (TMP). Construction of the southern interchange would be staged to facilitate upgrade to a grade separated intersection with minimal disruption to existing traffic. The northern at-grade intersection has been designed to allow construction of the at grade intersection – (refer to Appendix B for the Revised Concept Design Report).
The TMP would be prepared to facilitate the proposed works and may include use of:

- Temporary signals or give way signs;
- Temporary road closures with detours;
- Manual traffic control;
- Warning signs and delineation;
- Speed Reduction; and
- Temporary side tracks.

The TMP would include methods to maintain access to all properties at all stages of the proposed works. The TMP would provide specific traffic control methods for various anticipated traffic volumes during works and would facilitate local access requirements for each area being constructed.

### 7.4 Construction Activities

#### 7.4.1 Work Methodology

**Pre-construction activities**

- Land acquisition (see Section 7.9 for further information);
- Relocation of affected utilities prior to establishment on site, where possible;
- Notification of residents of commencement of works; and
- Survey set-out identifying construction footprint.

**Establishment of site for construction**

- Establishment of compound site, including connection to power, plumbing and sewer;
- Installation of environmental controls;
- Clearing/grubbing/slashing of construction footprint area;
- Fencing off area for construction and construction truck movements; and
- Fencing off areas to be used for stockpile sites.

**Construction activities**

- Importation of fill material;
- Installation of permanent drainage;
- Relocation of utilities;
- Construction of bridge over Deepbridge Creek;
- Construction of bridge over Main Northern Railway;
- Construction of north and southbound load ramps to Sandgate Road;
- Construction of bridge over H23;
- Construction of intersection with H10;
- Installation of noise attenuation;
- Conversion of construction stormwater basins into permanent basins/habitat;
- Installation of permanent signs, street lighting, traffic signals and line marking;
- Landscaping of surrounding areas; and
- Site clean up and final commissioning of ramps and intersections.
7.4.2 **Construction Equipment**

Plant and equipment likely to be used include:

- Excavators;
- Loaders
- Graders
- Compactors
- Vibrating rollers
- Bobcats
- Cranes
- Backhoes
- Trenching machines
- Bulldozers
- Milling machine
- Concrete agitator trucks
- Concrete and asphalt paving plant
- Concrete pumps
- Piling rigs
- Water cart
- Road sweepers
- Line-marking plants
- Semi-trailers and large delivery trucks
- Light commercial and passenger vehicles

7.4.3 **Access**

Access or alternative access to all properties would be maintained during the proposed works.

7.4.4 **Source of Material**

Where possible, materials required for the Proposal would be sourced from local suppliers. Those materials would include, but not limited to, the following:

- Imported fill (250,000m³);
- Concrete (36,500m² of concrete pavement and 15,000m² other flexible pavement/overlay);
- Steel; and
- Geotextile fabric.

7.4.5 **Additional Truck Movements**

For the majority of the construction period approximately 5-10 additional truck movements per day would be required for movement of crew and materials. During excavation periods the number of truck movements would increase due to the removal of some spoil off site. It is not anticipated that the number of additional truck movements required would have a substantial impact on other road users.

The Proposal would require transportation of a large amount of fill to the site. It is proposed to source the imported fill from a local mine or quarry. The large amount of fill required (250,000m³ equating to approximately 550,000 tonnes) would require in excess of 27,500 movements for a 20 tonne truck. Further assessment would be required once the source of fill is known to adequately assess the level of impact that the transportation of fill on the road network.
7.4.6 Workforce and Working Hours

The workforce would range from 30 – 100 personnel, with 50 being the average. It is anticipated that working hours for the Proposal would be undertaken during standard working hours adopted by the RTA as detailed below:

- **Standard Working Hours:**
  - Monday – Friday: 7.00am to 6.00pm
  - Saturday: 8.00am to 1.00pm
  - Sunday and Public Holidays: No work.

Should work be required outside of the standard working hours, the procedure contained in the RTA’s *Environmental Noise Management Manual 2001, “Practice Note vii – Roadworks Outside of Normal Working Hours”* would be followed.

7.5 Stockpile and Compound Sites

The compound sites would be located adjacent to Sandgate Road and Deep Bridge Creek, and potentially another location to be acquired by the RTA west of Maitland Road between the Sandgate Cemetery and the proposed H23 alignment. Both of these locations have been considered within this assessment. The compound site would likely consist of:
- Demountable sheds for offices, meal room, and conference room
- Portable toilets
- Gravelled area for parking and access into the compound site
- Hardstand areas for delivery of materials
- Area for chemical storage
- Containers for site equipment

7.6 Additional Fill Material

It is anticipated that the Proposal would require importation of 250,000$m^3$ of fill material. Known sources of suitable fill include:
- Allandale Quarry;
- Martins Creek Quarry;
- Brandy Hill Quarry;
- Seaham Quarry;
- Stockrington Quarry;
- Various other quarries around Black Hill; and
- Overburden from cut mines near Singleton.

All of these quarries are located at similar distances from the Proposal site. Mine overburden sourced from Singleton would represent a longer haul and would only be used if supported by relative cost savings associated with winning the material. Other suitable sources of fill may be identified by the contractor.
7.7 Utilities

The Proposal would require the relocation of the following utilities:

- 180m of 150mm gas main;
- 550m overhead power lines;
- 600m of 150mm water-main;
- Concrete encase sewer main; and
- 500m of Telstra copper wire.

During further development of the detailed design, and additionally during the public display period of the Proposal, liaison would continue to take place with all affected stakeholders.
8 Environmental Assessment

8.1 General

This section of the REF provides a detailed description of the potential environmental impacts associated with the Proposal during both construction and operation, and provides site-specific safeguards to ameliorate the identified potential impacts.

The environmental safeguards predominantly outline additional site-specific requirements, which are not covered by RTA QA Specification G36 – Environmental Protection (Management System), RTA QA Specification G38 – Soil and Water Management (Soil and Water Plan) and RTA QA Specification G40 – Clearing and Grubbing for inclusion into the Contractors Environmental Management Plan (CEMP) and the Project Environmental Management Plan (PEMP). These safeguards would be implemented prior to construction, during construction and post construction. The RTA’s Regional Environmental Adviser Hunter Region would review the CEMP and PEMP prior to the commencement of work.

8.2 Landform, Geology and Soils

Existing Environment

Landform

The study area is located within the physiographic region known as the Lower Hunter Plains and is covered by the Soil Landscapes of the Newcastle 1:100 000 Sheet (Matthei, 1995). The landform within the study area is largely characterised by the broad estuarine plain of the Hunter River which varies in width throughout the wider area to between 2km and 8km (Matthei, 1995). Local relief within the area varies between sea level and <10m, although much of the area is limited to elevations of <2m (Matthei, 1995). Higher elevations up to 5-10m are evident in developed areas at the northern and southern extent of the study area.

Geology

The underlying geology of the study area comprises the Permian Tomago Coal Measures, Permian Mulbring Siltstone and Quaternary estuarine/lacustrine sediments. The Permian Tomago Coal Measures are characterised by shale, mudstone, sandstone, coal, tuff and clay, the Permian Mulbring Siltstone by siltstone, claystone, thin sandstone and limestone, and the Quaternary estuarine/lacustrine sediments by silts and clays (Matthei, 1995).

Soils

The soils located within the Proposal site are comprised of those listed under the classification of Hexham Swamp, Beresfield and Disturbed Terrain. Soils found within the Hexham Swamp category are well distributed in the local area, although are locally restricted within the Proposal site to low lying areas adjacent to the Wetlands Centre Australia and north of the Main North Railway. Soils traditionally comprise a black pedal silty clay loan A-horizon of 100mm-200mm in depth and a gleyed sticky plastic clay B-horizon also to a depth of between 100-200mm. This soil type has a pH level between 5.5 and 6, is a ground water pollution risk, is subject to a high watertable, prone to seasonal waterlogging, has low fertility and has a high potential for acid sulfate soil (Matthei, 1995).

Soils found within the Beresfield category are located within a small area at the northern
extent of the Proposal site where the new road would tie into H10 (Maitland Road). The soil within the Beresfield formation generally comprises five dominant layers including a friable brownish black loam $A_1$ horizon, hard setting dull yellowish brown sandy loam $A_2$ horizon, pedal brown plastic mottled clay $B_2$ horizon, reddish brown plastic pedal clay $B_2$ and $B_3$ horizon, and gleyed “puggy” silty clay $B_2$, $B_3$ and $C$ horizon. Soils within this category tend to exhibit a water erosion hazard, are seasonally waterlogged, are highly acidic and provide low fertility (Matthei, 1995).

The remaining soil type within the Proposal site is referred to as Disturbed Terrain (Matthei, 1995). This soil type is restricted to the fill embankment south of the Main Northern Railway and is constructed from excess spoil originating from the Jesmond to Shortland H23 project. This material was placed in-situ for preloading should this current Proposal be approved and proceed.

**Acid Sulphate Soils**

A search of the DNR Acid Sulfate Soils Risk Map indicated that there is a high potential for acid sulfate soils (ASS) within the low lying areas adjacent to Wetlands Centre Australia and north of the Main Northern Railway. While not within the Proposal site, 2HD Swamp and Sandgate Cemetery have been identified as areas containing high and low risk of ASS potential, respectively (refer to Appendix D for map).

**Potential Impacts**

The Proposal would be constructed largely on fill embankments, with the exception of a confined area located at the crossing of Sandgate Road. It is therefore considered that there is limited opportunity for erosion of in-situ soils to occur as a result of the Proposal. However, during earthworks and the associated importation of large quantities of fill material, there is the potential for soil laden runoff originating from unconsolidated fill to discharge from the site.

In addition, bridge piling works over Deepbridge Creek would have the potential to expose areas of high acid sulfate soil potential. These areas, while limited in extent, should they be disturbed and inadequately managed have the potential to contribute to a local reduction in aquatic habitat quality, fish kills, deoxygenation of waterways and outbreaks of disease in fish, to name a few (DNR 2006).

During operation there is not anticipated to be any impact to the environment associated with soils. Site rehabilitation of disturbed areas would be progressively undertaken as part of the landscaping activities for the Proposal.

To reduce the risk of sediment laden runoff being discharged from the site, or contamination should acid sulfate soils be exposed, the following safeguards would be implemented as part of the Proposal.

**Site Specific Safeguards**

- A Soil and Water Management Plan (SWMP) would be developed and incorporated into the CEMP. The plan would incorporate specifications outlined in *Managing Urban Stormwater: Soils and Construction* (“Blue Book”), *RTA Code of Practice for Water Management 1997*, and *RTA’s Road Design Guide 2000*, and identify areas requiring management controls, include inspections and checklist sheets to be reviewed by the RTA’s Regional Environmental Adviser, Hunter Region prior to the commencement of works. Best practice techniques would be implemented to design pollution control structures, and such design would be determined following use of the abovementioned guidelines and policy. This plan would be prepared by a suitably qualified soil conservationist (see also Section 8.6).
• Temporary and permanent stormwater control devices and/or erosion and sedimentation controls would be implemented at Proposal site discharge points to prevent sediment-laden runoff leaving the Proposal site and entering the local waterways. Indicative locations of water quality control basins are discussed in Section 2.2. These basins would be appropriately sized to address the potential for particulate matter to enter waterways, and would be implemented in conjunction with measures in place for the control of erosion and sedimentation. In addition, following the completion of the construction these basins would be suitably modified to act as operational water pollution controls to collect runoff from the paved road surface, including any spills.

• Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. Sediment would be cleared from behind barriers on a regular basis and all controls would be managed in order to work effectively at all times, that is, sedimentation controls would be less than 50% full at all times.

• All stockpiles would be designed, established, operated and decommissioned in accordance with the RTA’s Stockpile Management Procedures 2001. In addition, all stockpiles would be located at least 50m away from the high bank of any rivers or drainage lines.

• Any material transported onto pavement surfaces would be swept and removed at the end of each working day.

• Hardstand material would be implemented at entry and exit points to construction and compound areas to minimise the tracking of soil and particulates onto pavement surfaces.

• Imported fill required for the Proposal would be sourced from licensed/registered suppliers within the local area.

• Site rehabilitation of disturbed areas would be undertaken progressively as stages are completed.

• All in-situ soils excavated as part of the Proposal would be managed according to the RTA Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze 2005 which would adequately control the associated risks of ASS.

• Should ASS be detected where excavation is required, works would proceed according to the RTA’s previously mentioned guidelines and would include activities including, but not limited to;
  - Capping of exposed surfaces with clean fill to prevent oxidation;
  - Placing excavated ASS separately in a lined, bunded and covered area;
  - Neutralise ASS by using soil additives such as lime; and
  - Disposing of ASS in accordance with Guidelines.

8.3 Climate

Existing Environment

The nearest weather station to the Proposal site representing comparable climatic conditions is located at William Town RAAF Base approximately 15km to the north east. Data recorded at this station between 1862 and 2004 indicate highest mean maximum temperatures of 27.8°C during January and minimum mean low temperatures of 6.4°C during July. Rainfall within the region is substantially higher during summer and autumn, particularly February and March, with mean monthly rainfall up to 121.5mm in March. The region experiences an annual average rainfall of 1120mm (BOM 2006).
Seasonal climatic variability in the Newcastle region is attributable to distinctive weather patterns. During summer months, sub-tropical south-easterly circulation patterns provide moist south easterly airstreams along the Hunter coast resulting in higher levels of rainfall than in winter. During winter mid-latitude westerly winds prevail which bring cold south-westerly air northwards (NCC 2006).

**Potential Impacts**

The Proposal would be undertaken over a three year period resulting in a high potential to encounter seasonally adverse weather conditions during all phases of construction. High rainfall or storm events during construction would have the potential to discharge sediment laden runoff into Deepbridge Creek, which in turn flows into Iron Bark Creek and finally the Hunter River. Flooding of Deepbridge Creek during heavy rainfall conditions would have the potential to back-flow into Shortland Wetlands distributing any material suspended within the runoff into the Wetlands. Increased turbidity or discharge of pollutants into the adjacent wetland would have the potential to degrade the aquatic habitat for local flora and fauna species.

Measures to reduce the potential for impacts on the surrounding environment attributable to climatic condition would be minimised through the implementation of safeguards detailed in Section 8.2, 8.4 and 8.5 of this REF and those detailed below.

**Site Specific Safeguards**

- Weather forecasts would be periodically assessed and works programmed to avoid increasing the risk of erosion and sedimentation.

**8.4 Water Quality and Hydrology**

**Existing Environment**

The study area lies within the catchment of Ironbark Creek, one of the largest tidal creeks draining to the Hunter River. Its catchment covers some 12,500 hectares and has a diversity of land uses, including urban and limited rural residential, industrial and commercial, important communication and transport corridors, recreation, conservation, agriculture, mining, forested land and wetlands. Drainage from the study area is generally north towards a network of channels, which drain from the adjoining low-lying pastures into Iron Bark Creek.

Water quality in Ironbark Creek is characterised by high nutrient levels with consequent excess plant growth and undesirable variability in dissolved oxygen. The reduced tidal exchange stemming from historical engineering programs has resulted in oxidation of acid sulphate soils, lowered pH levels in several tributaries and raised soluble iron levels in the local waterway (NCC, 2004).

**Potential Impacts**

The Proposal is based on the previous investigations conducted during the late 1980’s and early 1990’s, including the bridge over the Ironbark Creek tributary running through the study area. The proposed 240m long bridge structure would be unlikely to have any residual impacts on flooding within the area as acceptable hydraulic capacity could be achieved with a bridge of approximately 50m in length. There is adequate capacity for transverse drainage through the study area, and as such there would be no flooding issues for areas upstream of the Proposal. In addition, the required amount of imported fill for the Proposal would not
have any adverse impacts on the flood storage of the area considering the size of the storage compared with the amount of fill required for the Proposal.
Potential impacts to water quality relate mainly to the construction of the Proposal, with there being a physical potential to pollute waters from the introduction of sediments, or the potential to disturb ASS, and therefore reduce the pH of the water system. Both of these potential impacts have been addressed in Section 8.2. Combined with the mitigations proposed in Section 8.2, and the adoption of RTA QA Specification G38 – Soil and Water Management (Soil and Water Plan) and RTA QA Specification G40 – Clearing and Grubbing as described in Section 8.1, the proposal would not require any further site specific safeguards.

8.5 Air Quality

Existing Situation

The closest air quality receivers to the Proposal are the residential dwellings located east of the Proposal adjacent to Wetland Centre Australia, the pocket of houses along Astra Street midway along the alignment and the group of houses east of the Proposal at the northern extent fronting H10. At each of these locations, properties at given points are within 50m of the proposed alignment.

No quantitative air quality assessment was undertaken as part of the environmental assessment for the Proposal. However, past investigations into air quality in Newcastle have shown that ambient air quality is usually within regulatory guidelines, although there is evident variability throughout the calendar year influenced by complex interactions between meteorology and air emissions. Anthropogenic sources of air pollution in Newcastle include motor vehicles (petrol and diesel engines); harbour activities (ship and boat emissions and wharf activities); rail activities (diesel powered coal trains and other goods trains); and residential emissions (household heating devices, maintenance activities such as painting and lawn mowing) (NCC 1998).

The Newcastle region is affected by both the mid-latitude westerly wind regime in winter and the sub-tropical south-easterly circulation pattern during summer. In the former regime, westerly winds prevail and cold fronts which bring cold south-westerly air northwards after passage are common. In winter, local drainage flows (200–700 m deep) from the west with an average speed of approximately 3 m/s dominate on days with weak synoptic flow. These drainage flows may persist for up to 16 hours per day and have been identified as a major factor in loose particulate transport from Kooragang Island to Stockton. Strong westerlies may also lead to high pollutant concentrations in the lower atmosphere through lack of dilution. Data collected from monitoring stations within the Newcastle area indicate that higher air pollution is most likely experienced under stable meteorological conditions, that is, anticyclone conditions, medium to warm temperatures, light breezes, low relative humidity and little rainfall, evident during winter months (NCC 1998).

Potential Impacts

Operation

No measurable change in air quality would be anticipated during operation of the Proposal beyond that attributable to population growth and the correlating increase in vehicle numbers. The Proposal would serve to improve motor vehicle efficiency within the local area and reduce the dependency of Sandgate Road and Wallsend Road as the primary route for H23 traffic. It is generally recognised that real improvements to urban air sheds would be effected only through the phasing out of the use of leaded petrol and technological improvements to the engines of motor vehicles (RTA 2002).
In terms of greenhouse gas emissions, individual road projects are unlikely to have a noticeable effect on greenhouse gas emissions. Response strategies are generally focussed at the strategic level and address issues such as:

- Reducing fuel consumption of motorised transport;
- Improving the efficiency of the road network; and
- Encouraging alternative forms of transport such as the use of bicycles.

Whilst the Proposal contributes to some of these initiatives it would have a negligible impact, positive or negative, on greenhouse emissions.

**Construction**

The Proposal would be undertaken over a three year period covering all seasonal climatic variability. During construction, risk to air quality would be limited, as much of the Proposal would be constructed on fill material thereby limiting the exposure of underlying soils to wind dispersion. Following the importation of fill material and excavation works for the bridge over Sandgate Road there would be a minor risk of dust emissions affecting residential communities at the southern, central and northern extent of the Proposal site. The total amount of dust generated is dependent on the moisture content of the soil/fill material, the weather conditions and the type of construction activities undertaken. Typically dust generating activities associated with this Proposal would include earthworks, using graders, excavators and haulage trucks. These activities, together with wind erosion, have the potential to generate dust.

Potential dust impacts are likely to be minor, and would be managed through the safeguards outlined in this REF and the RTA’s QA Specification G36.

**Site Specific Safeguards**

- Any stockpiles and general areas with the capacity to cause dust would be dampened to suppress dust emissions.
- Long term stockpiles would be sprayed with a sterile grass mix to suppress dust generation.
- Any materials transported in trucks would be appropriately covered to reduce dust generation.
- Construction activities that generate high dust levels would be avoided during strong wind conditions.
- Where winds reach a velocity that visibly mobilises dust particulates, the frequency of dust suppression such as watering would be increased appropriately.
- Fenced boundaries surrounding stockpile sites would be lined with geotextile fabric.

8.6 **Biodiversity**

**Existing Environment**

An Ecological Assessment and a Green and Golden Bell Frog Assessment were prepared by HWRR Ecological Pty Ltd in December 2005 and January 2006. The findings of these reports are discussed below.
**Flora**

The study area is located within the low-lying areas of Shortland and Sandgate comprising a mix of cleared wastelands, remnant wetland areas and small patches of remnant forest. Areas that have been previously cleared and used for agricultural purposes now support relatively dense areas of exotic weed species.

Areas at lower elevations that are periodically inundated are generally less disturbed and support dense areas of Common Reed (*Phragmites australis*). The small patches of remnant forest generally comprise Forest Red Gum (*Eucalyptus tereticornis*) at higher elevations and Swamp Oak (*Casuarina glauca*) at lower elevations. There are a number of areas of planted native species including around the Shortland Wetland Centre, near the end of the existing State Highway 23, on either side of the existing embankment on the southern side of the Main Northern Railway and along the western boundary of the Sandgate Cemetery. Other areas comprise existing roads, railway, sealed surfaces, residential areas and managed grass areas.

A total of 145 native and exotic plant species were identified during the ecological assessment. The ecological assessment characterised the study area and found that there are seven distinct vegetation communities present. The vegetation communities are described in Table 8.1.

**Table 8.1: Description of the vegetation communities within the study area**

<table>
<thead>
<tr>
<th>Dominant Species</th>
<th>Height/ Cover</th>
<th>Total Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reedland</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Reed (<em>Phragmites australis</em>)</td>
<td>1-3m Closed</td>
<td>4ha</td>
<td>This community occurs in two large patches generally in low lying areas permanently or periodically inundated with fresh water (e.g. surrounding Deep Bridge Creek and adjacent to Sandgate Cemetery). Evidence of saline influence in some areas. Comprised of closed reedlands dominated by Common Reed (<em>Phragmites australis</em>) and some small pockets of deeper water where Cumbungi (<em>Typha orientalis</em>) dominates. Some small Swamp Oak (<em>Casuarina glauca</em>) can be found scattered throughout. Moderately to highly disturbed in places with weed species becoming co-dominant including Pampas Grass (<em>Cortaderia selloana</em>), Tobacco Bush (<em>Solanum mauritianum</em>) and Blackberry (<em>Rubus fruticosus</em>). Other smaller native grasses, herbs and rushes also occur in places, including (<em>Paspalum distichum</em>), Mat Grass (<em>Hemarthria uncinata var. uncinata</em>) and Water Peppers (<em>Persicaria spp.</em>).</td>
</tr>
<tr>
<td>Cumbungi (<em>Typha orientalis</em>)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Rush (<em>Juncus usitatus</em>)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sedgeland</strong></td>
<td>1m Closed</td>
<td>0.1ha</td>
<td>This community occurs in a small pocket adjacent to the northern side of Deep Bridge Creek where there has been relatively minor...</td>
</tr>
<tr>
<td>Dominant Species</td>
<td>Height/ Cover</td>
<td>Total Area</td>
<td>Description</td>
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<td>------------------</td>
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<tr>
<td></td>
<td></td>
<td>past disturbances. Structurally it comprises a low closed sedgeland and is exclusively dominated by Caldwell Club-rush (<em>Bolboschoenus caldwellii</em>). This community is affected by weed species such as Curled Dock (<em>Rumex crispus</em>) and Pennywort (<em>Hydrocotyle bonariensis</em>).</td>
<td></td>
</tr>
</tbody>
</table>

**Swamp Oak Forest**

| Swamp Oak  
(*Casuarina glauca*) | 7-12m Closed-Open | 0.8ha | This community occurs in a number of small pockets in the investigation area surrounding Deep Bridge Creek and on the northern side of the Main Northern Railway. It occurs in low lying areas with saline or sub-saline groundwater that are waterlogged or periodically inundated. Structurally it comprises a patchy canopy layer of Swamp Oak (*Casuarina glauca*), with Hard Quandong (*Elaeocarpus obovatus*) being co-dominant in places. This community is generally highly disturbed, with weed species dominating the understorey including Torpedo Grass (*Panicum repens*), Vasey Grass (*Paspalum urville*) and Pennywort (*Hydrocotyle bonariensis*). Some native species persist in the understorey including Common Couch (*Cynodon dactylon*), Water Couch (*Paspalum distichum*) and Native Grape (*Cayratia clematidea*). |
| Hard Quandong  
(*Elaeocarpus obovatus*) |               |       | |

**Planted Swamp Oak Forest**

| Swamp Oak  
(*Casuarina glauca*) | 5-10m Closed | 1ha | This community occurs on the southern side of the Main Northern Railway. The presence of this community is the result of previous landscaping activities. It is dominated by Swamp Oak (*Casuarina glauca*) with other planted species including Fringed Wattle (*Acacia fimbriata*), Sydney Golden Wattle (*Acacia longifolia*) and Coastal Teatree (*Leptospermum laevigatum*) occurring at lower densities. Some weeds are also present mostly on the edges of this community including Lantana (*Lantana camara*), Golden Wreath Wattle (*Acacia saligna*), Coolatai Grass (*Hyparrhenia hirta*) and Red Natal Grass (*Melinis repens*). |

**Paperbark/Hard Quandong Forest**

| Prickly-leaved Paperbark  
(*Melaleuca stypheloides*) | 5-10m Closed | 0.3ha | This community occurs adjacent to Maitland Road at the northern end of the investigation area on slopes surrounding low lying wetland areas. Structurally it comprises a patchy closed canopy layer of Prickly-leaved Paperbark (*Melaleuca stypheloides*) and Hard Quandong (*Elaeocarpus obovatus*), along with Whale |
| Hard Quandong  
(*Elaeocarpus obovatus*) |               |       | |
<table>
<thead>
<tr>
<th>Dominant Species</th>
<th>Height/ Cover</th>
<th>Total Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone Tree (Streblus brunonianus), Flintwood (Scolopia braunii), Sweet Pittosporum (Pittosporum undulatum), Cheese Tree (Glochidion ferdinandii) and Mock Olive (Noteleea longifolia). This community is highly disturbed from edge effects with weeds present including Lantana camara, and Kikuyu (Pennisetum clandestinum) encroaching from the edges. Underneath areas of dense canopy cover there is a sparse groundcover of native species including Basket Grass (Opismenus aemulus), Scurvy Weed (Commelina cyanea), Kidney Weed (Dichondra repens) and Sickle Fern (Pellea falcata). Climbing species present include Wonga Vine (Pandorea pandorana), Monkey Rope (Parsonsia straminea) and Cockspur Thorn (Maclura cochinchinensis).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eucalypt Forest</td>
<td>10-15m Open</td>
<td>0.2ha</td>
<td>This community occurs on slopes surrounding low lying wetland areas in a number of small pockets in the investigation area near Shortland Wetland Centre at the southern end of the investigation area and adjacent to Maitland Road at the northern end of the investigation area. Structurally it comprises a patchy canopy layer of Forest Red Gum (Eucalyptus tereticornis), Grey Box (Eucalyptus molucanna), Spotted Gum (Corymbia maculate) and Grey Ironbark (Eucalyptus paniculata). The understorey is moderately to highly disturbed, with weed species dominating the understorey including Lantana camara, Kikuyu (Pennisetum clandestinum), Purple Top (Verbena banariensis) and Fireweed (Senecio madagascariensis). Some native species still exist in the understorey at low densities including Gorse Bitter-Pea (Davesia ulicifolia) and Blackthorn (Bursaria spinosa).</td>
</tr>
<tr>
<td>Planted Native Species</td>
<td>5-12m Closed-Open</td>
<td>0.6ha</td>
<td>This community is associated with planted areas along the edge of Sandgate Cemetery and along the edges of the existing State Highway 23. It is well established adjacent to Sandgate Cemetery containing Swamp Mahogany (Eucalyptus robusta), Coastal Banksia (Banksia integrifolia), Lemon-scented Tea Tree (Leptospermum petersonii) and Magenta Lillypilly (Syzygium paniculatum). Understorey components include Mat Rush (Lomandra longifolia), Hairy Clerodendrum (Clerodendrum tomentosum), Fringed Wattle (Acacia fimbriata) and Climbing Guinea Flower.</td>
</tr>
</tbody>
</table>
Along the edges of the existing State Highway 23 the plantings are relatively sparse, generally comprising spaced Wattle species (*Acacia* spp.). Some weeds are present including Cobbler Peg (*Bidens pilosa*) and Flatweed (*Hypochoeris radicata*).

<table>
<thead>
<tr>
<th>Dominant Species</th>
<th>Height/ Cover</th>
<th>Total Area</th>
<th>Description</th>
</tr>
</thead>
</table>
| (Hibbertia scandens) |  |  | This community occurs on areas that have been cleared and subject to agricultural activities in the past. There is a diversity of weed species present throughout this community and generally grass species dominate including Kikuyu (*Pennisetum clandestinum*), Buffalo Grass (*Stenotaphrum secundatum*), Vasey Grass (*Paspalum urvillei*), Pampas Grass (*Cortaderia selloana*) and Ratstail Grass (*Sporobolus indicus*). Other flora species that are dominant in different areas include Blackberry (*Rubus fruticosus*), Tobacco Bush (*Solanum mauritimum*), Green Cestrum (*Cestrum parqui*), Lantana (*Lantana camara*), Paddys Lucerne (*Sida rhombifolia*) and Purple Top (*Verbena bonariensis*). Some small fragmented patches of natives do persist within this community where conditions are suitable including Cumbungi (*Typha orientalis*), Common Reed (*Phragmites australis*), Harsh Ground Fern (*Hypolepis muelleri*), River Buttercup (*Hydrocotyle inundatus*), White Root (*Pratia purperascens*) and Water Peppers (*Persicaria spp.*).

|  |  |  | The ecological assessment identified nine weeds within the study area that are declared as noxious in the Newcastle City Council area. These weeds are described in Table 8.2 which includes the classification and legal requirements as stated under the *Noxious Weeds Act 1993*.

**Table 8.2: Description of the Noxious Weeds identified within the study area**

<table>
<thead>
<tr>
<th>Weed</th>
<th>Class</th>
<th>Legal requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Cestrum (<em>Cestrum parqui</em>)</td>
<td>W3</td>
<td>The plant must be fully and continuously suppressed and destroyed.</td>
</tr>
<tr>
<td>Common Prickly Pear (<em>Opuntia stricta</em>)</td>
<td>W4</td>
<td>The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.</td>
</tr>
<tr>
<td>Blackberry (<em>Rubus fruticosus agg.</em>)</td>
<td>W4</td>
<td>The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.</td>
</tr>
<tr>
<td>Crofton Weed</td>
<td>W4</td>
<td>The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.</td>
</tr>
</tbody>
</table>

---

Upgrade of Highway 23, Shortland to Sandgate  
RTA Environmental Technology
Weed | Class | Legal requirements
--- | --- | ---
(Ageratina adenophora) |  | controlled according to the measures specified in a management plan published by the local control authority.
Pampas Grass (Cortaderia selloana) | W4 | The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.
Large-leaf Privet (Ligustrum lucidum) | W4 | The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.
Small-leaf Privet (Ligustrum sinense) | W4 | The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.
Lantana (Lantana camara) | W5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.
Annual Ragweed (Ambrosia artemisiifolia) | W5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

**Threatened flora species, populations and communities**
The ecological assessment identified two threatened plant species and four Endangered Ecological Communities (EECs) within and/or adjacent to the investigation area. These are described in Table 8.3.

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Occurrence in Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magenta Lillypilly (Syzygium paniculatum)</td>
<td>V</td>
<td>Has been planted adjacent to Sandgate Cemetery (along western boundary).</td>
</tr>
<tr>
<td>Zannichellia palustris</td>
<td>E</td>
<td>Recorded in the study area within the Sandgate Road drainage channel, Hexham Swamp, 2HD Swamp. The closest recording to the Proposal site is within the man made drainage channel on the north side of the Shortlands Wetland Centre.</td>
</tr>
<tr>
<td>Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>EEC</td>
<td>Localised occurrences in study area. Scatter occurrences throughout the local area.</td>
</tr>
<tr>
<td>Freshwater Wetlands on Coastal</td>
<td>EEC</td>
<td>Includes area of weeds and</td>
</tr>
</tbody>
</table>

Table 8.3: Threatened flora species and ecological communities recorded within the study area
### No endangered flora populations are known to occur in the study area and none were located during the ecological assessment.

**Regionally significant flora species**
The ecological assessment identified that two flora species listed as Regionally Significant are located in the study area. These are Cockspur Thorn (*Maclura cochinchinensis*) and Grey Ironbark (*Eucalyptus paniculata* ssp. *matutina*). These species are considered regionally significant pursuant to Stage 1 of the *Lower Hunter Regional Biodiversity Strategy*.

### Wetlands
**State Environmental Planning Policy 14 (Coastal Wetlands)**
Some of the remnant wetlands present near to the study area are listed under SEPP 14 and as such are State significant. These are:
- Hexham Swamp to the northwest;
- Newcastle Wetlands Reserve to the east; and
- Market Swamp to the east.

The wetlands have been disturbed and modified by previous development in the area. Development has included installation of flood gates and urbanisation, preventing normal cycles of tidal inundation and altering hydrological characteristics. Changes to the hydrological regime have facilitated colonisation of much of the remnant wetland areas by emergent macrophytes, including Common Reed (*Phragmites australis*) and Broad-leaf Cumbungi (*Typha orientalis*) and has allowed stands of Swamp Oak (*Casuarina glauca*) to become established. Reed growth and sedimentation of drainage lines has resulted in previously seasonal ponds associated with Newcastle Wetlands Reserve and the Market Swamp becoming more permanent.

The remnant wetlands within the study area are not defined as SEPP 14 but are considered to provide habitat for significant species and therefore are considered to have local importance.

**Ramsar Wetlands**
The Ramsar listed Hunter Estuary Wetlands site is comprised of two separate areas between which the Proposal site traverses. The Ramsar Wetland areas are located outside of the study area. They are the Kooragang Nature Reserve which is located approximately 450m west of the Proposal site and the Shortland Wetlands site, which is located approximately 2km northeast of the Proposal site. The two areas are connected by a wildlife corridor consisting of Ironbark Creek, the Hunter River and Ash Island.
**Fauna**

Important habitat features within the study area were recorded. An analysis of key habitat requirements of significant species potentially occurring in the area against the habitat available in the study area was performed. The analysis identified significant species likely to occur in the area. These include one amphibian species, nineteen bird species and seven mammal species. These species are listed below:

- Green and Golden Bell Frog (*Litoria aurea*);
- Black-necked Stork (*Ephippiorhynchus asiaticus*);
- Wompoo Fruit-Dove (*Ptilinopus magnificus*);
- Osprey (*Pandion haliaetus*);
- Powerful Owl (*Ninox strenua*);
- Australasian Bittern (*Botaurus poicoptilus*);
- Black Bittern (*Ixobrychus flavicollis*);
- Painted Snipe (*Rostratula benghalensis australis*);
- Magpie Goose (*Anseranas semipalmata*);
- Comb-crested Jacana (*Irediparra gallinacean*);
- Latham’s Snipe (*Gallinago hardwickii*);
- Garganey (*Anas querquedula*);
- Great Egret (*Egretta alba*);
- Cattle Egret (*Ardeola ibis*);
- Glossy Ibis (*Plegadis falcinellus*);
- White-bellied Sea Eagle (*Haliaeetus leucogaster*);
- Common Greenshank (*Tringa nebularia*);
- Fork-tailed Swift (*Apus pacificus*);
- White-throated Needletail (*Hirundapus caudacutus*);
- Swamp Harrier (*Circus approximans*);
- Koala (*Phascolarctus cinerus*);
- Grey-headed Flying Fox (*Pteropus poliocephalus*);
- Eastern Free-tail Bat (*Mormopterus norfolkensis*);
- Little Bent-wing Bat (*Miniopterus norfolkensis*);
- Eastern Bent-wing Bat (*Miniopterus australis*);
- Large-footed Myotis (*Myotis adversus*); and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

The ecological assessment identified ten significant fauna species during the field surveys. The species are all listed as migratory under the EPBC Act. The White-bellied Sea Eagle is also listed under CAMBA. The significant fauna species identified are:

- Tawny Grassbird (*Megalurus timoriensis*);
- Little Grassbird (*Magalurus gramineus*);
- Clamorous Reed Warbler (*Acrocephalus stenoreus*);
- Golden-headed Cisticola (*Cisticola exilis*);
- Masked Lapwing (*Vanellus miles*);
- Chestnut Teal (*Anas castanea*);
- Wandering Whistle Duck (*Dendrocygna arcuata*);
• Whistling Kite (*Haliastur sphenurus*);  
• Nankeen Kestrel (*Falco cenchroides*); and  
• White-bellied Sea Eagle (*Haliaeetus leucogaster*).

The Green and Golden Bell Frog (GGBF) assessment found that core GGBF habitat is present in the northern part of the study area in the 2HD Swamp from which individuals disperse after good breeding seasons. Whilst a previous study during the 2001/2002 breeding seasons found 100 individuals in the 2HD Swamp, no individuals were heard calling nor were observed during intensive surveys undertaken for this assessment. In December/January 2005/2006, further intensive studies were undertaken for the GGBF, taking into account reference sites known to contain GGBF individuals. Despite microhabitat mapping of 2HD swamp, extensive nocturnal transects, call playback and listening, opportunistic searches and the assessment of a reference site, no GGBF were heard calling or observed during the search effort in either 2HD swamp or the reference site at Ash Island. Though no positive identifications were obtained, the GGBF assessment concludes that the GGBF is extant within the 2HD Swamp.

**Aquatics**

The ecological assessment found that the main area of aquatic habitat in the study area is a man-made channel known as Deep Bridge Creek. Deep Bridge Creek is classified as a Class 2 stream (Fairfull and Witheridge, 2003) meaning that it has the following characteristics:

“Named permanent or intermittent stream, creek or waterway with clearly defined bed and banks with semi-permanent to permanent waters in pools or well connected wetland areas. Marine or freshwater aquatic vegetation is present. Known fish habitat and/or fish observed inhabiting the area.”

No aquatic surveys were undertaken for the ecological assessment however a review of previous studies in the area was performed. The most recent study in the vicinity of the Hexham Swamp Rehabilitation Project found a total of 61 species of which 39 are primarily estuarine/saltwater species, 19 are known to occur in both fresh and estuarine waters at some stage in their life history and three are primarily freshwater species. All fish recorded were relatively common and widespread throughout NSW.

The introduced Plague Minnow (*Gambusia holbrooki*) is known to occur within the study area and to be widely distributed.

A habitat assessment determined whether any habitat is present within the study area that would indicate the presence of any threatened species, populations or communities listed under the *Fisheries Management Act 1994*. The assessment found that the habitat present is not suitable for any of the species, populations or communities listed and further that no protected marine species would be affected by the proposed activity.

**Potential Impacts**

Assessment of the potential impacts of the proposed action pursuant to s.5A of the EPA Act was conducted for 14 Threatened Species and 4 EEC’s (see Appendix 7 of the assessment, contained in Appendix E of this report) for which known or potential habitat occurred within the study area. The assessment concluded that the proposed action was unlikely to have a significant impact on the species and communities identified. Furthermore the assessment concluded that the Proposal would have a minor ecological impact on species and communities listed as threatened in NSW pursuant to the TSC Act.
Assessment of the potential impacts of the proposed action pursuant to the EPBC Act was conducted for 17 Matters of National Environmental Significance consisting of 2 threatened fauna species and 15 migratory birds (see Appendix 8 of Appendix E). It was concluded that the proposed action was unlikely to have a significant impact on the 15 migratory species, GGBF or Grey Headed Flying fox.

**Site Specific Safeguards**

- Waterway Crossing for Deep Bridge Creek should be designed in accordance with Fairfull and Witheridge (2003) as specified by NSW Fisheries (2003) (Appendix E, Appendix 10);
- A Flora and Fauna Management Plan should be prepared and implemented by an appropriately qualified ecologist to manage and restore flora and fauna habitats adjacent to the proposed highway;
- A Soil and Water Management Plan would be prepared by a suitably qualified soil conservationist (refer section 8.2). It should provide recommendations on design features that will ensure that there is no significant changes to the hydrology of adjacent wetlands; and, identify how the effectiveness of the sediment and erosion control system will be monitored, reviewed and updated;
- A Weed Management Plan would be prepared and implemented by a suitably qualified ecologist/bush regeneration contractor, including: identification of weeds within the Proposal site and adjoining areas; weed eradication methods and protocols for the use of herbicides; methods to treat and re-use weed infested topsoil; and, strategies to control the spread of weeds during Construction;
- Temporary fencing would be installed around sensitive areas adjacent to the construction site to ensure that there is no accidental incursion into these areas. Signs would be posted on the fences which clearly indicate that the areas are “Sensitive Environmental Area”. The importance of these areas would be emphasised during staff inductions;
- Permanent GGBF habitat would be established post construction. This habitat would replace the sedimentation pond used during construction between the Proposal and Sandgate Cemetery, and in conjunction with specific culverts and the Deepcreek Bridge would aim to maintain connections between known and potential habitat for GGBF populations;
- Frog exclusion fencing would be incorporated into the final design of the Proposal to reduce the incidence of roadkill particularly of GGBF individuals, and encourage the use of habitat connections designed into the Proposal and the permanent GGBF habitat; and
- Landscaping associated with the proposed action would consist of locally occurring native species.

### 8.7 Non-Indigenous Heritage

**Existing Environment**

The Proposal site and the surrounding area have been heavily modified since European settlement through a variety of development and land use activities. Newcastle itself has a long and established history initially through the mining and exportation of coal to Sydney in the late 1790’s and then as a penal colony during the early 1800’s (NCC, 2006). The early establishment of Newcastle and its suburbs following British settlement is evident today with the abundance and diversity of heritage items across the region. To ensure all heritage items located in the area were identified, a number of searches were conducted on relevant heritage databases and registers including, the Australian Heritage Register; State Heritage
Register and Inventory; RTA and other Section 170 Registers; and Newcastle City Council LEP listings. A list of items in close proximity to the Proposal site and their sources identified during these searches have been provided below:

- Hunter Estuary Wetland (Australian Heritage Database);
- 2HD Studio (Newcastle LEP);
- Ironbark Creek Underbridge, Sandgate (RailCorp Section 170 Register under Heritage Act 1977);
- Sandgate Cemetery (Newcastle LEP);
- Sandgate Cemetery Office (Newcastle LEP);
- Sandgate Cemetery Rail Spur (Newcastle LEP); and
- Sandgate Footbridge (Railcorp Section 170 Register).

**Potential Impacts**

The Proposal site is located completely within a historical road corridor and therefore no direct impact on any of the listed heritage items would be anticipated either during construction or operation as a result of the activity. However, the Hunter Estuary Wetlands, which is listed on the Australian Heritage Database, covers an area of approximately 6500ha at Kooragang part of which is immediately adjacent to the Proposal. The Hunter Estuary Wetlands are internationally significant as waterbird habitat and are known to support at least 45 migratory species presently listed under the Japan-Australia Migratory Bird Agreement (JAMBA) and/or the China-Australia Migratory Bird Agreement (CAMBA) (DEH, 2005).

During construction and operation there is the potential for runoff from the Proposal to discharge pollutants in the form of sediment and/or chemicals/hydrocarbons into Shortland Wetlands (one component of the Hunter Estuary Wetland). The control of runoff from the Proposal site during construction and operation would be implemented through the safeguards and design features detailed in Section 7.4, 8.2 and 8.4 of this REF.

In the event non-indigenous heritage items currently unidentified are uncovered as a result of construction of the Proposal they would be managed through the safeguards outlined in the RTA’s QA Specification G36. No additional site specific safeguards have been identified for the Proposal.

### 8.8 Indigenous Heritage

**Existing Environment**

The Hunter Valley region, over the past 20 years, has been the subject of many Indigenous cultural and archaeological heritage investigations. Results from investigations across the broader Hunter Valley region include archaeological site types such as grinding grooves, quarries or raw material resource areas, art sites, scarred trees, carved trees, stone arrangements, ceremonial grounds, burials, mythological sites, mission sites and occupation sites (rock shelters, open artefact scatters and shell middens) (Steele 2005).

The environment within and immediately adjacent to the subject land would have provided Aboriginal people with access to freshwater and a variety of plant and animal resources, some of these are known from historical documentation to have been used. Equally relevant however is the fact that the majority of the subject land is, and was for probably several thousand years, swampland which, whilst utilised for its resources was not lived in/on by Aboriginal people. The only likely surface on which Aboriginal people may have lived would be higher (dry) ground at the margins of the swamp. Such areas appear restricted to the
southern end of the subject land and in any case may have been moderately to severely affected by European land use (Steele 2005).

Dominic Steele Consulting Archaeology (DSCA) was engaged by the RTA to prepare a Preliminary Aboriginal Archaeological Survey and Assessment of the Proposal site. Findings from the report have been summarised below and a copy of the full report has been provided in Appendix G of this REF.

A site inspection was undertaken by a representative of DSCA on 28 September 2005 and later by a representative of the Awabakal Local Aboriginal Land Council (ALALC) on 7 October 2005. The Proposal site for the purposes of the assessment was broken into 5 distinctive areas referred to as (in order from south to north): End of Existing H23 to Sandgate Road; Sandgate Road to Proposed Bridge; Proposed Bridge to Main Northern Railway Intersection; Main Northern Railway Intersection to Northern Boundary of Sandgate Cemetery; and Northern Boundary of Sandgate Cemetery to H10.

The survey found no evidence of past Aboriginal visitation or use of the study area, specifically:

- No Aboriginal stone artefacts were located on the ground surface within the land surveyed, nor were any areas with potential to contain sub-surface deposits located.
- No evidence for trees with scars of an Aboriginal cultural origin was noted in the entire study area. No mature trees were observed within the subject land of sufficient age to bear scars of Aboriginal cultural origin.
- No other evidence of past Aboriginal use of the area was located during the survey.

**Potential Impacts**

The findings of the Preliminary Aboriginal Archaeological Survey and Assessment concluded that:

- Virtually the entire Proposal corridor can be described as disturbed terrain with no potential for the presence of intact Aboriginal archaeological remains or swamplands which would not have been lived in/on by Aboriginal people and which in any case have been disturbed through clearance and drainage works.
- The southbound exit ramp at Sandgate Road represents the only potentially natural ground within the subject land. Despite a lack of surface exposure, this area would have been partially disturbed by tree clearance and adjacent construction works and is not considered to retain the potential for intact and extensive archaeological deposit.
- The only evidence of Aboriginal occupation which may remain in this area are likely to be low density surface stone artefact finds representing the disturbed remnants of the past Aboriginal use of the area. These artefacts would retain no archaeological significance (Steele, 2006 – Appendix G).

While adverse impacts on Aboriginal cultural heritage values of the place are considered unlikely, nonetheless, a number of safeguards would be implemented as part of the Proposal and have been outlined below.

**Site Specific Mitigation Safeguards**

- Further consultation with the Awabakal Local Aboriginal Land Council would be undertaken prior to the commencement of works to ensure non-indigenous heritage is provided with the appropriate level of safeguards.
- All personnel working on site would receive training in their responsibilities under the National Parks and Wildlife Act 1974.
- Should Indigenous heritage items be uncovered during works, all works in the vicinity of
the find would cease and the RTA’s Aboriginal Programs Consultant, Regional Environmental Adviser Hunter, DEC representative and relevant LALC representative would be contacted. Works would not re-commence until appropriate clearance has been received.

8.9 Noise and Vibration

Existing Environment
In August 2005, Global Acoustics undertook a noise and vibration assessment for the Proposal (Refer Appendix H), with a brief to investigate the noise environment within the study area. Specifically:

- Determine the appropriate construction noise and vibration criteria, calculate likely noise levels for construction and assess the potential impacts; and
- Determine likely road traffic noise criteria for the variety of land use zones within the study area; calculate likely traffic noise for the Proposal, and suggest options for mitigation; and assess potential sleep disturbance impacts.

Accordingly, long term noise monitoring at five locations was undertaken to gather an appreciation of the existing noise environment. These locations were selected due to their proximity to the proposed upgrade and because they are representative of different noise catchments within the study area. The noise loggers used to monitor these locations, returned data at 15 minute statistical intervals. This information was summarised to quantify ambient, road traffic and maximum noise levels. These results are presented in Section 2 of Appendix H. In summary, the findings of the monitoring revealed high levels of existing road traffic noise.

Potential Impacts
Construction Noise and Vibration
Given the likely duration of construction involved for the Proposal (greater than 26 weeks), the relevant criteria as outlined in the DEC Environmental Noise Control Manual (ENCM) are such that the LA10 should not exceed the existing background LA90 by more than 5dB(A). It is expected that there would be minimal sound loss through ground and molecular absorption, on account of the close proximity of receivers to the Proposal. The Proposal site is generally open, all nearby residences are therefore exposed to all construction activity and so no barrier attenuation would occur. Accordingly predicted construction noise levels (without any mitigation) would likely be higher than daytime ENCM criteria. Section 3.1.1 of Appendix H provides day and night time ENCM construction noise targets for Sandgate Road, Astra Street and Maitland Road receptors.

A criterion of 5mm/s peak particle velocity (ppv) has been suggested for the Proposal in order to preserve the amenity of residences. This criterion has taken into account, various standards and guidelines, including the DEC ENCM, British Standard 6472 and the United States Bureau of Mines. In reference to the suggested criterion, vibration levels resulting from a variety of construction activities are likely to be below the suggested criterion at most locations. The exception to this could be from piling during bridge works where levels of up to 6mm/s ppv could be experienced.

The DEC ENCM has been updated in the respect that the DEC has recently released “Assessing vibration: a technical guideline” (DEC, 2006), which states the following:

Assessing vibration: a technical guideline is based on guidelines contained in BS 6472-1992, Evaluation of human exposure to vibration in buildings (1-80 Hz). BS 6472
(current and former versions) has guided the Department of Environment and Conservation’s (DEC) evaluation of vibration since the mid-1980s. Thus, this technical guideline does not represent a change in policy approach.

Considering the criterion developed above is consistent with BS 6472-1992, the RTA has taken the position that the vibration criterion suggested for the Proposal is consistent with the most recent DEC Technical Guidelines, and therefore does not require amendment.

**Operational Noise**

The Proposal is required to meet the night time criterion \( \text{L}_{\text{Aeq}(9\text{hr})} \) of 50dB for a “new freeway or arterial road corridor”, as identified within the DEC document *Environmental Criteria for Road Traffic Noise* (ECRTN). Noise modelling results indicate that at receptors along the proposed alignment, the 50dB \( \text{L}_{\text{Aeq}(9\text{hr})} \) criterion is exceeded (refer to Table 8.4). Road traffic noise levels were calculated with surfaces of dense and open grade asphalt and concrete for residences adjacent to the Proposal. In meeting this criterion, the RTA would meet all other operational noise criteria for the Proposal.

Table 8.4 provides a comparison of the predicted \( \text{L}_{\text{Aeq}(9\text{hr})} \) levels and predicted “future existing” \( \text{L}_{\text{Aeq}(9\text{hr})} \) levels for the Proposal with dense grade asphalt, open grade asphalt and concrete pavement types.

**Table 8.4: Predicted \( \text{L}_{\text{Aeq}(9\text{hr})} \) levels and predicted “future existing” \( \text{L}_{\text{Aeq}(9\text{hr})} \) levels for the Proposal with dense grade asphalt, open grade asphalt and concrete pavement types**

<table>
<thead>
<tr>
<th>Receptor</th>
<th>Open Grade Asphalt</th>
<th>Dense Grade Asphalt</th>
<th>Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Future existing*</td>
<td>Future**</td>
<td>Future</td>
</tr>
<tr>
<td>26 Astra Street</td>
<td>N/A</td>
<td>56</td>
<td>N/A</td>
</tr>
<tr>
<td>19 Astra Street</td>
<td>N/A</td>
<td>55</td>
<td>N/A</td>
</tr>
<tr>
<td>4 Astra Street</td>
<td>N/A</td>
<td>54</td>
<td>N/A</td>
</tr>
<tr>
<td>438 Sandgate Rd</td>
<td>53</td>
<td>58</td>
<td>53</td>
</tr>
<tr>
<td>172 Maitland Rd</td>
<td>56</td>
<td>58</td>
<td>56</td>
</tr>
</tbody>
</table>

* Based on calculated 2016 AADT without Proposal
** Based on calculated 2016 AADT with Proposal

Note: N/A denotes no future traffic noise

The potential impacts of the Proposal on the noise environment within the study area would be further investigated during the detailed design phase after consultation with affected stakeholders during the public exhibition period. As such various options are available to ensure an acceptable outcome for residents and stakeholders. Therefore, during detailed design, the RTA would investigate a combination of treatment options to optimise road traffic noise mitigation and satisfy project objectives. These treatment options may include, but not be limited to quieter pavement surfaces, noise barriers and architectural (at house) treatments.

**Sleep Disturbance**

In accordance with the ENMM guidelines, an assessment was conducted on the Proposal’s potential for sleep disturbance. The results show that regardless of the road surface used, emergence related sleep disturbance might be possible at some receptors.

**Site Specific Safeguards**

- The RTA will develop a process for ascertaining the most reasonable and technically feasible approach to managing the mitigation of operational noise impacts related to Proposal. This process would be finalised during further detailed development of the
Proposal and in consultation with relevant stakeholders.

- Further detailed noise assessment of the Proposal will occur during the detailed design phase and prior to determination of the Proposal. The outcome of this further assessment would be used to develop the most reasonable and feasible options for noise attenuation of the Proposal;
- Selection of low noise emission plant (some plant can be 5 dB or more quieter with engineering noise controls, smaller plant items are often quieter);
- Schedule work to include respite periods (that is, limit the number of consecutive days work and total days per month);
- Temporary noise barriers when required (erect hoarding adjacent to work areas as required, these must be temporary as the intersection must be operational during the day);
- Educate contractors about quieter work practices (this can be particularly useful with regard to limiting maximum noise levels);
- Change the piling configuration to reduce received vibration levels; and
- Monitor vibration levels at the commencement of the activity to optimise the piling configuration to meet the vibration criterion.

8.10 Visual Amenity and Landscape

**Existing Environment**

The visual amenity of the local area is considered moderate, owing to a mixture of built and natural landscape features that while common the local area, are regionally unique. The Hunter River flood plain, which includes a combination of open grass lands, and temporary and permanently inundated wetlands, is the dominant feature of the Study area. Named wetlands in the area include Market Swamp and Newcastle Wetlands Reserve to the east, Shortland Wetlands Centre, 2HD Swamp and Hexham Swamp to the west.

While the area exhibits a number of natural landscape features, there is also an equivalent number of built elements. A substantial area located to the west at the southern extent of the Proposal site forms the northern section of the suburb of Shortland. Two small pockets of residential housing located to the east of the Proposal corridor and south of the Main Northern Railway, constitute the remaining areas of Shortland’s residential housing features. At and north of the Main Northern Railway east of the Proposal site are Shortland Railway Station and Sandgate Cemetery. Sandgate Cemetery is one of Newcastle’s largest and well established burial grounds covering an area of approximately 28 hectares. At the northern most extent of the Proposal site is an isolated pocket of residential and commercial properties centrally located within the physical boundaries of Sandgate suburb.

West of the Proposal site and confined to the northern end of the Proposal is the remaining built up area. This area exhibits a large, and a number of smaller, light industrial premises and the facilities associated with the St Joseph’s Nursing Home.

**Potential Impacts**

In undertaking this assessment, a specialist visual assessment and urban design strategy was specifically developed to provide a vision for the further development of the Proposal (see Appendix I).

The general character of the landscape and built form of the area is not considered highly sensitive and has been substantially altered by a range of different land uses. The presence of existing features such as the rail line, roads, radio mast and power lines are an indicator of
the general capacity of this landscape to accommodate further change. However certain areas of the landscape have qualities that would be safeguarded through a sensitive concept design. These are the flood plain area of Deepbridge Creek and the Wetland Centre, the wetland area to the north of the Proposal site, and Sandgate Cemetery.

**Site Specific Safeguards**

- The Urban Design Framework proposed in Appendix I, would be adopted for the Proposal. This framework would incorporate the Proposal into its built and landscape context and avoid or minimise impacts on the local community and public space. The key elements of the framework include:
  - Ensuring the design of the Proposal in consistent with the existing inner city bypass;
  - A simple, refined and slender bridge structure over the floodplain;
  - Creating an appropriately fitting context for the Cemetery and the Wetland Centre; and
  - Incorporating the proposed landform into the existing topography, wherever possible.

Further details and specific design considerations are provided in Section 5 of Appendix I.

- During construction, all working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.

### 8.11 Socio-economic Considerations

**Existing Environment**

The alignment for the proposed continuation of H23 between Shortland and Sandgate is within a historical corridor first set aside for transport infrastructure during the 1950’s. Land use within the immediate surrounding area comprises wetland reservations, residential landholdings, industrial premises, rail infrastructure and a cemetery. The early identification of the potential network alignment, and the subsequent reservation of this land by the local authority for this purpose, has ensured that development in the local area has been sympathetic to any proposed future road network development within this corridor.

South of the proposed H23 continuation is a 3.3km long stretch of median separated dual carriageway highway (H23) with a grade separated interchange with University Drive and a large radius roundabout at the intersection with Newcastle Road. Highway 23 and the adjoining roads in this area serve to connect the suburbs of Jesmond, Wallsend, North Lambton, Birmingham Gardens and also the University of Newcastle. North of the Proposal site H10 (or Maitland Road) is a median separated four lane north-south link between the City of Newcastle (its CBD, residential areas and Port), Maitland and the north coast of NSW.

**Potential Impacts**

**Operation**

During operation it is anticipated that the Proposal would result in a reduction in the amenity and outlook for residents located within the developed areas, particularly those east of the Proposal, due to operational noise, light spill and the physical scale of the elevated formation. Residences located east of the Proposal currently experience largely uninhibited views of the Hexham flood plains, with the exception of those properties located immediately south of the Main Northern Railway. The Proposal would comprise a
combination of elevated embankments and bridges for the full length of the works that would substantially curtail the views currently experienced by residents. Similarly, the new alignment would introduce a new noise and light source at the rear of residential properties east of the Proposal currently not experienced under the existing situation.

The implementation of the Proposal would see a number of positive socio-economic outcomes to the local and wider area, namely, the improved provision for cyclists, improved traffic efficiency and safer intersection and corridor operation. The Proposal would provide for a continuation of the shared cyclist and breakdown lane for the full length of the Proposal and provide connectivity to the cyclist facilities provided on H10 and the H23 Jesmond to Sandgate section. Similarly, the improved horizontal and vertical alignment, intersection treatments and the increased vehicle carrying capacity would serve to improve the distribution of light and heavy vehicle movement through the area from both a safety and operational efficiency perspective.

**Construction**

During construction it is anticipated that there would be delays to traffic along the existing alignment, specifically at the proposed interchange at the southern end of the route with Sandgate Road and at the northern end intersection with H10, relating to the importation of material by construction vehicles and later due to interchange works. It is anticipated that the extent of delays associated with construction activities would be dependent on the process underway at any particular time and would be the greatest early in the construction period during the importation of fill and later during connection of the Proposal to the existing road network.

In addition, it is anticipated that construction activities would result in both negative visual and noise related impacts at residential properties to the east of the Proposal corridor, and to a lesser extent to those properties in the north western section of Shortland. Impacts attributable to noise have been discussed further in Section 8.9 of this REF. Visual impacts (discussed in Section 8.10 of this REF) associated with the construction activities would be due to exposed fill embankments, site office facilities and the general movement of construction vehicles and equipment throughout the site and the adjacent road network.

The Proposal has the potential to result in dust nuisance for residences adjacent to the Proposal site and the Shortland Wetlands Centre. Predominant weather conditions would see dust dispersion, should material be dislodged, affecting properties largely to the north and east of the Proposal corridor due to seasonally predominant westerlies in winter and south/south easterlies in summer.

Socio-economic impacts attributable to the Proposal would be managed through the implementation of safeguards outlined in Sections 8.5, 8.8 and 8.10 and those detailed below.

**Site Specific Safeguards**

- All property acquisitions would be negotiated in accordance with the RTA’s Land Acquisition Policy, and compensation in accordance with the *Land Acquisition (Just Terms Compensation) Act, 1991*. Property acquisitions and/or leasing arrangements would be resolved between the RTA and property owners prior to the commencement of works.
- The lighting design would comply with AS/NZS 1158.1.1:1997 Category V3.
- Access to Sandgate Road and adjacent commercial and residential properties would be maintained at all times.
- Consultation would be undertaken with potentially affected residences prior to the
commencement of works and would be undertaken in accordance with the RTA's *Community Involvement Practice Notes and Resource Manual, 1998*. In addition, consultation would include but not limited to door knocks, newsletters or letter box drops providing information on the proposed works, working hours adhered to and a contact name and number should any complaints wish to be registered.

- A Traffic Control Plan would be prepared in accordance with the RTA's *Traffic Control at Work Sites Manual 2003*, and approved by the RTA prior to implementation. The Traffic Control Plan would include the notification of any traffic alterations or closures.

### 8.12 Waste Minimisation and Management

#### Potential Impacts

The construction and operation of the Proposal has the potential to generate liquid and non-liquid wastes. The key waste streams likely to be generated include:

- Green waste;
- Excavated soil;
- Contaminated/unsuitable soils (ASM);
- General construction waste;
- Asphalt;
- Sewage from the compound site;
- Fuels, oils, liquids and chemicals;
- Gross pollutants and putrescible waste; and
- Cement.

#### Site Specific Safeguards

- A Waste Management Plan would be prepared in accordance with RTA's QA Specifications and in accordance with RTA's *Waste Minimisation & Management Guidelines, 1998* and the principles of the WARR Act.
- Leaf material and small branches of native vegetation would be chipped and used as mulch in revegetation works.
- There would be no burning of waste.
- All noxious weeds and exotic plant species removed would be bagged and disposed of at a licensed landfill facility.
- All construction materials, surplus soils and wastes generated from the Proposal would be stockpiled and stored at the compound site prior to reuse, recycling or disposal.
- All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.
- Wastes would not be stored for long periods during construction of the Proposal. Empty drums of fuels, oils or chemicals and fluids would not be stored on site during construction.

In addition, the Resource Management Hierarchy principles of the WARR Act would be adopted as follows:

1. Avoid unnecessary resource consumption as a priority;
2. Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling, and energy recovery; and
3. Disposal is undertaken as a last resort.
8.13 Operation Hazards and Risks

The Proposal would generate a number of potential hazards and risks. The majority of these would generally apply to all types of road infrastructure. Sources of potential hazards and risks include:

- General operational traffic accidents associated with road travel involving single and multiple vehicles and cyclists; and
- Heavy and dangerous goods transportation (e.g., Chemical spills into adjacent sensitive environment).

By nature, improvements in performance and efficiency of any road generally attract larger volumes and frequency of traffic from the surrounding road network. Such increases carry inherent risks that can be expected in most situations. The Proposal is not expected to generate significant operational risks and hazards that cannot be managed through the implementation of appropriate road safety and user guidelines in accordance with the relevant Australian Design Standards.

8.14 Demand on Resources

The RTA adopts the Resource Management Hierarchy principles embodied in the WARR Act (as outlined in Section 8.12). The Proposal would not require the use of any resources that are, or are likely to become, in short supply. All road base materials would be sourced from licensed quarries within the region.

8.15 Cumulative Environmental Effects

Clause 228(2) of the Environmental Planning and Assessment Regulations 2000 requires that an environmental assessment under Part 5 of the Act take into account any cumulative environmental impact with other existing or likely future activities.

The anticipated cumulative environmental effects of the Proposal relate to the combined effect of individual impacts of the Proposal as well as to the cumulative effect of this Proposal with other nearby projects or planned projects or activities in the locality.

The major developments in the region with which the Proposal may have cumulative impact include:

- Australian Rail Track Corporation Sandgate Rail Grade Separation;
- H23 Rankin Park to Jesmond Realignment;
- H23 West Charlestown Bypass;
- F3 to Branxton Link; and
- F3 to Raymond Terrace Link.
8.15.1 Environmental Cumulative Impacts
The Proposal would have the potential to contribute to the following cumulative environmental impacts in the region:
- Potential for a general reduction in the amenity and outlook experienced by local residents due to the physical presence of the Proposal, a redistribution of the dominant road traffic noise source and construction related aspects;
- Potential for a reduction in the water quality of Deepbridge Creek and Iron Bark Creek; and
- Potential for a reduction in flora and fauna species diversity (e.g., Green and Golden Bell Frog) by contributing to ongoing habitat loss.

8.15.2 Social Cumulative Impacts
The Proposal would have the potential to contribute to the following cumulative social impacts in the region:
- Improved road user safety;
- Reduced travel times and increased travel efficiency;
- Increase in construction traffic and heavy vehicles on local roads in the region during the construction period; and
- Temporary reduction in local air quality due to increased machinery emissions and generation of dust during construction.

8.15.3 Economic Cumulative Impacts
The Proposal would have the potential to contribute to the following cumulative economic impacts in the region:
- Travel cost savings for motorists due to an improvement of transport links in the region;
- Increased employment during the construction stage; and
- Increase in local trade due to the influx of the workforce.

8.16 Principles of Ecologically Sustainable Development

The National Strategy for Ecologically Sustainable Development (ESD) has been formulated to ensure ESD is accounted for in all Proposals. There are three core objectives:
- To enhance individuals' and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life support systems.

These objectives are complemented with a number of guiding principles that are considered below in Table 8.1 in terms of the Proposal.
Table 8-1: Principles of ESD applied to the Proposal.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Application to the Proposal</th>
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<tr>
<td><strong>Precautionary Principle</strong></td>
<td>Four route options for the Proposal were considered during the early network option development and assessment phase. Environmental, social, economic and other impacts were evaluated during this process before on a merit basis the Shortland to Sandgate option was considered to be the preferred alignment. In addition, specific design aspects have considered and addressed potential hazards and risks resulting from both the construction and operation elements of the Proposal. No issues have been identified that would cause any serious or irreversible environmental damage as a result of the Proposal. Environmental safeguards outlined in Section 9.1 would further ameliorate potential environmental impacts.</td>
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<td><strong>Intergenerational Equity</strong></td>
<td>The proposed continuation of H23 would provide for a more efficient and safer transport corridor for all road users into the future by improving the alignment, connections/intersections, traffic flow and by providing better cyclist facilities. The Proposal includes a range of design features and additional ameliorative measures to be implemented during construction and operation to maintain the natural and social values of the environment for future generations.</td>
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<tr>
<td><strong>Conservation of Biological Diversity &amp; Ecological Integrity</strong></td>
<td>The Proposal has been developed with regard to the potential direct impact on the ecology of the corridor and the indirect impact on the adjacent wetlands and tributaries of the Hunter River. Specialist studies prepared as part of the environmental assessment indicated that the Proposal would not diminish the biological diversity or ecological integrity of the area. Safeguards that have been developed as part of this REF would be implemented to ensure any potential adverse effects associated with construction of the Proposal are minimised.</td>
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<tr>
<td><strong>Improved Valuation &amp; Pricing of Environmental Resources</strong></td>
<td>The criteria used for evaluating route options and later a preferred option focused on a range of environmental and community factors, as well as traffic, economic and engineering considerations. This approach has ensured that appropriate values have been attached to all environmental factors considered and assessed. Safeguards have been identified for incorporation into the detailed design, construction and operation of the H23 continuation. These measures reflect the value of preserving the natural and built environments affected by the Proposal.</td>
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Environmental Management

9.1 Summary of Proposed Safeguards

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the Proposal and during construction and operation of the Proposal. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. All safeguards described in this REF and the Decision Report/ Conditions of Approval would be incorporated into the Contractor’s Environmental Management Plan (CEMP) and the Project Environmental Management Plan (PEMP).

The CEMP and PEMP (if required) would be developed in accordance with the specifications set out in the RTA’s Environmental Protection (Management Plan) – QA Specification G36 and G38.

Table 9.1: Site Specific Environmental Safeguards.

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| Landform, Geology & Soils | • A Soil and Water Management Plan (SWMP) plan would be developed and incorporated into the CEMP. The plan would incorporate specifications outlined in *Managing Urban Stormwater: Soils and Construction* (“Blue Book”), RTA Code of Practice for Water Management 1997, and RTA’s Road Design Guide 2000, and identify areas requiring management controls, include inspections and checklist sheets to be reviewed by the RTA’s Regional Environmental Adviser, Hunter Region prior to the commencement of works. Best practice techniques would be implemented to design pollution control structures, and such design would be determined following use of the abovementioned guidelines and policy. This plan would be prepared by a suitably qualified soil conservationist (see also Section 8.6).  
• Temporary and permanent stormwater control devices and/or erosion and sedimentation controls would be implemented at Proposal site discharge points to prevent sediment-laden runoff entering the local waterways. Indicative locations of water quality control basins are discussed in Section 2.2. These basins would be appropriately sized to address the potential for particulate matter to enter waterways, and would be implemented in conjunction with measures in place for the control of erosion and sedimentation. In addition, following the completion of the construction these basins would be suitably modified to act as operational water pollution controls to collect runoff from the paved road surface, including any spills.  
• Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept and provided at anytime upon request. Sediment would be cleared from behind barriers on a regular basis and all controls would be managed in order to work effectively at all times, that is, sedimentation controls would be less than 50% full at all times.  
• All stockpiles would be designed, established, operated and decommissioned in accordance with the RTA’s *Stockpile*  

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<td><em>Management Procedures 2001.</em> In addition, all stockpiles would be located 50m away from the high bank of any rivers or drainage lines.</td>
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<td>• Any material transported onto pavement surfaces would be swept and removed at the end of each working day.</td>
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<td>• Hardstand material would be implemented at entry and exit points to construction and compound areas to minimise the tracking of soil and particulates onto pavement surfaces.</td>
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<td>• Imported fill required for the Proposal would be sourced from licensed/registered suppliers within the local area.</td>
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<td>• Site rehabilitation of disturbed areas would be undertaken progressively as stages are completed.</td>
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<td>• All in-situ soils excavated as part of the Proposal would be managed according to the RTA Guidelines for the Management of Acid Sulfate Materials: Acid Sulfate Soils, Acid Sulfate Rock and Monosulfidic Black Ooze 2005 which would adequately control the associated risks of ASS.</td>
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<td>• Should ASS be detected where excavation is required, works would proceed according to the RTA’s previously mentioned guidelines and would include activities including, but not limited to;</td>
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<td>- Capping of exposed surfaces with clean fill to prevent oxidation;</td>
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<td>- Placing excavated ASS separately in a lined, bunded and covered area;</td>
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<td>- Neutralise ASS by using soil additives such as lime; and</td>
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<td>- Disposing of ASS in accordance with Guidelines.</td>
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<tr>
<td>Climate</td>
<td>Weather forecasts would be periodically assessed and works programmed to avoid increasing the risk of erosion and sedimentation.</td>
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<tr>
<td>Water Quality &amp; Hydrology</td>
<td>Waterway Crossing for Deep Bridge Creek should be designed in accordance with Fairfull and Witheridge (2003) as specified by NSW Fisheries (2003) (Appendix E, Appendix 10);</td>
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<td>• A Flora and Fauna Management Plan should be prepared and implemented by an appropriately qualified ecologist to manage and restore flora and fauna habitats adjacent to the proposed highway;</td>
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<td>• A Soil and Water Management Plan would be prepared by a suitably qualified soil conservationist. This plan would identify the construction activities that could cause soil erosion or discharge sediment or water pollutants from the site; describe management methods to minimise soil erosion or discharge of sediment or water pollutants from the site including a strategy to minimise the area of bare surfaces during construction; describe the location and capacity of erosion and sediment control measures; identify the timing and conditions under which construction stage controls will be decommissioned; include contingency plans to be</td>
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<td>implemented for events such as fuel spills; provide recommendations on design features that will ensure that there is no significant changes to the hydrology of adjacent wetlands; and, identify how the effectiveness of the sediment and erosion control system will be monitored, reviewed and updated;</td>
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<td>• A Weed Management Plan would be prepared and implemented by a suitably qualified ecologist/bush regeneration contractor, including: identification of weeds within the Activity and adjoining areas; weed eradication methods and protocols for the use of herbicides; methods to treat and re-use weed infested topsoil; and, strategies to control the spread of weeds during Construction;</td>
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<td></td>
<td>• Temporary fencing would be installed around sensitive areas adjacent to the construction site to ensure that there is no accidental incursion into these areas. Signs would be posted on the fences which clearly indicate that the areas are “Sensitive Environmental Area”. The importance of these areas would be emphasised during staff inductions;</td>
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<td></td>
<td>• Permanent GGBF habitat would be established post construction. This habitat would replace the sedimentation pond used during construction between the Proposal and Sandgate Cemetery, and in conjunction with specific culverts and the Deepcreek Bridge would aim to maintain connections between known and potential habitat for GGBF populations;</td>
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<td>• Frog exclusion fencing would incorporated into the final design of the Proposal to reduce the incidence of roadkill particularly of GGBF individuals, and encourage the use of habitat connections designed into the Proposal and the permanent GGBF habitat; and</td>
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<td>• Landscaping associated with the proposed action would consist of locally occurring native species.</td>
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<tr>
<td>Air Quality</td>
<td>• Any stockpiles and general areas with the capacity to cause dust would be dampered to suppress dust emissions.</td>
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<td>• Long term stockpiles would be sprayed with a sterile grass mix to suppress dust generation.</td>
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<td>• Any materials transported in trucks would be appropriately covered to reduce dust generation.</td>
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<td>• Construction activities that generate high dust levels would be avoided during strong wind conditions.</td>
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<td>• Where winds reach a velocity that visibly mobilises dust particulates, the frequency of dust suppression such as watering would be increased appropriately.</td>
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<td>• Fenced boundaries surrounding stockpile sites would be lined with geotextile fabric.</td>
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<td>Biodiversity</td>
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• A Weed Management Plan would be prepared and implemented by a suitably qualified ecologist/bush regeneration contractor, including: identification of weeds within the Activity and adjoining areas; weed eradication methods and protocols for the use of herbicides; methods to treat and re-use weed infested topsoil; and, strategies to control the spread of weeds during Construction;  
• Temporary fencing would be installed around sensitive areas adjacent to the construction site to ensure that there is no accidental incursion into these areas. Signs would be posted on the fences which clearly indicate that the areas are “Sensitive Environmental Area”. The importance of these areas would be emphasised during staff inductions;  
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• Frog exclusion fencing would incorporated into the final design of the Proposal to reduce the incidence of roadkill particularly of GGBF individuals, and encourage the use of habitat connections designed into the Proposal and the permanent GGBF habitat; and  
• Landscaping associated with the proposed action would consist of locally occurring native species.  
• Further consultation with the Awabakal Local Aboriginal Land Council would be undertaken prior to the commencement of works in to ensure non-indigenous heritage is provided with the appropriate level of safeguards.
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<td>Noise and Vibration</td>
<td>• All personnel working on site would receive training in their responsibilities under the National Parks and Wildlife Act 1974.</td>
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<td>• Should Indigenous heritage items be uncovered during works, all works in the vicinity of the find would cease and the RTA’s Aboriginal Programs Consultant, Regional Environmental Adviser Hunter, DEC representative and relevant LALC representative would be contacted.Works would not re-commence until appropriate clearance has been received.</td>
</tr>
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<td>• The RTA will develop a process for ascertaining the most reasonable and technically feasible approach to managing the mitigation of operational noise impacts related to Proposal. This process would be finalised during further detailed development of the Proposal and in consultation with relevant stakeholders.</td>
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<td>Socio-Economic Considerations</td>
<td>- All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.</td>
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<td>- All property acquisitions would be negotiated in accordance with the RTA’s Land Acquisition Policy, and compensation in accordance with the <em>Land Acquisition (Just Terms Compensation) Act, 1991</em>. Property acquisitions and/or leasing arrangements would be resolved between the RTA and property owners prior to the commencement of works.</td>
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<tr>
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<td>- Access to Sandgate Road and adjacent commercial and residential properties would be maintained at all times.</td>
</tr>
<tr>
<td></td>
<td>- Consultation would be undertaken with potentially affected residences prior to the commencement of works and would be undertaken in accordance with the RTA’s <em>Community Involvement Practice Notes and Resource Manual, 1998</em>. In addition, consultation would include but not limited to door knocks, newsletters or letter box drops providing information on the proposed works, working hours adhered to and a contact name and number should any complaints wish to be registered.</td>
</tr>
<tr>
<td></td>
<td>- A Traffic Control Plan would be prepared in accordance with the RTA’s <em>Traffic Control at Work Sites Manual 2003</em>, and approved by the RTA prior to implementation. The Traffic Control Plan would include the notification of any traffic alterations or closures.</td>
</tr>
</tbody>
</table>

| Waste Management & Minimisation | - A Waste Management Plan would be prepared in accordance with RTA’s QA Specifications and in accordance with RTA’s *Waste Minimisation & Management Guidelines, 1998* and the principles of the WARR Act. |
|                                | - Leaf material and small branches of native vegetation would be chipped and used as mulch in revegetation works.                                                                                            |
|                                | - There would be no burning of waste.                                                                                                                                                                                  |
|                                | - All noxious weeds and exotic plant species removed would be bagged and disposed of at a licensed landfill facility.                                                                                               |
|                                | - All construction materials, surplus soils and wastes generated from the Proposal would be stockpiled and stored at the compound site prior to reuse, recycling or disposal.                                         |
|                                | - All working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day.                                                                                                           |
|                                | - Wastes would not be stored for long periods during construction of the Proposal. Empty drums of fuels, oils or chemicals and fluids would not be stored on site during construction.          |
9.2 Licences and Approvals

**Water Act, 1912**

Should water for bridge and road works and associated ancillary works need to be drawn from any waterways and used, a permit would be required from the NSW Department of Natural Resources (DNR). In addition, the Regional Environmental Advisor, Hunter Region would be advised of the location and methodology in which water would be drawn.

Should it be required to construct any weirs or dams or undertake structural flood mitigation works, a licence would be required from the DNR under Part 2 of the *Water Act 1912*.

Any diversion of water for the purposes of the Proposal or any ancillary works would also need to be licensed under the *Water Act 1912*.

It should however be noted that at any time after the completion of writing this REF that the above sections of the *Water Act 1912* may be superseded by the *Water Management Act 2000*. Therefore, any new or additional requirements due to changes in legislation would need to be addressed.

**Rivers and Foreshores Improvement Act, 1948**

The *Rivers and Foreshores Improvement Act 1948* is regulated by DNR, Department of Commerce, and Waterways Authority. The Act is relevant where there is the making of an excavation or removing of material on land that is, or is within 40m from, the bank, shore, or bed of a river, lake, coastal lagoon or lagoon. Section 22H(1) exempts the RTA from the requirement to obtain a permit. DNR, Department of Commerce, and Waterways Authority can however direct the RTA to carry out remedial work if they are satisfied that work:

- Has or is likely to damage or detrimentally affect land that is, or is within 40m from, the bank, shore or bed of a river, lake, coastal lake or lagoon; or
- Has or is likely to change the course of a river, lake, coastal lake or lagoon.

It should, however, be noted that at any time after the completion of writing this REF that the above sections of the *Rivers and Foreshore Improvement Act, 1948* may be superseded by the *Water Management Act 2000*. Therefore, any new or additional requirements due to changes in legislation would need to be addressed.

**Water Management Act, 2000**

This Act may apply to the Proposal where it supersedes the *Water Act, 1912* and the *Rivers and Foreshores Improvement Act, 1948*. In particular, it is relevant to constructing or removing drainage works, or constructing or modifying flood works. The provisions of the *Water Management Act* are progressively being introduced, however Schedule 7 that would repeal the *Water Act 1912* is yet to be gazetted, and therefore the *Water Act 1912* still applies. The application of this Act should be further investigated before the commencement of works.

**Protection of the Environment Operations Act, 1997**

Under this Act, should an activity involve the pollution of waters, as defined under the Act such as any chemical, biological, physical change to existing water quality (i.e. turbidity, release of untreated wastewater) an Environment Protection Licence would be sought from DEC under the *PoEO Act*. In addition the Act relates to any pollution of the environment through noise, air and waste. The Act also provides for the licensing of certain scheduled
activities. The Proposal would likely be a scheduled activity under the Act (Highway/Tollway Construction) and as such an Environment Protection Licence would be required.

The Act also obliges the Contractor and the RTA to notify DEC when a “pollution incident” occurs that causes or threatens “material harm” to the environment.

**NSW Fisheries Management Act, 1994**

The Minister for Fisheries would be notified of any proposed dredging or reclamation works associated with the Proposal in accordance with **Section 199** of the *Fisheries Management Act, 1994*. Section 199 states, ‘A public authority must, before it carries out or authorises the carrying out of any such works, give the Minister for Fisheries written notice of the proposed works, and consider any matters raised by the Minister concerning the proposed work within 28 days after giving notice’.

Such works may include, but are not limited to:

- The construction of temporary crossings/sidetracks, bridges, and creek diversions;
- Dredging/boring in the bed of a creek for the placement of pylon, piers, abutments etc;
- The deposition of fill for the construction of a working pad in a watercourse and for works associated with construction and replacing pylons and bridge abutments (NSW Fisheries, 2003); and
- The construction and use of a cofferdam.

A permit is required from NSW Fisheries to temporarily or permanently block fish passage under **Section 219** of the Act. Such blockages may include silt fencing across waterways for sediment and erosion control and bunding and dewatering works during the construction of crossings (NSW Fisheries, 2003).

In addition, the FM Act through the Fish Habitat Protection Plan No. 1, requires public authorities, including local government and state authorities to notify the Minister for Fisheries of any Proposal to remove or relocate woody debris.

It is uncertain which if any of these activities would be carried out as part of the Proposal, as this would be decided upon during the detailed design phase of the proposal, when further consideration of the NSW Fisheries and the FM Act requirements would be made.
10 Summary of Environmental Effects

10.1 Beneficial Effects

The Proposal would have a generally moderate impact on the environment. The expected benefits associated with the Proposal include:

- Providing a continuation of the Newcastle Inner City Bypass and facilitating the relief of a heavily congested section of the state road network;
- Contributing to provided access between the developing western parts of Newcastle, the Regional Produce Markets and the Port of Newcastle;
- Improving road safety for all road users;
- Provision for cyclists; and
- Improving access to the wider road network.

10.2 Adverse Effects

The Proposal is likely to result in some adverse effects which would include:

- Increased potential for erosion and sedimentation during construction;
- Potential exposure of acid sulfate soils during bridge piling works;
- Potential loss of secondary habitat for the Green & Golden Bell Frog;
- A reduction in visual amenity experienced by residents of local area;
- A temporary reduction in water quality of the locality by increasing turbidity and sedimentation and a potential for change in the chemical and physical parameters of the water;
- A temporary reduction in local air quality during construction due to dust emissions from unconsolidated imported fill material;
- New and increased noise source for local residents largely during construction, but also to an extent during operation; and
- Changed traffic conditions and minor delays during construction.
11 Consideration of Environmental Factors

11.1 Clause 228(2) Factors (NSW Legislation)

The factors which need to be taken into account when considering the environmental impact of an activity are listed in Clause 228(2) of the Environmental Planning and Assessment Regulation 2000. Those factors have been addressed in Table 11-1 below to ensure that the likely impacts of the proposed activities on the natural and built environment are fully considered.

Table 11-1: Compliance with Clause 228(2) of the EP&A Regulation 2000.

<table>
<thead>
<tr>
<th>Clause 228(2) Factors</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Any environmental impact on a community?</td>
<td></td>
</tr>
<tr>
<td>The local community and wider region would substantially benefit by improved road safety. Travel times would be reduced and the Proposal would contribute to the road network upgrade in the region. Also the road would have a dedicated pedestrian and cycle footway making this form of transport more attractive and safer for the local community.</td>
<td>Long term +ve</td>
</tr>
<tr>
<td>Short-term negative impacts potentially include traffic delays, increased dust and construction noise emissions. Impacts would be minimised through the implementation of controls and measures described in Section 9 of this REF.</td>
<td>Short term –ve</td>
</tr>
<tr>
<td>With the adoption of appropriate noise attenuation measures, noise impacts from the operation of the Proposal would likely cause minor negative impacts to the community.</td>
<td>Minor -ve</td>
</tr>
<tr>
<td>b) Any transformation of a locality?</td>
<td></td>
</tr>
<tr>
<td>The Proposal would introduce new features into the locality, being a new road within an historic road reserve. It would also include the removal of vegetation, and introduce some sections of noise walls. These features have the potential to impact on the existing visual landscape and alter the main viewsheds of the area.</td>
<td>Long term minor –ve</td>
</tr>
<tr>
<td>However the design of the Proposal would incorporate urban design principles to reflect the existing scenic qualities of the area and safeguards in Section 9 of this REF would ensure that potential impacts are minimised.</td>
<td>Long term +ve</td>
</tr>
<tr>
<td>c) Any environmental impact on the ecosystem of the locality?</td>
<td></td>
</tr>
<tr>
<td>The Proposal would result in some ecological impacts as described in Section 8.6 of this report. The Proposal involves major construction works within an environmentally sensitive floodplain. It would also involve the removal of some vegetation, and the potential disturbance of local fauna populations including some listed as threatened under both State and Federal legislation. Clearing associated with the Proposal would result in loss of habitat for common native fauna.</td>
<td>Long term -ve</td>
</tr>
<tr>
<td>Although such impacts may occur, it is not anticipated that the Proposal would result in any significant or adverse impacts on the ecosystem of study area.</td>
<td></td>
</tr>
<tr>
<td>Clause 228(2) Factors</td>
<td>Impact</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
</tr>
<tr>
<td><strong>d)</strong> Any reduction of the aesthetics, recreational, scientific or other environmental quality or value of a locality?</td>
<td>Short term -ve</td>
</tr>
<tr>
<td>The Proposal would temporarily impact on the aesthetics of surrounding as a result of construction works, and through the introduction of a new and substantial component of road infrastructure. However, these would be minimised through the implementation of safeguards outlined in Section 9.</td>
<td>Long term +ve</td>
</tr>
<tr>
<td>It is expected that in the long-term the urban design treatments proposed within this REF would produce a visually attractive element to the locality.</td>
<td></td>
</tr>
<tr>
<td><strong>e)</strong> Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present generations?</td>
<td>Long term minor -ve</td>
</tr>
<tr>
<td>The Proposal would result in a substantial change to the locality, with the introduction of new road infrastructure. However, the presence of existing features such as the rail line, roads, radio mast and power lines are an indicator of the general capacity of this landscape to accommodate further change. In this respect, and in consideration of the safeguards outlined in Section 9.1, impacts are likely to be minimal.</td>
<td></td>
</tr>
<tr>
<td><strong>f)</strong> Any impact on habitat of any protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?</td>
<td>Minor -ve</td>
</tr>
<tr>
<td>Impacts associated with the Proposal in regard to habitat have been described Section 8.6. No potentially significant impacts have been identified by the assessment and it is considered that the Proposal would have a minor ecological impact.</td>
<td></td>
</tr>
<tr>
<td><strong>g)</strong> Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?</td>
<td>Nil</td>
</tr>
<tr>
<td>No species would be endangered as a result of the Proposal, although the habitats and feeding resources of native fauna species would be impacted as a result of construction of the Proposal.</td>
<td></td>
</tr>
<tr>
<td><strong>h)</strong> Any long-term effects on the environment?</td>
<td>Long-term Positive</td>
</tr>
<tr>
<td>In the long term, the Proposal would provide improved transport links for the local regional networks.</td>
<td>Minor -ve</td>
</tr>
<tr>
<td>The Proposal would result in a loss of habitat for native fauna species and also involve some minor adverse impacts on endangered ecological communities and some threatened species, as outlined in Section 9 of Appendix E. These impacts have been assessed as minor.</td>
<td></td>
</tr>
<tr>
<td><strong>i)</strong> Any degradation of the quality of the environment?</td>
<td>Short term -ve</td>
</tr>
<tr>
<td>There is potential for minor short term degradation of the local environment in terms of noise, dust, increased traffic on local roads, water quality and soil erosion and spillage of dangerous materials.</td>
<td></td>
</tr>
<tr>
<td>Clause 228(2) Factors</td>
<td>Impact</td>
</tr>
<tr>
<td>-----------------------</td>
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</tr>
<tr>
<td>Safeguards outlined in section 9 of this REF would ensure that impacts are limited to minor, short-term impacts.</td>
<td>Long term Nil</td>
</tr>
<tr>
<td><strong>j) Any risk to the safety of the environment?</strong></td>
<td>Short-term Negative, Long-term Nil</td>
</tr>
<tr>
<td>There is the potential risk to the environment from spillage of dangerous materials during construction of the Proposal. Implementation of the mitigation measures contained in Section 9 of this REF would ensure that potential environmental risks are minimised.</td>
<td></td>
</tr>
<tr>
<td><strong>k) Any reduction in the range of beneficial uses of the environment?</strong></td>
<td>Short term Negative</td>
</tr>
<tr>
<td>Generally speaking, there would be no reduction in the range of beneficial uses of the existing environment resulting from the Proposal. The Proposal would be constructed on a historically created road reserve and during the construction phase particularly some land uses within the area might have reduced beneficial uses, however these are expected to be minor.</td>
<td></td>
</tr>
<tr>
<td><strong>l) Any pollution of the environment?</strong></td>
<td>Short-term Negative, Long-term Nil</td>
</tr>
<tr>
<td>There is some potential for short term negative impacts during Construction, in particular the decrease in water quality as a result of the works adjacent to Ironbark Creek, the decrease in air quality through the creation of dust, and the increase in noise during the construction phase. However the mitigation measures documented in Section 9 of this REF would ensure that this potential is effectively managed.</td>
<td></td>
</tr>
<tr>
<td><strong>m) Any environmental problems associated with the disposal of waste?</strong></td>
<td>Short term Negative</td>
</tr>
<tr>
<td>No difficulties with the disposal of waste are anticipated as a result of the Proposal. The Proposal would result in an overall cut to fill deficit requiring the importation of substantial quantities of suitable fill material. However, during bridge piling and permanent drainage works there would be the potential to disturb acid sulfate soil. Should the Proposal result in the disturbance of acid sulfate soil material, measures detailed in Section 8.2 of this REF, which may include treatment on-site or off-site disposal, would be implemented to reduce the risk to the environment. In addition, a small amount of green waste would be produced as a result of the Proposal. Measures detailed in Section 8.12 of this REF would be implemented as part of the Proposal that would include the reuse of suitable vegetation in landscaping works on-site, or disposal at an appropriately licensed land fill facility, as required.</td>
<td></td>
</tr>
<tr>
<td><strong>n) Any increased demands on resources, natural or otherwise which are, or are likely to become, in short supply?</strong></td>
<td>Nil</td>
</tr>
<tr>
<td>No increased demand on resources, natural or otherwise which are, or are likely to become, in short supply would be anticipated as a result of the Proposal.</td>
<td></td>
</tr>
</tbody>
</table>
### Clause 228(2) Factors

<table>
<thead>
<tr>
<th>o) Any cumulative environmental effect with other existing or likely future activities?</th>
<th>Impact</th>
</tr>
</thead>
</table>
| Activities associated with the Proposal and activities associated with other developments have the potential to accumulatively degrade the environmental qualities of the region. These cumulative environmental effects include the removal of native vegetation, effects from construction works (air and water quality) and a reduction in the general amenity of the area.  

However, the Proposal would contribute to positive cumulative environmental effects for the region including a safer and more efficient road transport network; and provide further opportunities for economic growth, both directly and indirectly. | Negative | Long term +ve |
### 11.2 EPBC Act 1999 Factors (Commonwealth Legislation)

The EPBC Act requires that the following matters of National Environmental Significance (NES) be considered.

**Figure 11-1:** Compliance with Commonwealth EPBC Act requirements.

<table>
<thead>
<tr>
<th>EPBC Act Factors</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a) Any environmental impact on World Heritage property?</strong></td>
<td>Nil</td>
</tr>
<tr>
<td>There would be no impact on any World Heritage property as a result of the Proposal.</td>
<td></td>
</tr>
<tr>
<td><strong>b) Any environmental impact on National Heritage places?</strong></td>
<td>Short term -ve</td>
</tr>
<tr>
<td>During construction and operation there is the potential for runoff from the Proposal to discharge pollutants in the form of sediment and other water pollutants into Shortland Wetlands (one component of the Hunter Estuary Wetland). The control of runoff from the Proposal site during construction and operation would be implemented through the safeguards and design features detailed in Section 7.4, 8.2 and 8.4 of this REF.</td>
<td>Long term Nil</td>
</tr>
<tr>
<td><strong>c) Any environmental impact on wetlands of international importance?</strong></td>
<td>Nil</td>
</tr>
<tr>
<td>No Ramsar listed wetlands occur within the study area however Shortland Wetlands forms part of the Hunter Estuary Wetlands (a declared Ramsar wetland) and occurs in close proximity to the study area. As indicated in Table 9.3.5 of Appendix E, the Proposal is unlikely to have a significant impact on the adjacent Shortland Wetlands, as the SWMP would safeguard against potential impacts on physio-chemical status of the wetland, in addition to maintaining current hydrological regimes.</td>
<td></td>
</tr>
<tr>
<td><strong>d) Any environmental impact on Commonwealth listed threatened species or ecological communities?</strong></td>
<td>Nil</td>
</tr>
<tr>
<td>Two vulnerable fauna species were assessed under guidelines pursuant to the EPBC Act. The Proposal is unlikely to have any environmental impact on the Grey-headed Flying Fox. The impact of the Proposal on the breeding population of Green and Golden Bell Frogs known to occur within the 2HD swamp is unclear. Despite numerous field assessments, it was not possible to determine if and how this species utilises the study area, or the extent of habitat. The population is relatively isolated from other populations known to occur in the local area, and therefore the Proposal could contribute to some or all of the relevant factors outlined under the EPBC Act as potentially causing a significant impact. Further assessment would aim to clarify this.</td>
<td>At present the impact is likely to be moderately adverse.</td>
</tr>
<tr>
<td><strong>e) Any environmental impact on Commonwealth listed migratory species?</strong></td>
<td>Short term -ve</td>
</tr>
<tr>
<td>An assessment of the EPBC register and the assessment of habitats contained on the study area identified 15 migratory species of conservation significance that are likely to utilise habitat contained within the study area.</td>
<td></td>
</tr>
</tbody>
</table>
### EPBC Act Factors

<table>
<thead>
<tr>
<th>EPBC Act Factors</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of potential impacts to these migratory species concluded that the proposed action is unlikely to seriously disrupt the lifecycle of any migratory species considered in this report. The overall impacts of the Proposal are considered to be short-term and relatively minor.</td>
<td>Long term Nil</td>
</tr>
<tr>
<td><strong>f)</strong> Does any part of the Proposal involve nuclear action?</td>
<td>Nil</td>
</tr>
<tr>
<td>No part of the Proposal would involve a nuclear action</td>
<td></td>
</tr>
<tr>
<td><strong>g)</strong> Any environmental impact on a Commonwealth Marine area?</td>
<td>Nil</td>
</tr>
<tr>
<td>There would be no impact on any Commonwealth Marine areas as a result of the Proposal.</td>
<td></td>
</tr>
<tr>
<td><strong>In addition: Any impact on Commonwealth Land?</strong></td>
<td>Nil</td>
</tr>
<tr>
<td>Commonwealth land would not be affected, indirectly or directly, as a result of the Proposal.</td>
<td></td>
</tr>
</tbody>
</table>
12 Certification

This Review of Environmental Factors provides a true and fair review of the Proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the Proposal.

Jesse Death  
Environmental Officer  
Date: 7/06/06

I have examined this Review of Environmental Factors and the certification by Jesse Death and accept the Review of Environmental Factors on behalf of the RTA.

Philip Davidson  
Project Manager  
Date: 7/06/06
13 References


Australian Rail Track Corporation Limited, 2005. Sandgate Rail Grade Separation Environmental Impact Statement. GHD.

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